Presentation to
Hon'ble Expert Appraisal Committee of MoEF&CC (T)
for
Environmental Clearance (EC)

Expansion of (8x135MW) 1080 MW TPP by adding 1x660 MW Lignite based Super Critical Power Plant

at

Village- Bhadresh, Tehsil & District- Barmer

RAJASTHAN

29TH JANUARY 2016

Applicant

Raj WestPower Limited

Barmer, Rajasthan

EIA Consultant

EMTRC Consultants Pvt. Ltd.

(NABET Accredited (41)

Project Brief

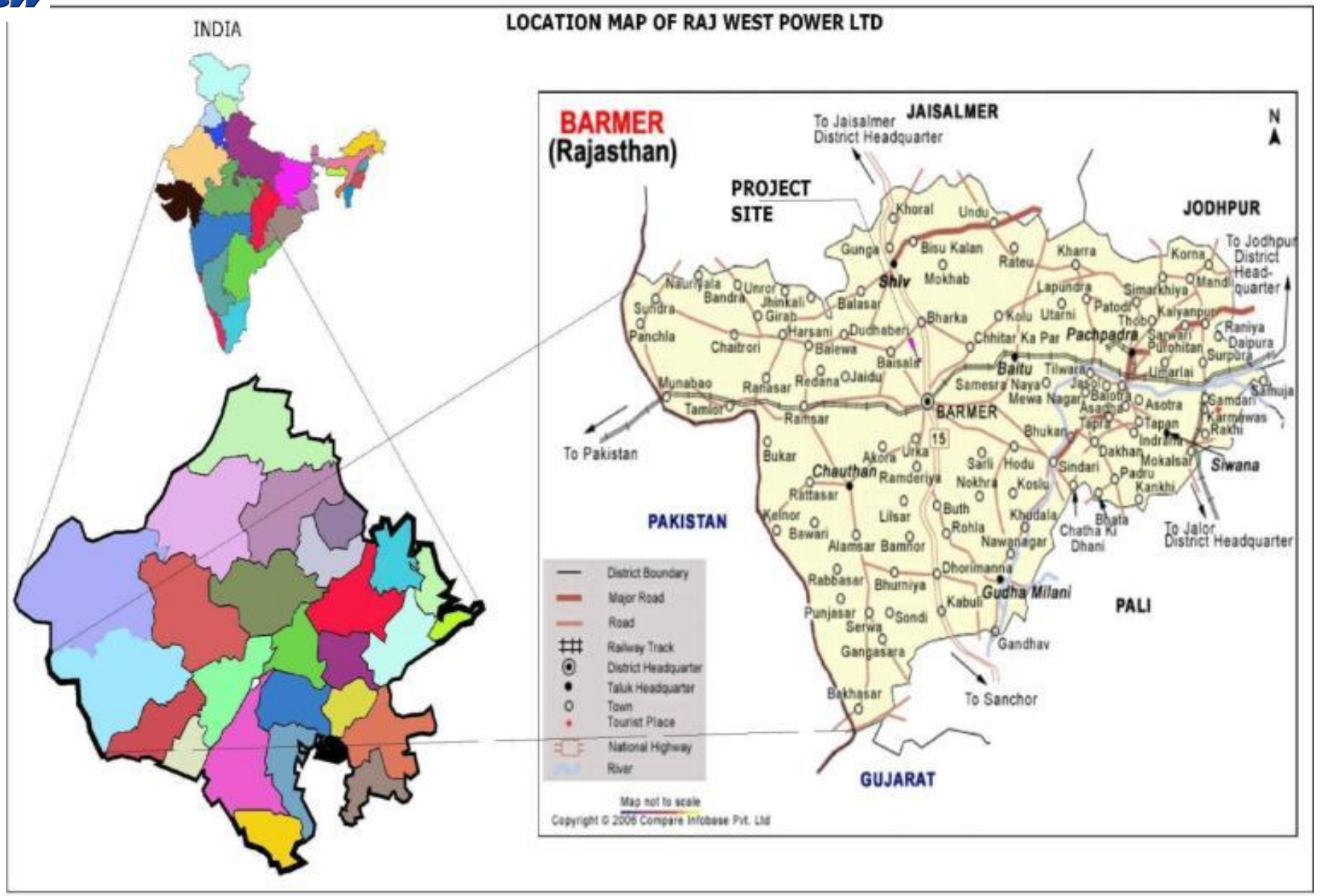
- **Raj WestPower Limited (RWPL) proposes to expand its existing 1080 MW (8x135 MW) power plant by adding 1x 660 MW power plant.**

- **Jalipa and Kapurdi Lignite mines of Barmer Lignite Mine Corp Ltd (BLMCL – JV with Rajasthan Govt) is located close to the plant site. Lignite (7 MTPA) is supplied using belt conveyors.**

- **EC for existing 1080 MW power plant issued by MOEF on 20th July 2007 (amendment dated 19th Nov, 2009). Regional Office of MOEF has submitted the Compliance Report. Existing plant is 100% compliant.**

- **TOR for expansion unit (1x660 MW) issued by MOEF on 25-2-2105. Public Hearing washeld on 23-7-2015**

- **The expansion will be done inside the existing premises (1186 acres). Entire land is in the possession of RWPL.**


INDIA
LOCATION MAP OF RAJ WEST POWER LTD
BARMER
(Rajasthan)
PROJECT
SITE
To Jaisalmer
District Headquarter
JAISALMER
JODHPUR
To Jodhpur
District
Head-
quarter
N
To Pakistan
PAKISTAN
BARMER
PACHPADRA
BAITU
SIWANA
PALI
GUJARAT
To Jalor
District Headquarter
To Sanchor
Gudha Milani
Chauthan
Shiv
Khoral
Undu
Gunga
Bisu Kalan
Rateu
Kharra
Korna
Mandli
Mokhab
Lapundra
Simarkhiya
Patodi
Kalyanpur
Thobo
Sarwari
Purohitan
Raniya
Daipura
Surpura
Umarlai
Kolu
Utarni
Bharka
Chhitar Ka Par
Balasar
Jhinkali
Bandra
Naurpala
Unror
Girab
Sundra
Panchla
Harsani
Dudhaberi
Balewa
Chaitrori
Baisali
Munabao
Ranasar
Redana
Jaidu
Tamlor
Ramsar
Samesra
Naya
Mewa Nagar
Tihwara
Jasol
Balotra
Asadha
Asotra
Tapra
Tapan
Indrana
Samdari
Karmawas
Rakhi
Samuja
Bhukan
Dakhan
Mokalsar
Padru
Kankhi
Sindari
Sarli
Hodu
Koslu
Nokhra
Ramderiya
Akora
Urka
15
Bukar
Rattasar
Kelnor
Bawari
Alamsar
Bamnor
Lilsar
Buth
Rohla
Khudala
Nawanagar
Chatha Ki
Dhani
Bhata
Dhorimanna
Rabbasar
Bhurniya
Punjasar
Sondi
Serwa
Kabuli
Gandhav
Gangasara
Bakhasar
District Boundary
Major Road
Road
Railway Track
District Headquarter
Taluk Headquarter
Town
Tourist Place
National Highway
River
Map not to scale
Copyright © 2006 Compare Infobase Pvt. Ltd

ToR -1

A detailed study of wildlife in the study area shall be carried out and if any scheduled species are found a conservation plan shall be submitted dully approved by the state government

REPLY:-

- **No reserve or protected forest, national park, wild life sanctuary, biosphere reserve is present within10 km area of the site. No Scheduled species of fauna was reported in the study area**

- **RWPL also engaged ZSI to conduct wildlife survey in the 10 km area around project site.**

- **Based on ZSI study, if any conservation plan is required, fund shall be deposited to State Forest Dept.**

ToR -2 & 3

The proposed project shall be given a unique name in consonance with name submitted to other Government Department etc. for its better identification and reference.

REPLY:- This is an expansion project to be established inside the existing plant boundary

Vision document specifying prospective long term plan of the project shall be formulated and submitted.

REPLY:-

RAJ WESTPOWER LIMITED has already established its infrastructure for water, ash pond, switchyard, road for its operating 8 x 135 MW power plant at Bhadresh in Barmer district Rajasthan. The expansion project of 1x660 MW will have interlink with existing 8 x 135 MW project for optimize use of resources and facilities.

Vision Statement

"To sustain and improve the legacy of Raj WestPower Ltd as a leading environment friendly corporate citizen with a proven track record of affirmative action in its project."

ToR - 4 & 5

Latest compliance report duly certified by Regional Office of MoEF for the conditions stipulated in the environmental and CRZ clearances of the previous phase(s) for the expansion projects shall be submitted

REPLY:- Compliance report obtained, 100% compliance noted by RO

The project proponent needs to identify minimum three potential sites based on environmental, ecological and economic considerations, and choose one appropriate site having minimum impacts on ecology and environment. A detailed comparison of the sites in this regard shall be submitted.

REPLY:- Being expansion project, not applicable.

ToR CONDITION-6

Executive summary of the project indicating relevant details along with recent photographs of the proposed site(s) shall be provided. Response to the issues raised during Public hearing and to the written representations (if any), along with a time bound Action Plan and budgetary allocations to address the same, shall be provided in a tabular form, against each action proposed.

1	Technology	Supercritical Unit (1x660 MW)
2	Turbine Cycle Heat Rate:	1850 Kcal/Kwh
3	Steam Generator Efficiency	79.3%
4	Cycle of Concentration in CT	10
5	ESP outlet emission level	30 mg/Nm^3 (1 field out of service)
6	Stack Height	275 m
7	FGD Unit & Outlet emission level of SO_2, NOx and Hg	FGD to keep SO_2 & NOx emission below 100 mg/Nm^3, Hg below 0.03 mg/Nm^3
8	FGD Sludge ($CaSO_4$)	450 TPD. 100% sold to cement plants
9	Ash Utilization & Disposal	Dry Collection and given for cement & brick making MOU made cement plants. Unutilized ash disposed as HCSD\'

PROJECT DETAILS

Total Land	**1186 Acres (Available with RWPL)** **Area of Existing Power Plant = 966 Acres** **Land for Proposed Expansion = 220 Acres**
Land Status	**Entire land is in the possession of RWPL**
Latitude	**25^0 53' 28" to 25^0 53' 31" N**
Longitude	**71^0 19' 13" to 71^0 19' 51" E**
Elevation (MSL)	**195 m**
Water Requirement	**Existing units - 3570 m^3/hr (35 Cusecs)** **Proposed unit - 1830 m^3/hr (18 Cusec)**
Water Permission	**Agreement with IGNP / GoR to draw 80 Cusecs water from Indira Gandhi Nahar Pariyojana for 30 years**
Project Cost (660 MW)	**Rs. 4916 Crores**

Lignite Requirement	**7.0 MTPA (1080 MW)** **4.75 MTPA (660 MW)**
Source	**Nearby Jalipa and Kapurdi Lignite Mines of Barmer Lignite Mining Company Ltd**
Lignite transportation	**Belt Conveyor**
EC of Lignite Mines	**EC of Jalipa Mines- 6 MTPA** **EC of Kapurdi Mines – 3.75 MTPA** **BLMCL will apply for 2 MTPA expansion of Jalipa Mines**
Nearest Railway Station/Town	**Barmer, 25 Km by road**
Nearest Airport	**Jodhpur– 200 Km**
National Park, Wildlife Sanctuary, Protected & Reserve Forests	**None in 10 km radius of site**
River & Streams	**None in 10 km radius**

View of existing plant

View of existing plant

Site for Expansion

View of existing plant

LOCATION OF EXPANSION UNIT SITE & ASH POND

PUBLIC HEARING

Public Hearing was conducted on 23.07.2015 at Govt. School, Bhadresh. Chief Executive Officer – Barmer Jila Parishad presided over the PH and officials of RSPCB assisted the CEO. 163 people signed the attendance register, 24 people spoke during the hearing.

S.N	Comments / Issues / Suggestion	Response of RWPL	Action Plan
1	Many speakers appreciated the CSR work being done by JSW, namely opening of schools, made 350 toilets, carrying out skill development program for village women, making overhead tank and supplying drinking water by pipeline to Bhadresh village, making road, doing plantation, organizing health camps, etc	--	RWPL is committed to continue the CSR activities
2.	Employment to local people who are diploma holders	Employment in plant will be given as per requirement	The diploma holders will be considered for job during plant construction

PUBLIC HEARING

SN	Comments / Issues	Response of JSW	Action Plan
3.	Provide technical support in Agriculture and Animal Husbandry practices	Agreed	Agriculture support activities with Krishi Vigyan Kendra in 110 Ha already in place. Veterinary camps will be organized. Fund allotted in CSR budget.
4.	Provide streetlight in roads	Agreed for DIZ villages	Work started with solar lights
5.	Construction of Toilets in nearby villages	Already 352 toilets have been constructed in surrounding villages	200 additional toilets under construction
6.	Provide one CBSE school in the area	Already adopted 14 Govt. Schools. 22 UDAAN playschools for children have been constructed.	RWPL will discuss with District Authorities and then decided to support the CBSE school
7	Open library and sports club	Presently sports activities are supported in surrounding villages.	Fund has been allotted in CSR budget to continue this activity

PUBLIC HEARING

S N	Comments / Issues	Response of RWPL	Action Plan
8	Extend the CSR activity to other villages like Kapurdi, Rohili, Bhadka, Jalipa, Chuli, Vishala.	Agreed	RWPL will extend the CSR activities to other areas mainly Chuli and Vishala from 2016-17 and then go to other villages
9	Sawairam Prajapat, Bhadresh: He met with an accident inside plant. He want permanent employment in RWPL	--	His application will be considered as per requirement, his skill and experience
10	Bhawani Singh, Chuli I have 3000 bighas of reserved Oran land where RWPL can develop greenbelt	--	RWPL is already developing greenbelt on village land in consultation with Panchayat Bhadresh. RWPL has agreed to give saplings and technical assistance free of cost to Bhawani ji for his 3000 bighas

ToR -7

Harnessing solar power within the premises of the plant particularly at available roof tops and other available areas shall be formulated and for expansion projects, status of implementation shall be submitted

REPLY:-

- **RWPL provided Solar Panel & Solar Heater at Township & Guest House**
- **RWPL has started Solar streetlight work in 4 DIZ villages**
- **RWPL initiated action of installing Solar Panel on TG building roof and solar street lights inside the plant.**
- **RWPL will install Solar Panel on new TG building roof.**

ToR -8

The geographical coordinates of the proposed site (plant boundary), including location of ash pond along with topo sheet (1:50,000 scale) and IRS satellite map of the area, shall be submitted. Elevation of plant site and ash pond with respect to HFL of water body/ nallah/ river and high tide level from the sea shall be specified

The latitude and longitude of the plant boundary is shown below:

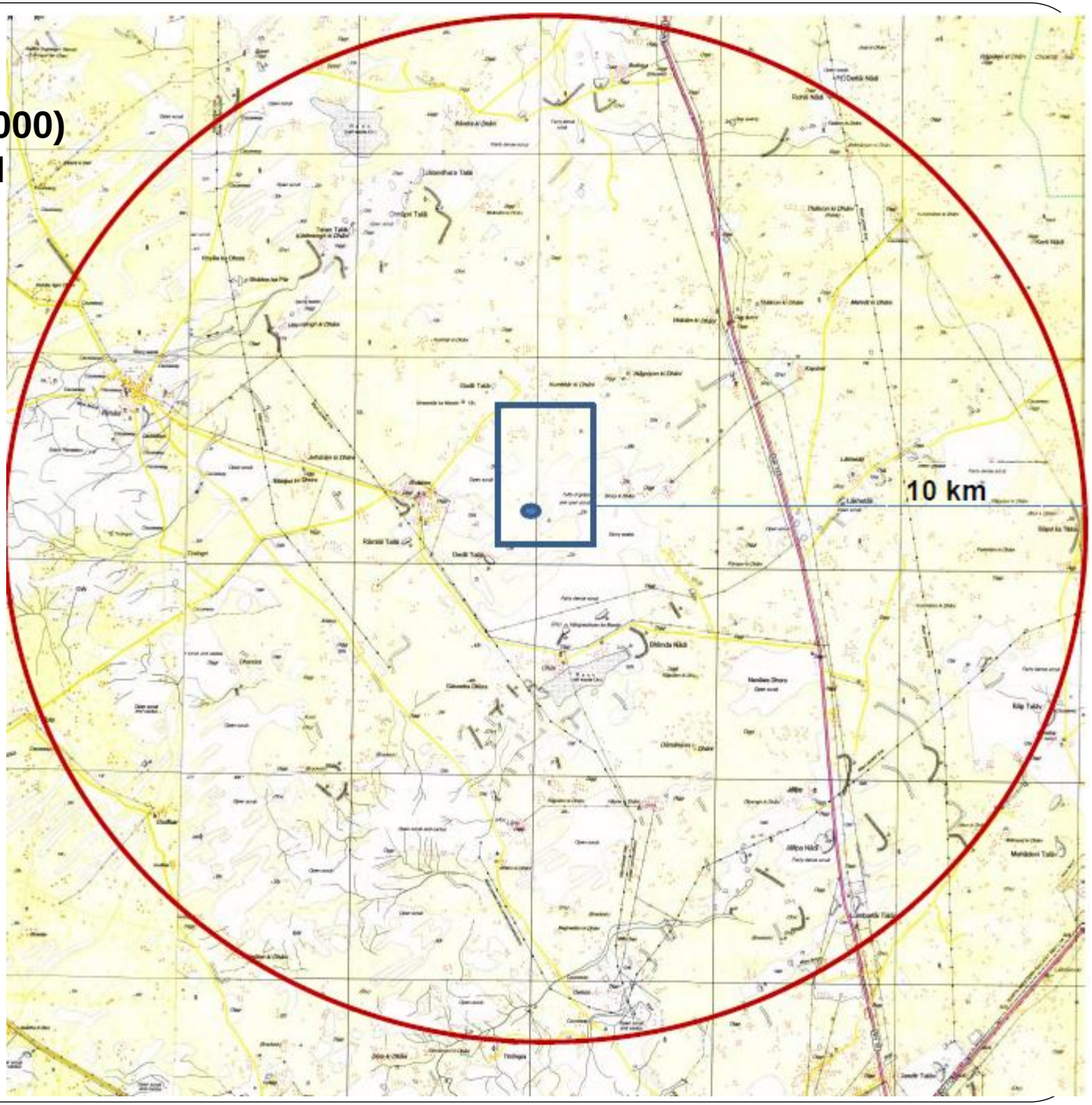
710 19'14" E 250 54' 22" N
710 20' 26" E 250 54' 22" N
710 20' 26" E 250 53' 05" N
710 19' 14" E 250 53' 05" N

Ash pond is located inside the plant premises.

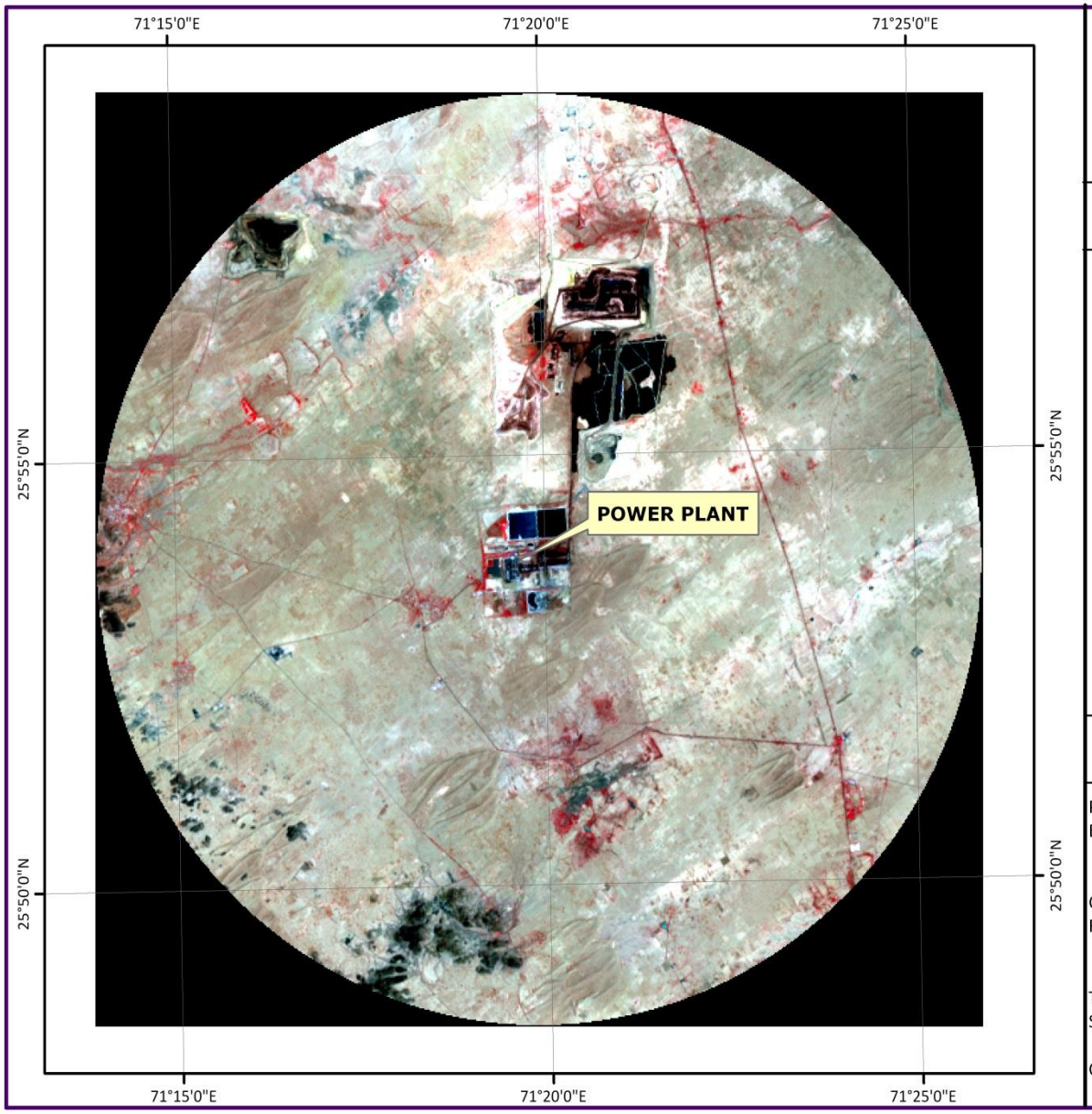
Elevation of plant site and ash pond – 197 m

No river or stream is present in the 10 km radius of the study area

TOPOSHEET (1 : 50000) OF SITE & 10 KM STUDY AREA



SATELLITE IMAGERY OF SITE & STUDY AREA



N
W E
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SATELLITE IMAGERY

Satellite Imagery Source Details

Satellite	IRS P6
Sensor	LISS III
Path/Row	91/53
Date of Pass	24 Apr 2015

0 1.25 2.5 5 Kilometers

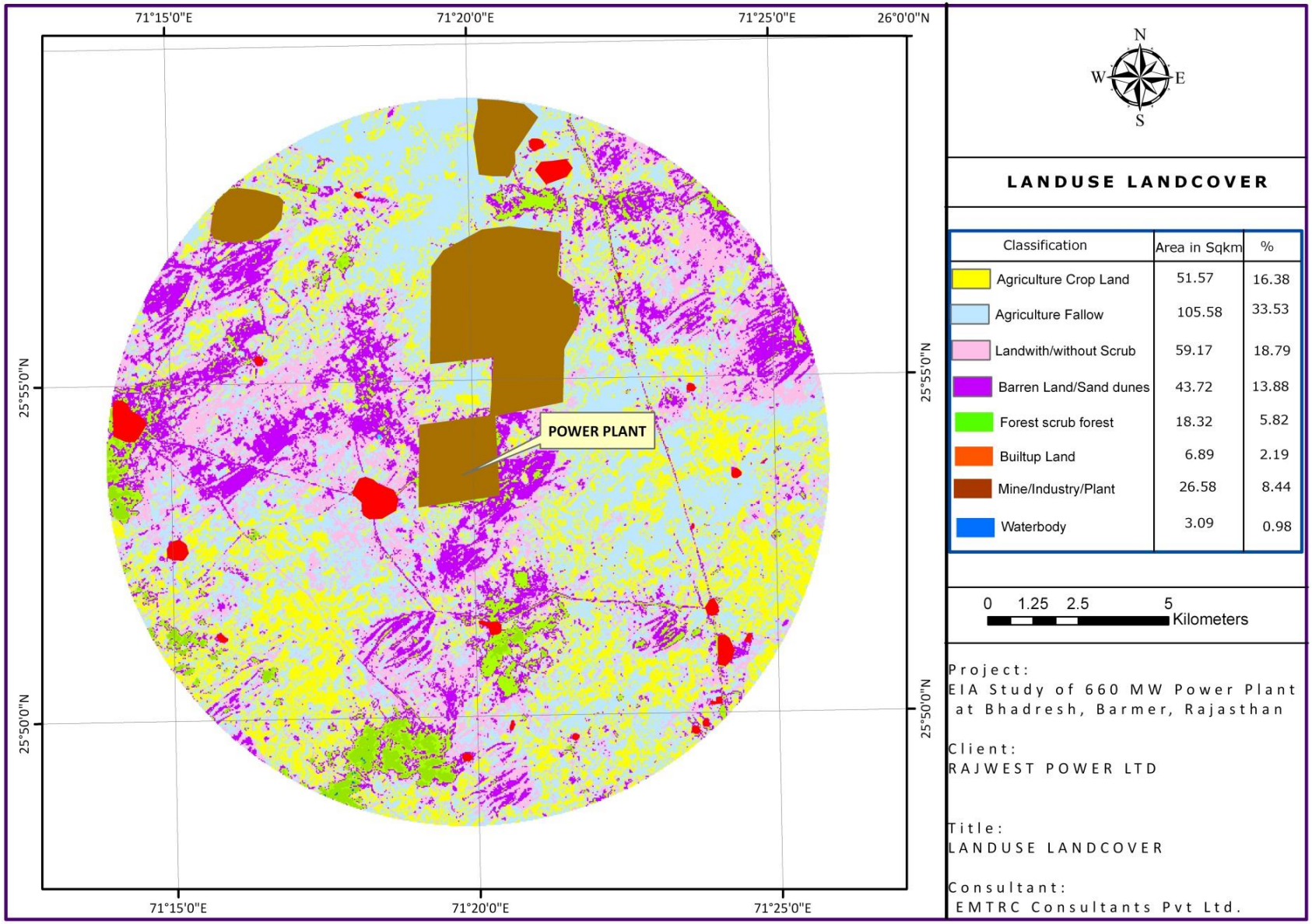
Project:
EIA Study of 660 MW Power Plant at Bhadresh, Barmer, Rajasthan

Client:
RAJWEST POWER LTD

Title:
SATELLITE IMAGERY

Consultant:
EMTRC Consultants Pvt Ltd.

LULC OF SITE & STUDY AREA



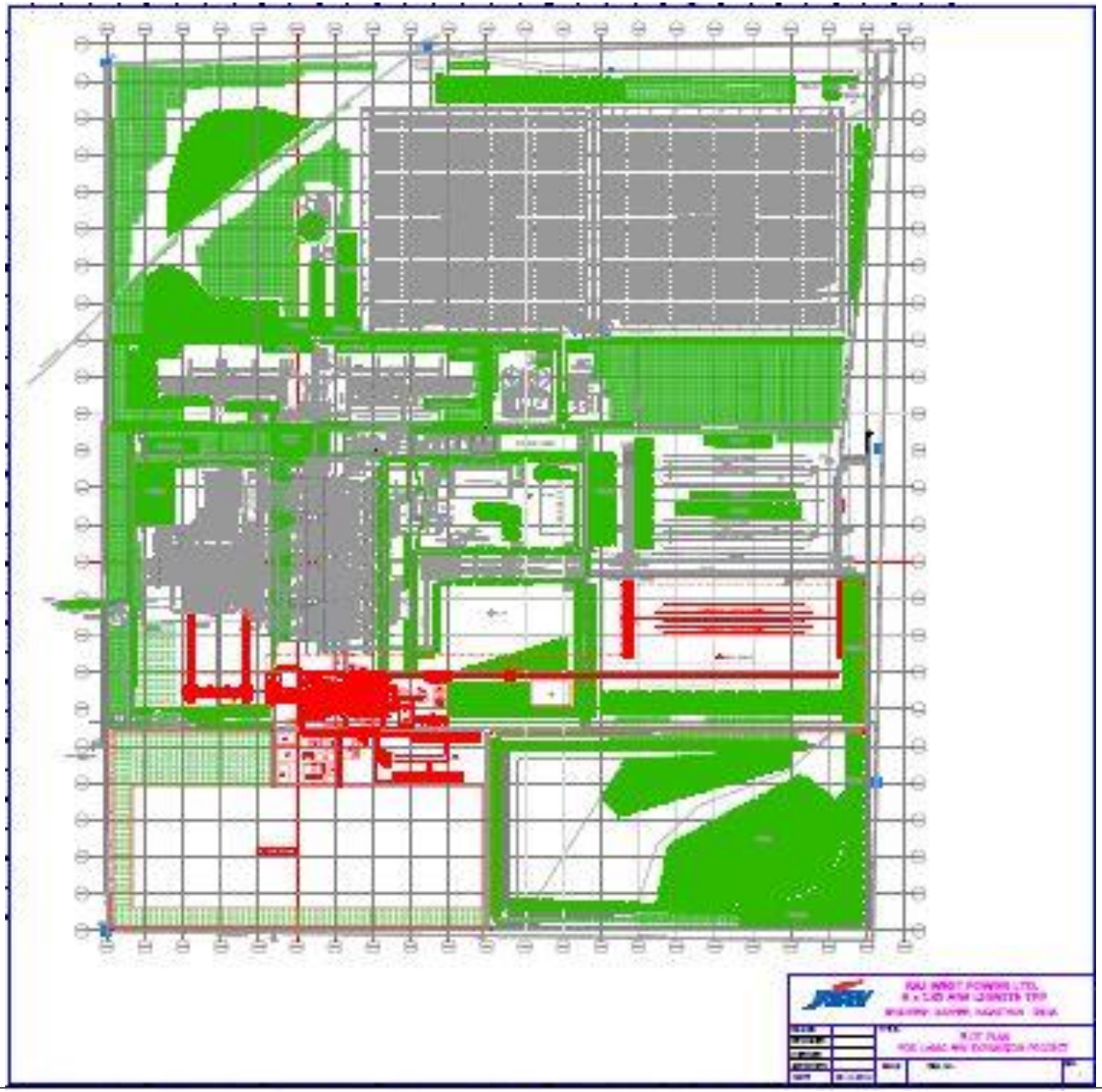
ToR -9

Layout plan indicating break-up of plant area, ash pond, green belt, infrastructure, roads etc. shall be provided.

Existing Project	Land Area
Existing Plant 1080 MW , BOP, Water Reservoir, WTP, Lignite Handling Yard, Ash Dyke, Switch Yard.	611
Greenbelt, 33% area	355
Vacant Land for Future Expansion	220
Total Land Available with RWPL	1186 acres

Expansion Project	Land Area
Main Plant	7.64
Lignite Handling Plant	36.3
Switchyard	6.9
Ash Disposal Area	98.0
Balance of Plant & Miscellaneous	70.6
Total Area of expansion 1 x 660 MW unit	220 acres

PLANT LAYOUT



ToR -10 & 11

Land requirement for the project shall be optimized and in any case not more than what has been specified by CEA from time to time. Item wise break up of land requirement shall be provided.

REPLY:-

Specific Land Use – 1740 MW plant in 1186 acres; 0.68 acres / MW

Present land use (including land class/ kism) as per the revenue records and State Government records of the proposed site, shall be furnished. Information on land to be acquired including coal transportation system, laying pipeline, ROW, transmission lines etc. shall be specifically submitted. Status of land acquisition and litigation should be provided.

REPLY:-

- **Present landuse of 1186 acres: Industrial Land.**
- **This is an expansion project to be located inside the existing plant boundary.**
- **Lignite transportation system, water pipeline, transmission lines etc. already developed and in the possession of RWPL.**
- **There is no land related litigation pending in any court of law or tribunal**

ToR -12, 13 & 14

If the project involves forest land, details of application, including date of application, area applied for, and application registration number, for diversion under FCA and its status should be provided along with copies of relevant documents.

REPLY:- The project does not involve Forest Land

The land acquisition and R&R scheme with a time bound Action Plan should be formulated and addressed in the EIA Report.

REPLY:- This is an expansion project and No additional land is required.

Entire land is in the possession of RWPL. R&R not applicable.

Satellite imagery and authenticated topo sheet indicating drainage, cropping pattern, water bodies (wetland, river system, stream, nallahs, ponds, etc.), location of nearest habitation (villages), creeks, mangroves, rivers, reservoirs, etc. in the study area shall be provided.

REPLY:- Already covered in slide 18-19.

ToR -15 & 16

Location of any National Park, Sanctuary, Elephant/ Tiger Reserve (existing as well as proposed), migratory routes/ wildlife corridor, if any, within 10 km, of the project site shall be specified and marked on the map duly authenticated by the Chief Wildlife Warden of the State or an officer authorized by him.

REPLY:- No National Park, Wildlife Sanctuary, Elephant/ Tiger Reserve (existing as well as proposed), Migratory routes/ wildlife corridor exists within 10 km, of the project site.

Topography of the study area supported by toposheet on 1:50,000 scale of survey of India, along with a large scale map preferably of 1:25,000 scale and the specific information whether the site requires any filling shall be provided. In that case, details of filling, quantity of required fill material, its source, transportation, etc. shall be submitted.

REPLY:- Already covered.

The 220 acres site is flat, no filling or cutting is required.

ToR -17

A detailed study on land use pattern in the study area shall be carried out including identification of common property resources (such as grazing and community land, water resources, etc.) available and Action Plan for its protection and management shall be formulated. If acquisition of grazing land is involved, it shall be ensured that an equal area of grazing land is acquired and developed and detailed plan submitted.

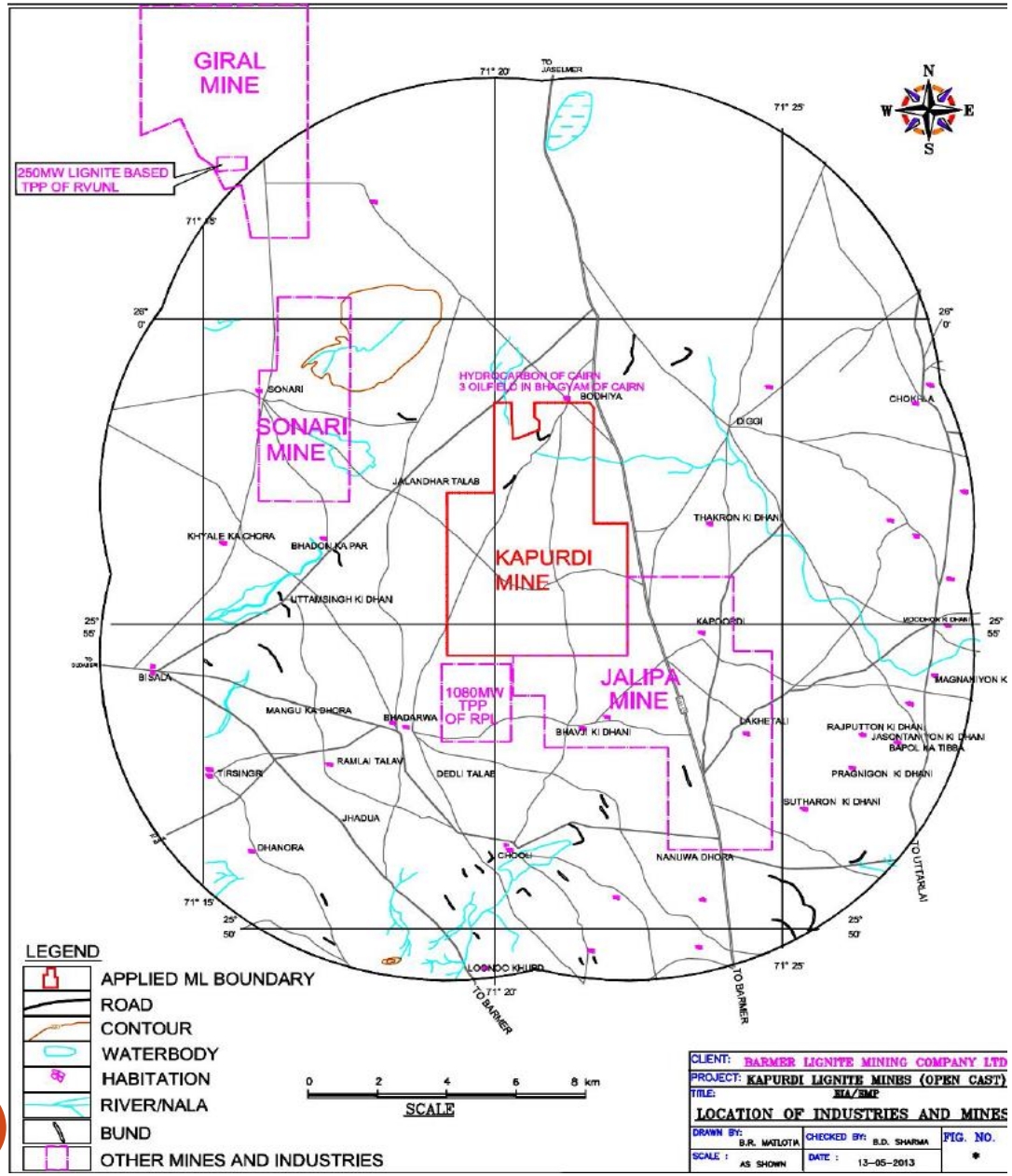
REPLY:

- **Landuse of the villages of study area has been obtained from revenue records. Agriculture fallow land and wasteland dominate the study area**

- **This is an expansion project to be located inside the existing plant boundary. Extra land is not required.**

- **RWPL will develop gauchar land, in consultation with local villagers / panchayat from its CSR Fund, because the local people are mostly dependent on Cattle / Animal Husbandry for livelihood. Rs.20 lakhs has been earmarked for fulfillment of local community needs towards socio-economic development**

ToR -18



A mineralogical map of the proposed site (including soil type) and information (if available) that the site is not located on potentially mineable mineral deposit shall be submitted.

REPLY:-

This is an expansion unit, located within the existing premises. The soil is sandy in nature.

ToR -19

Details of fly ash utilization plan as per latest fly ash utilization notification of GOI along with firm agreements/ MoU with contracting parties including other usages etc. shall be submitted. The plan shall include disposal method/ mechanism of bottom ash.

REPLY:-

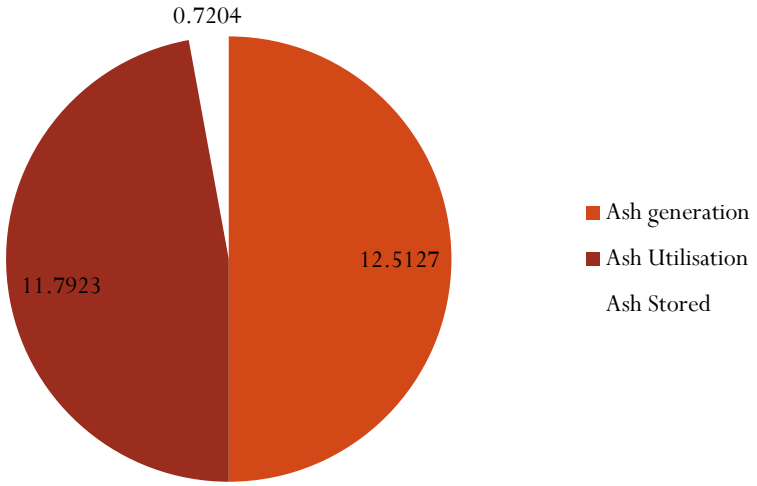
Flyash generation from expansion project: 576000 TPA

Bottom ash generation from expansion project: 144000 TPA

MOU for ash utilization done with Binani Cement Ltd and JK Lakshmi Cement Ltd (for 600000 TPA). Other MOU will be done soon.

Unutilized ash will be disposed as HCSD in ash pond.

Flyash Generation & Utilization in Existing Project



MOU Flyash Utilization

JK LAKSHMI CEMENT Ltd.

JKLCL/WP/2014-15/ 12th March, 2015

M/s Raj WestPower Ltd
Village/Post Bhadresh
BARMER(RAJ) – 344 001

Kind Attn : Sh.Madhu Sudan Sharma

Sub : Lifting of Fly Ash from your Upcoming New Power Plant at Bhadresh, Barmer.

Dear Sir,

With reference to your E-mail dated 12th March, 2015 on subject. Our Management has shown keen interest & ready to lift free of cost Fly Ash at a rate of 3 to 4 Lacs MT per annum from your Upcoming New Power Plant located at Bhadresh, Barker, Rajasthan on long term tie up basis for manufacturing of Portland Pozzolana Cement..

Further we hereby confirm having taking total responsibility while transporting fly ash from your works to our works. During transportation we will take care of all the Environmental/Social / Legal aspects or any kind of penalty compliances, if arises.

Thanking you,

Yours faithfully,
For JK LAKSHMI CEMENT LTD

(D.C.Jhanwar)
Sr.General Manager (Purchase)

JK LAKSHMI | JK LAKSHMIPLAST | JK LAKSHMI

ANNEXURE II – MOU FOR ASH UTILIZATION

BINANI CEMENT LTD.
CORPORATE OFFICE :
Mercantile Chambers, Gr. Floor, 12, J.N. Heredia Marg,
Ballard Estate, Mumbai - 400 001. India
Tel. : +91-22-2263 4932 Dir. : 2263 4942/4943
Fax : +91-22-3026 3087 Email : krishan.goenka@binani.net

Binani
BRAJ BINANI GROUP

BCL/LOG-CORP/ 689 **11th March, 2015**

Without Prejudice

To,
M/s Raj West Power Ltd,
Village & Post: Bhadresh,
Barmer: 344001
Rajasthan.

Sub: Lifting & Transportation of Fly Ash from Silo on FOC basis from the power plant of M/s Raj West Power Ltd.

Dear Sir,

We understand that your company is setting up a 1x660 MW lignite based power plant near Barmer which would generate Fly ash. We would like to express our serious interest to tie-up with you on long term basis for lifting of around 2,00,000 MTPA dry fly from your said plant & use it at our Cement plant for production of Portland Pozzalana Cement.

Thanking you,

Yours sincerely,
For Binani Cement Limited.

Yeshwant Yadav
Vice President
(Logistics)

ToR -20

The water requirement shall be optimized (by adopting measures such as dry fly ash and dry bottom ash disposal system, air cooled condenser, concept of zero discharge) and in any case not more than that stipulated by CEA from time to time, to be submitted along with details of source of water and water balance diagram. Details of water balance shall take into account reuse and re-circulation of effluents.

REPLY:- Water Requirement - 43920 m^3/day (1830 m^3/h).

Specific water consumption: 2.77 m^3/MWh considering 100% ash disposal in HCSD form. If RWPL utilizes at least 25% ash, then the specific water consumption would come down to below 2.5 m^3/MWh

- **COC adopted: 10**
- **Ash Collection: Dry form and used for cement and brick making**
- **Ash disposal: High Concentration Slurry Disposal**
- **The plant is based on 100% water reuse system. Effluent zero discharge concept will be adopted for the proposed plant using suitable effluent treatment plant, sludge thickener and RO system.**

ToR -20

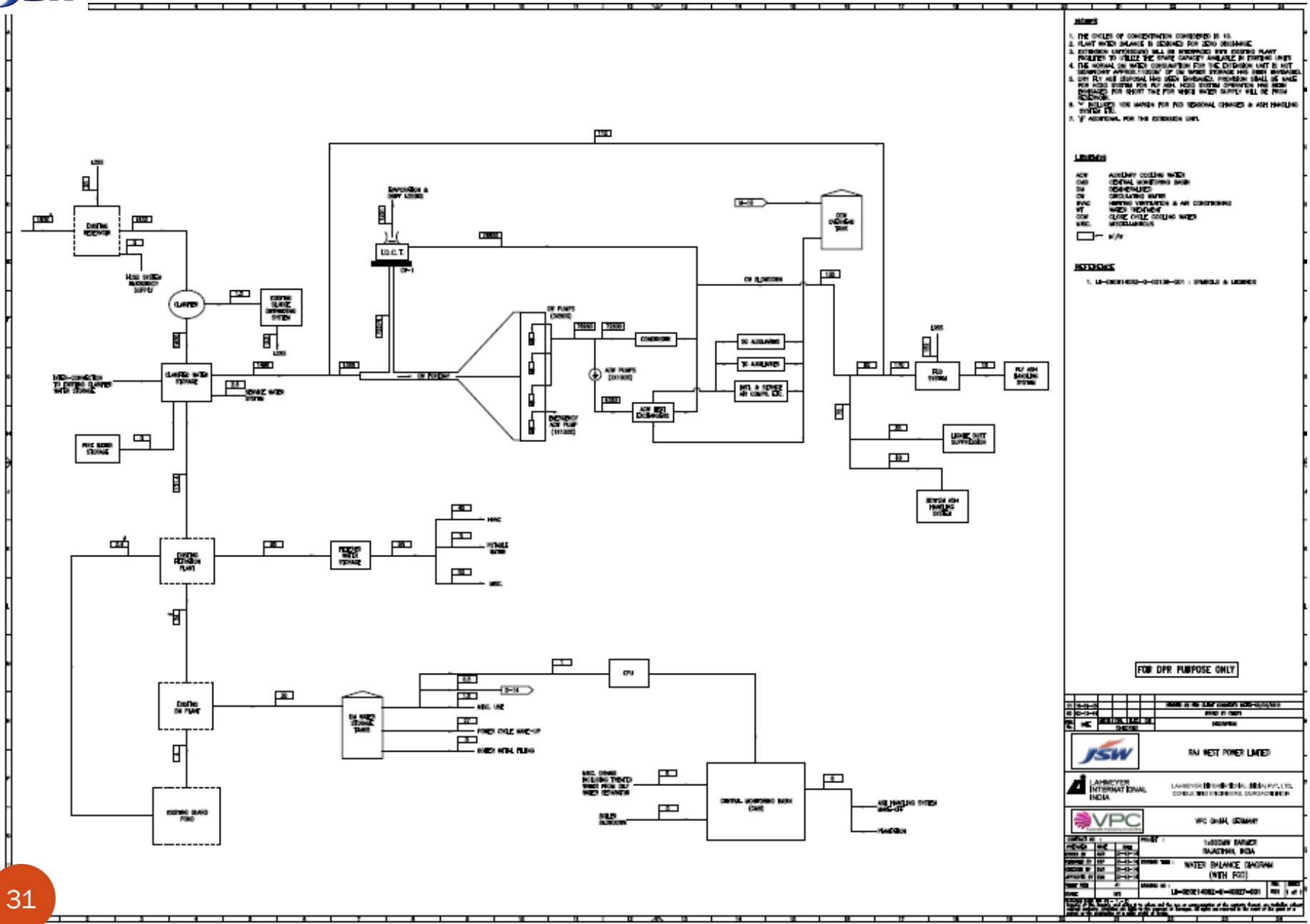
The water requirement shall be optimized (by adopting measures such as dry fly ash and dry bottom ash disposal system, air cooled condenser, concept of zero discharge) and in any case not more than that stipulated by CEA from time to time, to be submitted along with details of source of water and water balance diagram. Details of water balance shall take into account reuse and re-circulation of effluents.

Water Requirement for 1x660 MW

Item	Requirement m^3/day	Requirement m^3/hour
CW make up for Condenser Cooling / Auxiliary Cooling Water	35904	1496
DM Water requirement	720	30
Service water for Plant, HVAC makeup water, Ash handling, Lignite handling, Domestic use, etc.	2496	104
Water required for Flue Gas Desulphurization	4800	200
Total Clarified water required	43920	1830

100% wastewater shall be treated & reused (Zero Discharge Concept)

WATER FLOW DIAGRAM



ToR -21 & 22

Water body/ nallah (if any) passing across the site should not be disturbed as far as possible. In case any nallah/ drain is proposed to be diverted, it shall be ensured that the diversion does not disturb the natural drainage pattern of the area. Details of diversion required shall be furnished duly approved by the concerned department of the state.

REPLY-: No nalla is passing through the project site.

It shall also be ensured that a minimum of 500 m distance of plant boundary is kept from the HFL of river system/ streams, etc. and the boundary of site should also be located 500 m away from railway track and National Highways.

REPLY:- No river / stream exists around project site.

The nearest highway is 3 km away & nearest rail line is about 12-13 km away

ToR -23

Hydro-geological study of the area shall be carried out through an institute/ organization of repute to assess the impact on ground and surface water regimes. Specific mitigation measures shall be spelt out and time bound Action Plan for its implementation shall be submitted.

REPLY:

- **No river or stream exist in the 10 km area around site.**
- **Ground water is scarce and occurs 50-100 m depth and is brackish.**
- **The groundwater cannot be used for potable purpose.**
- **No groundwater will be used in the project.**
- **Soil is sandy and have thick bentonite layer.**
- **Rainfall is scanty. 100% rain water goes into the sand**
- **Ash disposal in the form of HCSD. Ash pond lined using HDPE**
- **Rainwater storage implemented**
- **The project will not create insignificant impact on ground and surface water regimes.**

ToR -24

Detailed studies on the impacts of the ecology including fisheries of the river/ estuary/ sea due to the proposed withdrawal of water/ discharge of treated wastewater into the river/ sea etc. shall be carried out and submitted along with the EIA Report. In case of requirement of marine impact assessment study, the location of intake and outfall shall be clearly specified along with depth of water drawl and discharge into open sea.

REPLY:-

- **No river or lake exists in the study area. Wastewater shall be treated and recycled and reused. No waste water goes out of plant premises.**

- **Agreement made with IGNP / GoR to draw 80 Cusecs water from Indira Gandhi Nahar Pariyojana for 30 years. Presently 35 cusecs water is used. After expansion 53 cusecs water will be used.**

- **RWPL is taking its portion of industrial water. IGNP has allocated sufficient water for drinking and irrigation purpose of the region. Monthly reviews are held by IGNP and water allocation to various users prioritized.**

ToR -25

Source of water and its sustainability even in lean season shall be provided along with details of ecological impacts arising out of withdrawal of water and taking into account inter-state shares (if any). Information on other competing sources downstream of the proposed project and commitment regarding availability of requisite quantity of water from the Competent Authority shall be provided along with letter/ document stating firm allocation of water.

REPLY:-

- **RWPL has permission to draw 80 cusecs water from IGNP.**
- **RWPL draws 35 cusecs water from Mohangarh, 184 km away and bring it to plant site by underground Pipeline.**
- **RWPL made water reservoir inside plant premises to store 5 MCM water (60 days storage).**
- **Water evaporation from reservoir is reduced by spraying evapo-suppressant on water surface.**

I.G.N.P Water Disbursal Schedule (20-Jan 2016 to 06-Feb 2016)

For Industry Use		
Sr.No	Name of Project	Cussec
1	Suratgarh Power Plant	75
2	Barsinghsir Thermal Plant	25
3	M/S V.S.Lignite Power Project Pvt. Ltd. Gudha	05
4	M/S Godawari Greeze Energy Limited (For Solar Power Project)	1.6
5	Ramgarh Gas Power Project	25
6	Giral Project	24
7	Rajwest Project	40
	Total	195.6
For Drinking Water & Irrigation		
Sr.No		Cussec
1	Rawatsir Branch	55
2	Bikaner City	76
3	Nagor Lift	30
4	Jodhpur Lift	195
5	Rural Area	70
6	Jaisalmer City	30
7	Pokran Falsund Drinking Water Scheme	30
8	Badmer Lift Project	16
	Total	502
For Storage		
Sr.No		Cussec
1	Kawarsen Water Canal	148
2	Sursagar Lake (Bikaner City)	02
3	Sahwa Water Canal	58.46
	Total	208.46
Water Losses		
Sr.No		Cussec
1	Harike Head to Biradhwal Head	530
2	Biradhwal Head to RD 620	200
3	IGNP of RD 620 to 1254	255
4	Below IGMN Burji 1254	115
	Total	1100
GRAND TOTAL		2006

ToR -26

Detailed plan for rain water harvesting and its proposed utilization in the plant shall be furnished.

REPLY:-

- **Rain water harvesting for recharging of ground water is not feasible in the region because of sandy soil followed by bentonite layer and ground water occurring at a depth beyond 50 - 100 m.**

- **Project site receives 280 mm of average annual rain fall.**

- **Rain water will be collected through sloped rooftops with the rainwater being guided into the down comers through traps on RCC roofs or gutters connected to sloped roofs of a steel structure.**

- **The down comers shall be connected to chambers from where pipes or surface garland drains carry the water through a filter media into an underground storage tank.**

- **Underground storage tank will be constructed in the proposed project area.**

ToR -27

Feasibility of near zero discharge concepts shall be critically examined and its details submitted

REPLY:-

- **Effluent zero discharge concept is adopted in existing plant**
- **Same concept will be adopted during expansion**
- **DM Plant Regeneration wastewater shall be neutralised and brought to CMB at CETP. Other wastewater (Boiler, Turbone, Washings, etc will be passed through Oil Water Separator and brought to CMB at ETP. ETP has chemical dosing, clarifier, centrifuge. The treated water is of reusable quality.**
- **CT blowdown shall be used for making lime slurry in FGD plant, dust suppression in Lignite handling yard, and bottom ash system make-up.**
- **FGD sludge shall be treated in Centrifuge and water recycled.**
- **Domestic Sewage is treated in STP. Treated sewage is reused for gardening purpose.**

ToR – 28 & 29

Optimization of Cycles of Concentrations (COC) along with other water conservation measures in the project shall be specified.

REPLY:- COC of 10 has been considered for this project.

Plan for recirculation of ash pond water and its implementation shall be submitted.

REPLY:- HCSD system shall be adopted. This system does not generate any wastewater for recirculation..

ToR -30

Detailed plan for conducting monitoring of water quality regularly with proper maintenance of records shall be formulated. Detail of methodology and identification of monitoring points (between the plant and drainage in the direction of flow of surface/ ground water) shall be submitted. It shall be ensured that parameter to be monitored also include heavy metals. A provision for long term monitoring of ground water table using Piezometer shall be incorporated in EIA, particularly from the study area.

REPLY:-

- **Wastewater quality from inlet and outlet ETP and STP is tested daily for parameters prescribed by RSPCB.**
- **Inlet water quality of INGP is also tested daily.**
- **Installing Piezometer is not feasible because the groundwater depth at site is beyond 100 m.**

ToR -31

Socio-economic study of the study area comprising of 10 km from the plant site shall be carried out by a reputed institute/ agency which shall consist of detail assessment of the impact on livelihood of local communities.

REPLY-: The study area is sparsely populated.

40 villages (17 revenue villages) fall in the 10 km area of project site.

Total Households – 7917 Total population - 44193

Male to Female ratio - 824 females / 1000 males

The site is located about 15 km northwest of Barmer town and surrounded by following villages: Bhadresh - 1.2 km on west side, Kumbharki Dhani - 0.5 km on north side, Nagniyon ki Dhani - 1.5 km on northeast side, Bhurji ki Dhani - 1 km on east side, Chuli - 3 km on south side and Bishala - 5 km.

The lignite mines is located on the east and north side of the plant site.

Literacy rate is 47.5%, 60% males and 35% females are illiterate.

15% people belong to SC and 6.5% are ST. 10 villages have no SC and 21 villages have no ST population

ToR -31

- Major portion is occupied by dry open grassland interspersed with thorny bushes.
- Poor people depend on goat, sheep and donkey for their livelihood 50% domestic animals are small ruminants like goat and sheep.
- Cow, buffalo and camel is kept by rich people (15%).
- Animal husbandry being major occupation, overgrazing is rampant.
- During rainy season people grow bajra, mung, moth, til, ragi, maize and gaur (sustenance agriculture).
- Villagers use traditional methods of rainwater harvesting; in small kutcha tunka, kui, khadeen (small pond).
- Prosopis cineraria (Khejri) is grown for fodder and wood.
- Biomass is used as primary fuel for cooking by all poor people.

ToR -32

Action plan for identification of local employable youth for training in skills, relevant to the project, for eventual employment in the project itself shall be formulated and numbers specified during construction and operation phases of the project.

REPLY:-

- **130 local women trained in tailoring course. Average income of trained women is 2000-2500 per month from local market. The products are purchased by RWPL and used among workers**
- **15 local villagers trained in carpentry and 10 as electrician. Their services are used in the plant.**
- **RWPL requires the services of about 120 skilled workers during the plant construction.**
- **The HR Department & CSR Cell has approached village Panchayat and told them about the requirement.**
- **Rolls of locally employable youth, who are willing to undergo training is under preparation.**
- **RWPL has tied up with the local ITI to train the local youths as electrician, carpenter, plumber, fitter, rigger, welder, etc. The trained people will be given job in RWPL project.**

ToR -33

If the area has tribal population it shall be ensured that the rights of tribals are well protected. The project proponent shall accordingly identify tribal issues under various provision of the law of the land.

REPLY:-

- **6.5% people of the study area are ST (2894 out of 44193).**
- **Out of 40 villages in the study area, 21 villages have no ST population**
- **ST people depend on goat, sheep and donkey for their livelihood**
- **RWPL has kept 10 Lakhs in CSR fund for imparting lifeskill related training and grooming of the SC and ST population, so that they can be interspersed with the mainstream population.**
- **Rs.20 lakhs has been earmarked for developing degraded forest including grassland.**

ToR - 34

A detailed CSR plan along with activities wise break up of financial commitment shall be prepared. CSR component shall be identified considering need based assessment study and Public Hearing issues. Sustainable income generating measures which can help in upliftment of poor section of society, which is consistent with the traditional skills of the people shall be identified. Separate budget for community development activities and income generating programmes shall be specified.

Caring

Corporate

Conquers

Community

Corporate Social Responsibility

Progress

RWPL, Barmer

Need based study have been conducted in surrounding villages :

- Water scarcity is the most vital issue.
- Lack of education facility, inadequate educational aids, desks, chairs, books, blackboards, computer, library, etc.
- Lack of industrial skilled labour in surrounding villages.
- Lack of basic health facility, inadequate beds and medicine, shortage of doctors and paramedical staff, no ambulance facility, no advanced healthcare facility.
- Sense of hygiene and sanitation is very poor among the village people.
- Nutritional status is poor among most of the people.
- Poor ventilation facility in the huts and houses of village people coupled with rampant use of biomass as cooking fuel, results in exposure to fine particulates.
- Basic infrastructure at village level is poorly developed.
- No fodder farms are available in the villages.
- Animal husbandry is poorly developed; veterinary hospitals are not available.
- Technical institutes do not exist at the Block Level.
- No vocational training center available, no computer institutes, no coaching centers.
- Yield of vegetables and milk is low, resulting in poor income of the villagers

Major Initiatives (2014-15)

- **Construction of 350000 liter capacity over head water tank at Bhadresh for providing drinking water to 3000 people of Bhadresh Gandhav, Bhadresh Punsiya, Kamoipura and Ishwarpura villages**

- **Adoption of 14 Govt. Schools in DIZ & 1 CHC in IIZ**
- **UDAAN play school for children - 22**
- **Medical camp for women - 488**
- **Screening of 652 students of 18 schools**
- **Constructed 350 toilets**

- **Formation of 8 SHGs and skill building**
- **Sewing centre for rural girls**
- **Massive plantation with tree guard**
- **Planting 3250 olive trees for farmers**
- **Agriculture support activities with KVK**
- **Sports promotional activities**

SOLAR STREET LIGHT AND ROAD

LIFE BEYOND DRAUGHT – DEVELOPEMNT of NADIES and BUNDS

ToR -35

While formulating CSR schemes it shall be ensured that an in-built monitoring mechanism for the schemes identified are in place and mechanism for conducting annual social audit from the nearest government institute of repute in the region shall be prepared. The project proponent shall time to time and dovetail the same with any government scheme(s). CSR details done in the past should be clearly spelt out in case of expansion projects.

Year	CSR expenses in Lacs INR
2006-07	26.89
2007-08	38.70
2008-09	62.77
2009-10	64.00
2010-11	50.96
2011-12	89.81
2012-13	149.73
2013-14	82.65
2014-15	208.48
Total	Rs. 774 Lakhs

Education

- Adoption of 14 Govt schools under PPP at our operational area.
- Upgradation of middle school to secondary school at Bhadresh.
- Financial assistance given to 27 local students for diploma in engineering and 3 students for NPTI course.
- Best teacher award function, rural scholarship awarded to 19 students.
- 20 local students have been trained in computer operation.
- Made class room, donated furniture, almirah in the secondary school at Bhadresh.
- Provided one teacher at secondary school, Bhadresh.
- Developed playground for sports activities in the school

Sustainable Livelihood

- 130 local women trained in tailoring course. Average income of trained women is 2000-2500 per month from local market.
- 15 local villagers trained in carpentry and 10 as electrician. Provided linkage with local market to provide regular orders to the trained villagers.
- Developed 35 Agors (Wells for water storage) at Bhadresh

Health

- Made available 1 Medical Officer, 2 Male Nurse and 1 Female Nurse in the villages to provide regular medical facility to local people
- Made availabile 2 Ambulances for transporting critical patients to Barmer/ Jodhpur
- Donated 1 Ambulance to Barmer District Hospital
- 25000 patients were treated on annual basis free of cost.
- Provide weekly facility of Obstetrics & Gynecology for the village women.
- Provided financial assistance to repair and renovate Govt Hospital at Bhadresh
- Made availabile medicines, medical equipment at the health facility at Bhadresh.
- Constriction of one additional room at Bhadresh sub centre health facility.

Sports

- Development of playground at Secondary school, Bhadresh
- Provided cricket kit to the youth club at Bhadresh village
- Provided carom to the adolescents club at Bhadresh village

Art & Culture

- Financial assistance for the celebration of Thar Mahotsav since 2007 onwards.
- Celebration of International Women's day, World Health Day, with the local people.
- Celebration of Independence and Republic Days in the local school.
- Drawing competitions organized at local schools.
- 5 days training given to 40 local children in traditional folk music.
- SANT ISHARDAS Temple development in consultation of Committee at Bhadresh

Budget earmarked for CSR activities during the current financial year (2015-16) is Rs. 5.24 Crores.

Name of activities is given below:

- **Formation of 8 Self Help Groups in collaboration with SURE in 4 revenue villages of Bhadresh Gram Panchayat and provided training to 113 members on SHG functions & operation for a sustainable income generation.**
- **Continuous sewing training to strengthen and uplift the community**
- **3250 olives planted in 5.39 hectares area of plant**
- **Crop productivity programme with the technical alliance of Krishi Vigyan Kendra, Barmer in 110 Hec. 50% growth has been recorded**
- **Constructed 350 toilets; Additional 200 are in progress.**
- **Regular medical camps organized for females and children. Screening and medico-counselling on female hygiene & reducing MMR & IMR.**

CSR Budget (2015-16)

	Activities	Budget (INR)
1	Improving Living Conditions	
1.1	Health Initiatives	2660000
1.2	Support to PHC adopted under CS-CSR Program	100000
1.3	Mobile medical van & medical team for health check up camp in village	2800000
1.4	Workshop & awareness activities on health, poverty, malnutrition, sanitation and other related prevailing issues, development of IEC material	100000
1.5	Support to Anganwari Centers, distribution of nutritional elements and Sanitary napkins for adolescent girls	200000
1.6	Assistance to PHC & construction of one room at Ishwarpura sub centre	1000000
1.7	Maintenance & operation of water supply	660000
1.8	Pipeline laying	3000000
	Sub Total	10520000

2	Education	
2.1	Support to adopted Govt. schools	750000
2.2	TIE (Theatre In Education-a programme of education by theatre)	500000
2.3	Additional teachers for schools	240000
2.4	Library at village	110000
2.5	Financial Assistance to poor villagers and widows	300000
2.6	UDAAN Play School	204000
2.7	Concept classes	120000
2.8	Education related training & workshop	100000
2.9	Livelihood & life skill training for rural youth and grooming of SC/ST	1000000
2.10	Scholarship for needy brilliant & meritorious students	500000
2.11	Support to educational and social awareness programmes for students and differently abled kids	700000
2.12	Distribution of rechargeable solar lamp to students	300000
2.13	Distribution of track suit, tiffin, bags & shoes, socks to students	400000
	Sub Total	5224000
3	Promoting Sustainable Livlihood	
3.1	Promotional activity for gender equality and empowerment by establishing enterprise centre Training for handicraft, capacity building of SHGs and other vocational training centres (Handicraft training- Applique, embroidery, mirror work) and tailoring centres.	2200000
3.2	Construction & development of multi purpose Vocational Training Centre	6000000
3.3	Budget for local community needs towards socio economic development	2000000
3.4	Prevention of early marriage, early pregnancy and female foeticide	150000
	Sub Total	10350000

.	**Addressing Environmental Issues**	
4.1	**Integration of farming activities and resource management for Thar zone (with the collaboration of NGO partner)**	**600000**
4.2	**Seminar on environment, natural resources and other subjects for mass awareness**	**100000**
4.3	**Watershed management - Life Beyond Drought (with the collaboration of NGO partner)**	**1500000**
4.4	**Distribution of smokeless chulha to reduce the air pollution exposure due to biomass burning in domestic kitchens**	**300000**
4.5	**Wildlife Conservation Fund [for faunal conservation namely desert cat, desert fox, monitor lizard, wolf, spiny tailed lizard] (providing fund to forest department for general animal welfare towards improving habitat/ living conditions, making water holes & adding nutritive food)**	**500000**
4.6	**Development of degraded forests around the plant in consultation with State Forest Department. Development of greenery in vacant land**	**2000000**
4.7	**Restoration of conventional water sources**	**3000000**
	Sub Total	**8000000**

5	Preserving Heritage	
5.1	Promotional activities for folk music, literature, dance, story telling Publication and showcasing the IEC material for national heritage and culture. Academy for conservation of Rajasthan's folk art, music and literature	2000000
5.2	Recording of PAD-PARAMPARA by Bhils of the surrounding villages and publication of FOLK SCIENCE, FOLK LITERATURE booklets on various subjects like Pug-mark reading, Folk science, Rural technology, Native history etc.	200000
	Sub Total	2200000
6	Promotion of Sports	
6.1	Promotion of sports (Infrastructure Development, providing Kit & Equipment to players on nearby villages)	1200000
	Sub Total	1200000

7	Rural Development Projects	
71	Construction of roads, construction of drainage, sanitation, installation of solar street lamps, improving ventilation in kitchens, development of MSW dumps, creation of blood banks and trauma centre	11900000
7.2	Road safety related activities, social & community training, IEC material, workshop, Lecture, orientation & other participative programmes	300000
	Sub Total	13100000
8	Swachh Bharat Mission	
8.1	Low cost toilets for community	2000000
8.2	Swachchh Bharat Abbhiyan & making public toilet	1000000
	Total	3000000
9	Training of Local Youth	
9.1	Honorarium for Teachers / Instructers (for training potential wekders, riggers, foreman, electrician, hospitality, housekeeping, etc)	506000
9.2	Purchase of training aids and equipment for imparting hand-on training	100000
	Total	606000
Grand Total		52400000

RWPL is committed to spend 2% of its PAT every year for CSR activities.

CSR Audits are done by Company Auditors (External).

Implementation and Monitoring of CSR Activities

RWPL has created a CSR Cell under the direct control of General Manager..

The consultative CSR committee comprises following members:

a) District Magistrate, or his/her representative	**Chairman**
b) Panchayat members of affected villages	**Member**
c) Woman (social worker) from the affected area	**Member**
d) Representative of well known NGO in the area	**Member**
e) SDM of the area or his nominee	**Member**
f) Head of the CSR Cell, RWPL	**Member Secretary**

ToR -36

R&R plan, as applicable, shall be formulated wherein mechanism for protecting the rights and livelihood of the people in the region who are likely to be impacted, is taken into consideration. R&R plan shall be formulated after a detailed census of population based on socio-economic surveys who were dependent on land falling in the project, as well as, population who are dependent on land not owned by them.

REPLY:- No additional land will be acquired for the expansion project, hence not applicable

ToR CONDITION-37

Assessment of occupational health as endemic diseases of environmental origin shall be carried out and Action Plan to mitigate the same shall be prepared.

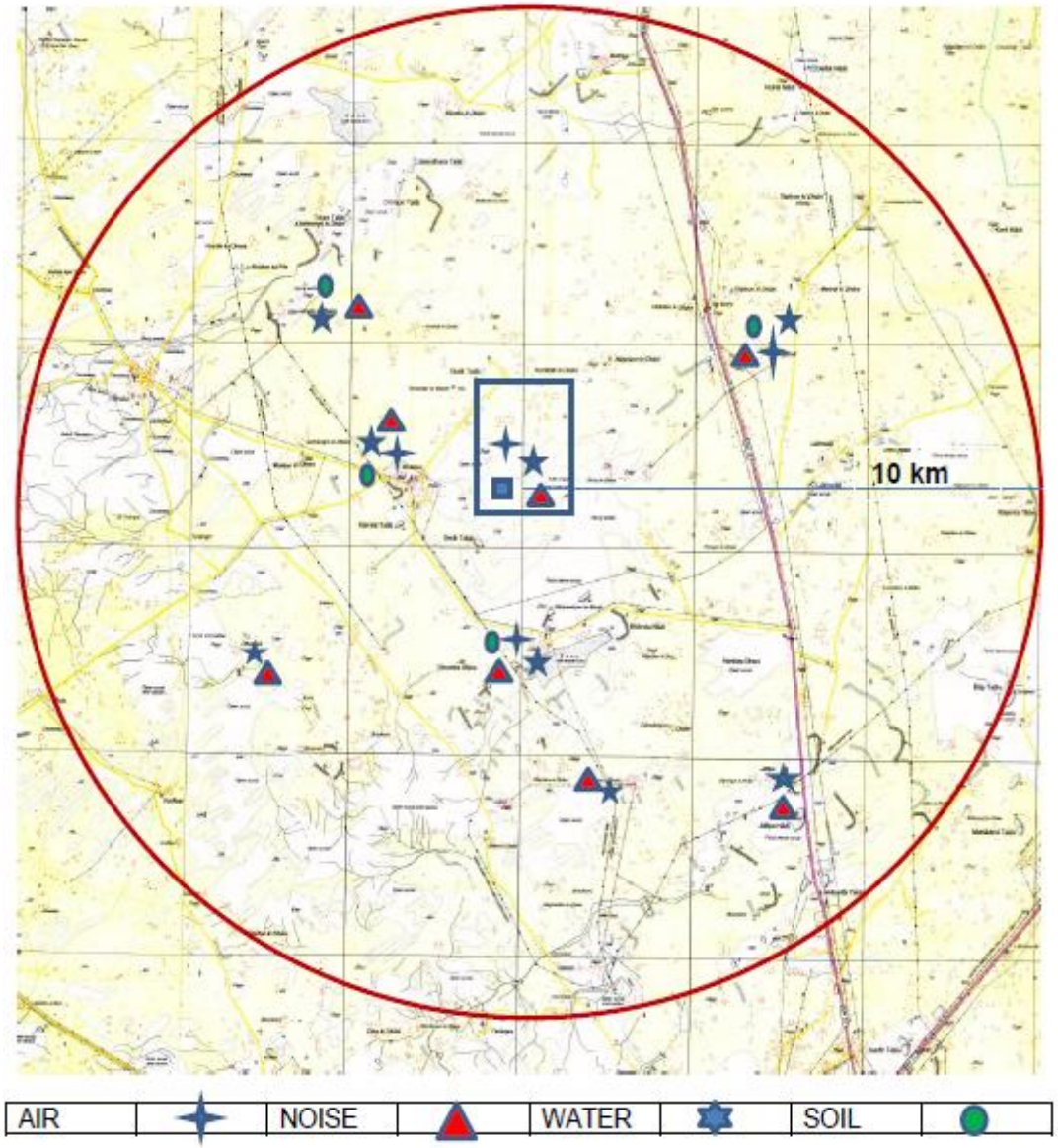
REPLY:-

- **Occupational Health Centre with qualified doctor and paramedical staff exists.**
- **OHC- 2 bed, O_2 cylinder, audiometer, spirometer and first aid facilities, medicines and ambulance.**
- **Medical checkup of all the employees done during pre-employment and at periodic intervals.**
- **Health awareness camps are organized at regular intervals.**
- **Health records are maintained for each employee. The health records indicate that over the past 7 years no worker has been found to be suffering from any occupational / environmental health related endemic diseases.**

ToR -39

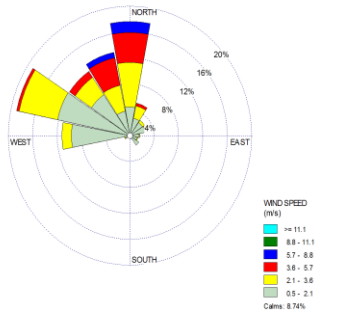
One complete season site specific meteorological and AAQ data (except monsoon season) as per MoEF Notification shall be collected and the dates of monitoring recorded. The parameters to be covered for AAQ shall include PM_{10}, $PM_{2.5}$, SO_2. NO_x, CO and Hg. The location of the monitoring stations should be so decided so as to take into consideration upward wind direction, pre -dominant downwind direction, other dominant directions, habitation and sensitive receptors. There should be at least one monitoring station each in the upwind and in the pre-dominant downwind direction at a location where maximum ground level concentration is likely to occur.

Map Showing Environmental Monitoring Locations

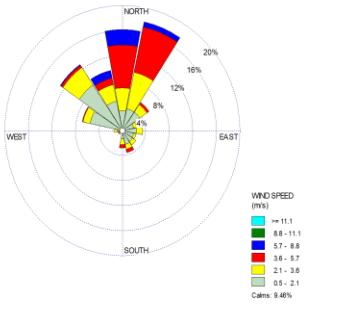


Wind Rose of Project Site (Winter & Summer Season)

DECEMBER 2014



JANUARY 2015



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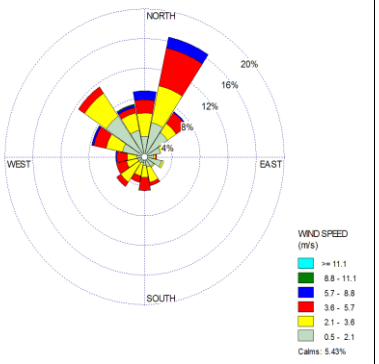
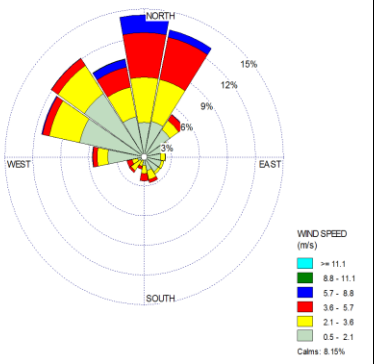
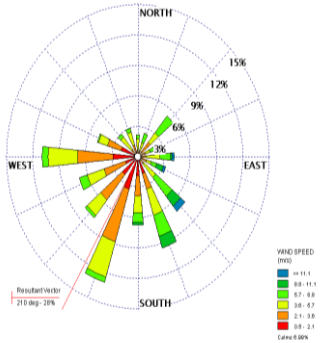


DECEMBER 2014 - FEBRUARY 2015



MARCH 2014



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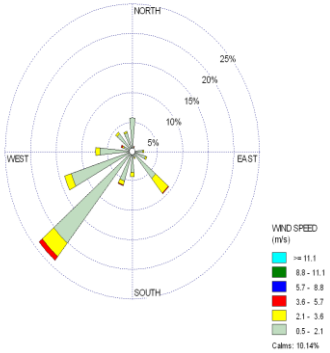

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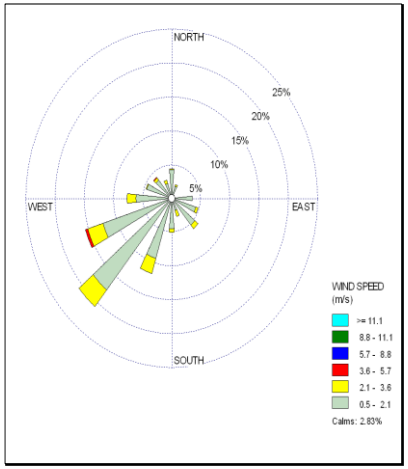
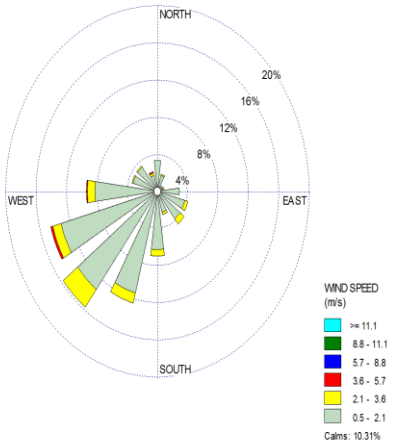
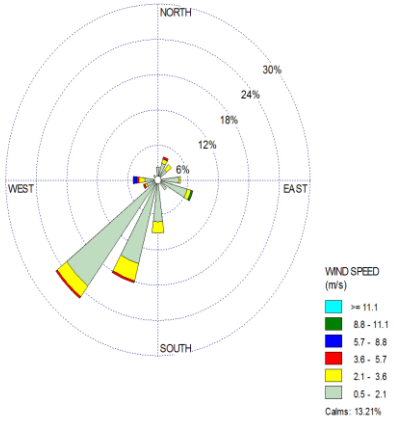


Wind Rose of Project Site (Monsoon & Post Monsoon Season)

JUNE 2014



JULY 2014



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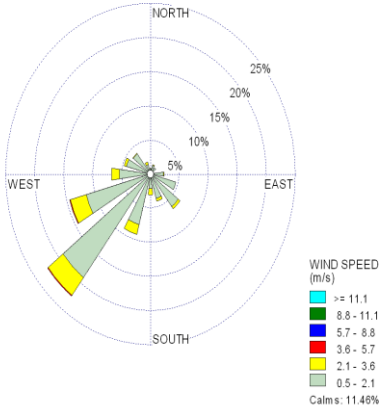
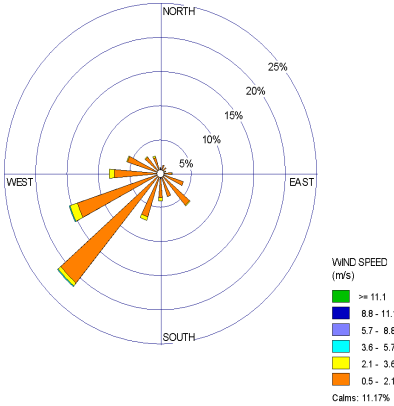


SEPTEMBER 2014



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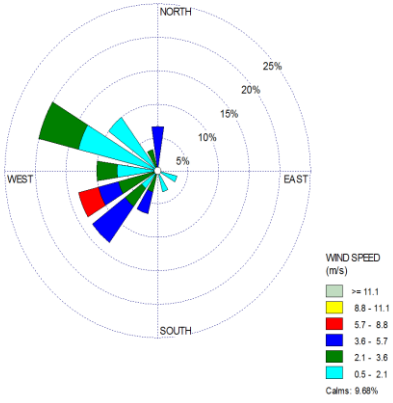

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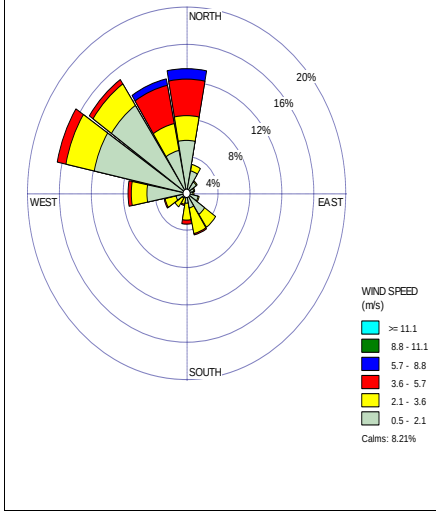


Ambient Air Quality Results (24-hour average, Feb 2015)

Location	$PM_{2.5}$, µg/m³			PM_{10}, µg/m³		
	Min	Max	Mean	Min	Max	Mean
Project Site (Guest House)	24	32	27	55	60	58
Bhadresh Village	23	30	26	54	58	54
Chuli Village	28	40	36	62	70	66
Kapurdi Village	30	45	38	66	74	70
STANDARD	**60**			**100**		

Location	SO_2, µg/m³			NO_2, µg/m³		
	Min	Max	Mean	Min	Max	Mean
Project Site (Guest House)	15.8	17.5	16.4	10.8	16.2	12.0
Bhadresh Village	15.2	15.8	15.6	10.6	15.4	12.1
Chuli Village	20.5	35.4	26.5	15.0	21.2	18.3
Kapurdi Village	22.8	35.8	27.3	15.2	21.5	19.1
STANDARD	**80**			**80**		

Ambient Air Quality Results (24-hour average, Feb 2015)

Location	Ozone (μg/m³) 8 hour			NH_3 (μg/m³) 24 hour Average		
	Min	Max	Mean	Min	Max	Mean
Project Site(Guest House)	16	22	19.2	16	22	18.6
Bhadresh Village	18	20	19.1	16	20	17.4
Chuli Village	14	21	17.9	12	18	15.5
Kapurdi Village	16	20	17.8	14	20	16.2
STANDARD	**100**			**40**		

Location	Parameters					
	CO μg/m³	Benzene μg/m³	BaP ng/ m³	As ng/ m³	Ni ng/m³	Pb μg/m³
Project Site (GH)	325	1.4	1.4	1.2	8.4	0.12
Bhadresh Village	350	1.5	1.5	1.5	8.3	0.16
Chuli Village	315	1.4	1.4	1.6	8.5	0.15
Kapurdi Village	320	1.4	1.5	1.5	8.6	0/14
STANDARD	**2000**	**5**	**5**	**5**	**10**	**1.5**

ToR -40

In case of expansion project, air quality, monitoring data of 104 observations a year for relevant parameters at a air quality monitoring stations as identified/ stipulated shall be submitted to assess for compliance of AAQ Standards (annual average as well as 24 hrs).

RWPL monitors the AAQ at 6 locations throughout the year.
Annual Average AAQ Results (Dec 2014 - Jan 2015, in µg/m^3)

LOCATION	$PM_{2.5}$	PM_{10}	NO_2	SO_2
Scrap Yard (Core zone)*	27.95	56.21	16.14	12.22
Main Gate (Core Zone)*	12.22	49.80	15.7	12.11
Guest House*	28.34	47.09	15.22	11.51
Bhadresh Village	23.52	40.16	15.79	11.26
Bishala Village	21.55	38.10	15.10	11.00
Chuli Village	20.57	37.80	15.08	10.63
National Standard- Annual Avg	**40**	**60**	**40**	**50**
National Standard- 24-h Avg	**60**	**100**	**80**	**80**

*** Using CAAQMS**

ToR -41

A list of industries existing and proposed in the study area

REPLY:- No industry exists in 10 km area. One brick unit exists near the plant. Lignite mines exists in the east and north direction of site.

Cumulative impacts of all sources of emissions including handling and transportation of existing and proposed projects on the environment of the area shall be assessed in detail. Details of the Model used and the input data used for modeling shall also be provided. The air quality contours should be plotted on a location map showing the location of project site, habitation nearby, sensitive receptors, if any. The wind rose and isopleths should also include impacts on water, soil and socio-economics.

Impact on Ambient Air Quality

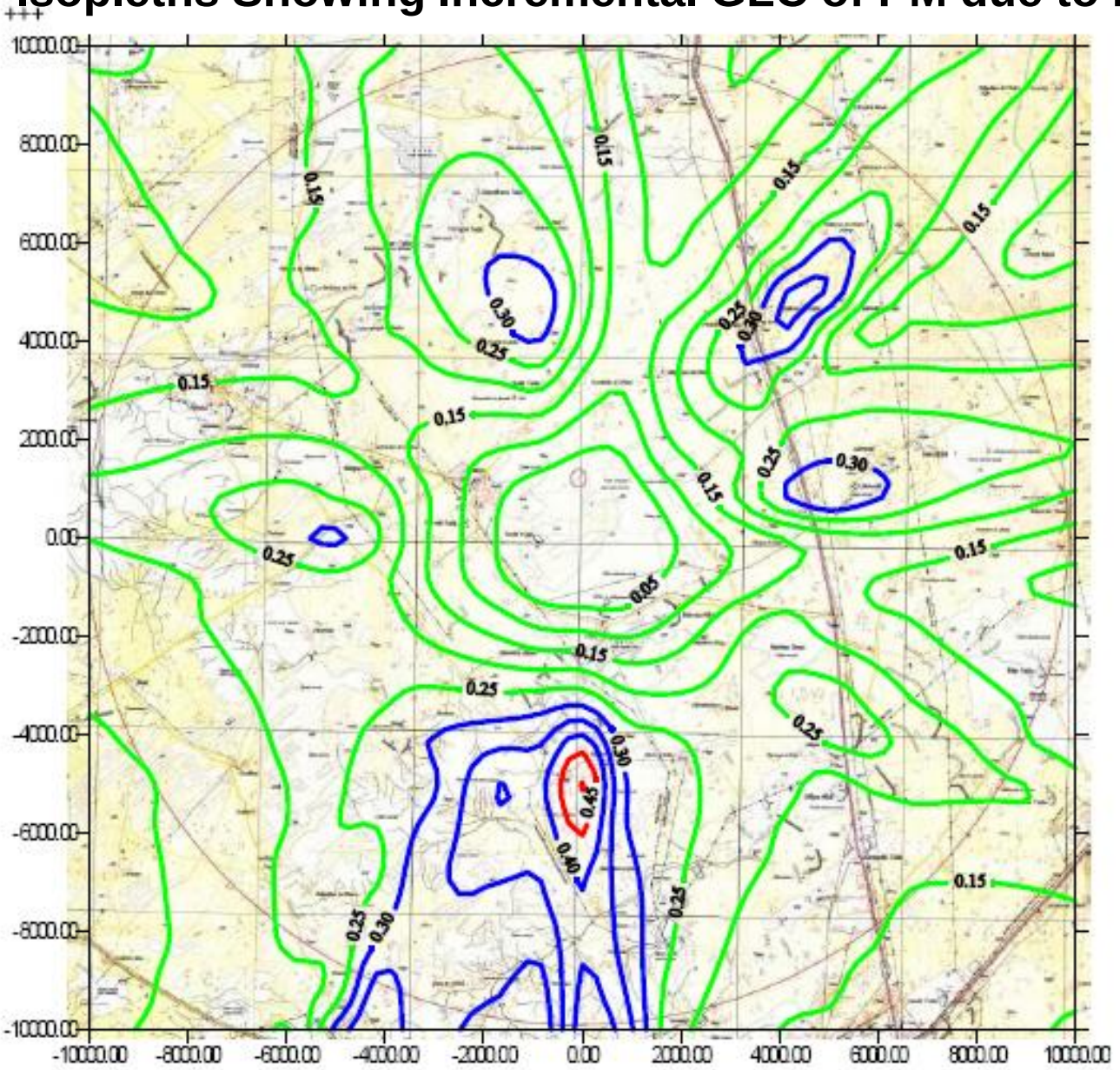
Stack emission inventory of expansion unit. (impact of air emissions from existing units is captured in the Baseline Air Quality).

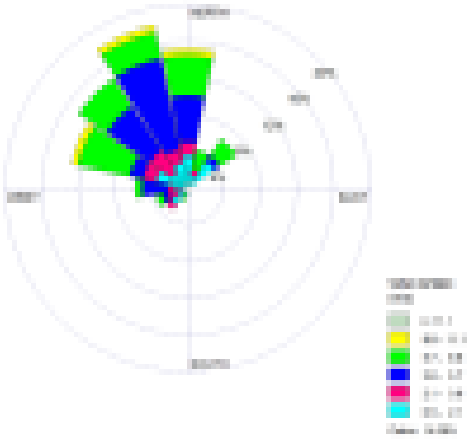
Name	Stack height (m)	Stack top dia, m	Stack temp, (K)	Stack velocity (m/s)	Stack Emission Rate (g/s)		
					PM	SO_2	NOx
Flue 1	275	7.5	413	20	32	555	287

Impact of Air Emissions on Baseline Environment (24-h avg in $\mu g/m^3$)

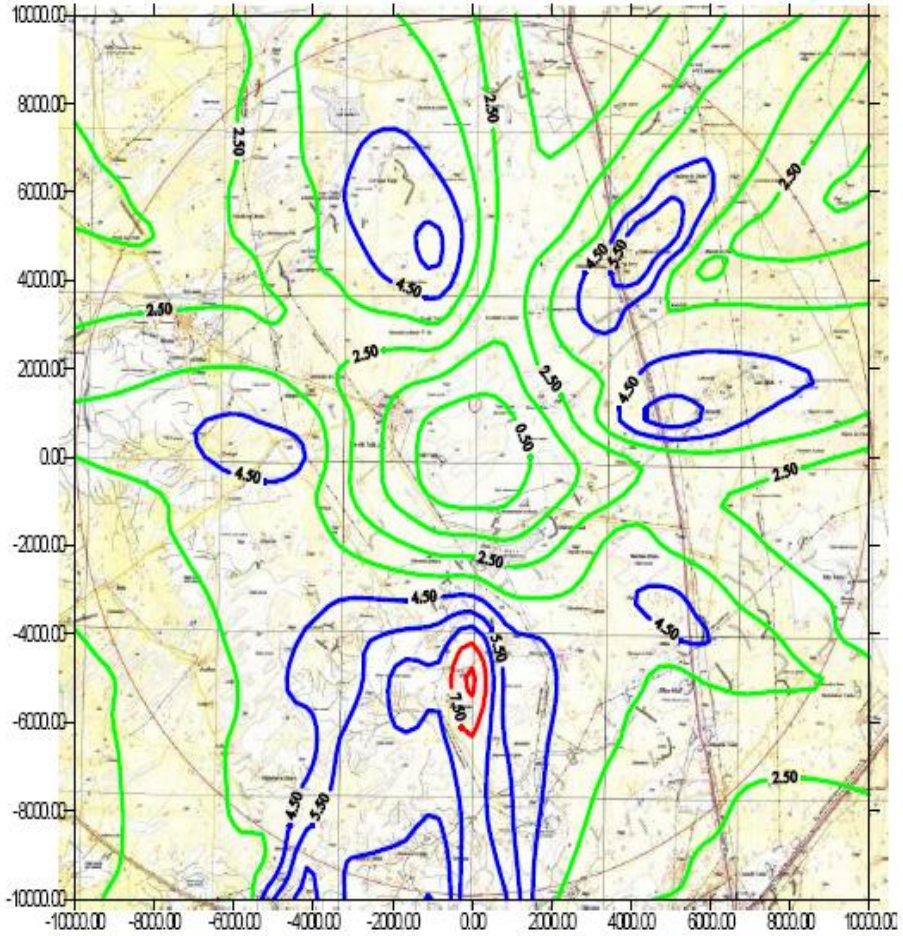
Parameter	Incremental GLC (max)	Background Level (max in d/w side)	Super imposed value	NAAQS (Nov 2009)	Percent Contribution
SO_2	6.6	35.8	42.4	80	8.25%
NO_X	3.4	21.5	24.9	80	4.25%
PM_{10}	0.4	74	74.4	100	0.4%

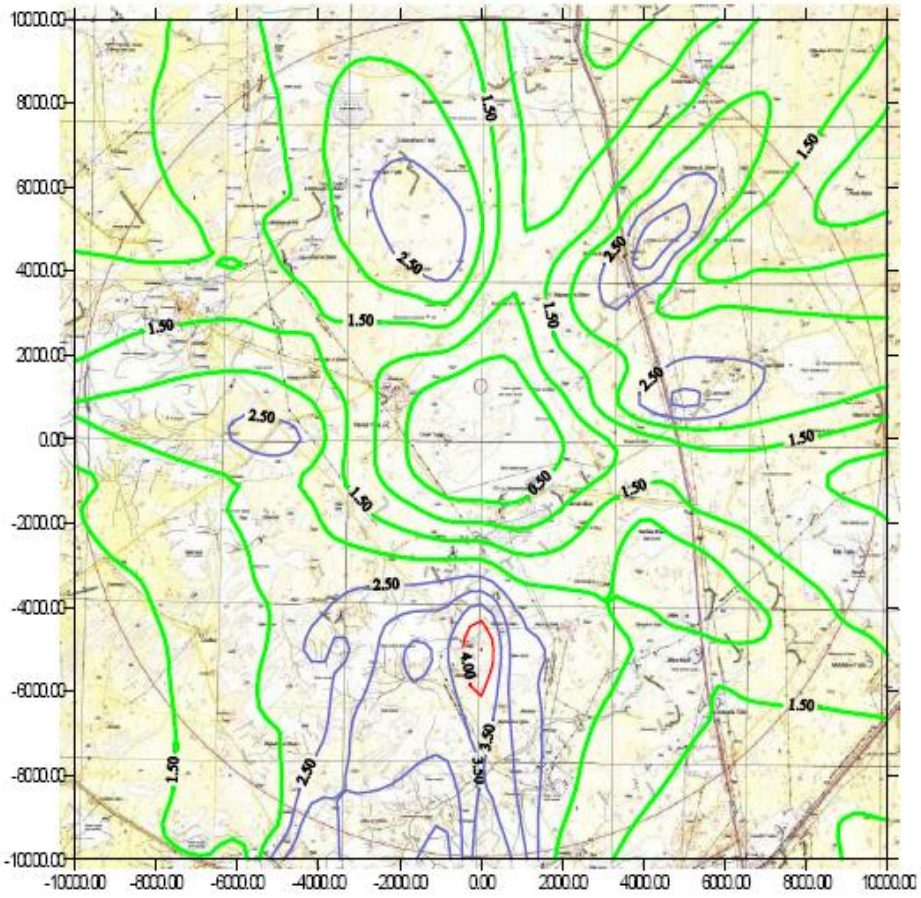
Isopleths Showing Incremental GLC of PM due to Expansion Project





Isopleths Showing Incremental GLC of SO_2 & NOx due to Expansion Project





GLC of SO_2

GLC of NO_x

Impact on Air Quality due to Road Traffic

- Movement of 3000 + 1990 TPD ash from plant for utilization done by road.
- Transportation using 40 tons bulkers and 26 tons box trucks.
- This involve 130 bulkers or 195 box trucks.
- 50 bus, car and jeep movement and 100 motorcycle movement added.

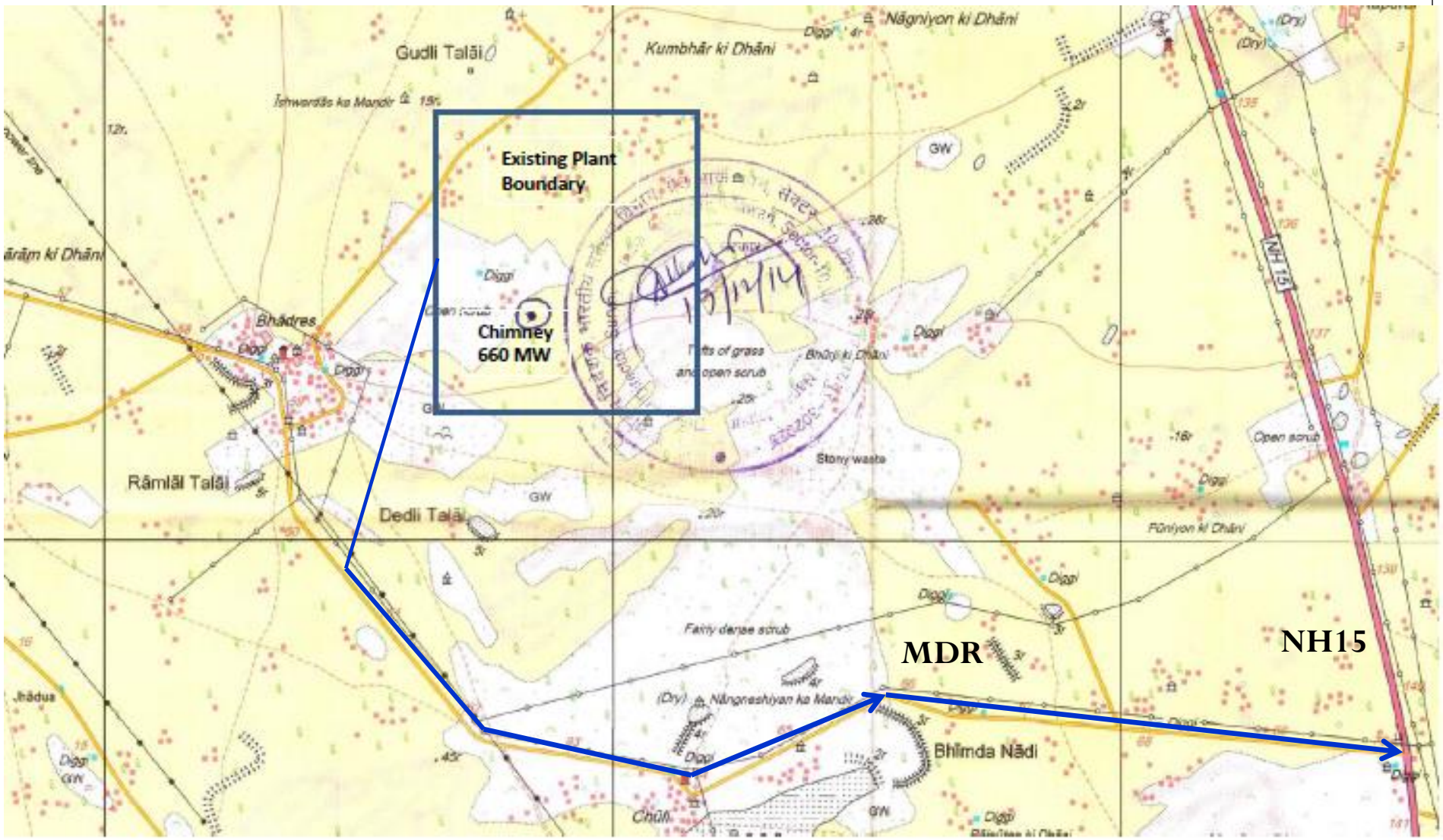
- Power plant is connected to MDR at Bhadresh by 1.4 km long 7.5 m wide road. 1.2 km road is maintained by RWPL.
- 15 km MDR from Bhadresh to Harsani Fanta at NH15 is 7.5 m wide.
- 4 small villages exists along the MDR road

- IRC64-1990: Capacity of 7.5 m wide road is 15000 PCU/day for plain terrain.
- The existing terrain is plain and the traffic volume is about 1500 PCU.

(180 trucks & bus, 65 bullock carts, 32 tractors, 65 3-wheeler & 328 2-wheeler per day).

- Additional PCU due to expansion: 1100 PCU
- Total PCU – 2600 which is much less than designed capacity of 15000 PCU

Movement of Road Traffic



Impact on Air Quality due to Road Traffic

The incremental concentrations (Hourly Average) of Pollutants viz. CO, NO_2 and PM in worst scenario are as under (predicted using CALINE IV):

- **CO: The incremental concentration of CO is 0.1 ppm (maximum) upto 5 m on either side of the road. Beyond 5 m, the incremental concentration is Negligible**

- **NO_2: The incremental concentration of NO_2 is 0.01 ppm upto 5 m on either side of the road. Beyond 5 m, the incremental concentration is Negligible.**

- **PM: The incremental PM concentration is 0.6 to 1.4 µg/m^3 upto 10 m on either side of the road. Beyond 10 m, the incremental concentration is negligible.**

Traffic Management Plan

- No-overtaking policy and speed limit of 35 km/hour for all dumpers.
- RWPL ensures that all dumpers are mechanically covered type.
- All dumpers are checked for exhaust emissions every three months, and maintained properly. Only PUC compliant vehicles are allowed to ply.
- Diesel is procured from authorised retailers, to avoid adulteration.
- In order to minimize re-suspended road dust generation, the roads are cleaned periodically by RWPL along all the settlements stretch.
- Measures for careful / safe and clean driving habits are employed by way of education, slogans and campaigns in order to inculcate the sense of responsibility among drivers and conductors.
- The settlements residing along the road are educated on all aspects related to road safety.

ToR -43

Radio activity and heavy metal contents of coal to be sourced shall be examined and submitted along with laboratory reports.

REPLY-: Lignite is brought from Jalipa - Kapurdi Lignite Mines located adjacent to the power plant. The radioactivity analysis of fly ash generated from lignite has been conducted through BARC laboratory. Results are found to be in normal range

क्रम सं. / SL. NO. : A 306 A 30554

ब्रिट / बीएआरसी वाशी कॉम्प्लेक्स,
BRIT/ BARC Vashi Complex,
सेक्टर-20, वाशी / Sec-20, Vashi,
नवी मुंबई / Navi Mumbai-400 703
www.britatom.gov.in

भारत सरकार / GOVERNMENT OF INDIA
परमाणु ऊर्जा विभाग / DEPARTMENT OF ATOMIC ENERGY
विकिरण एवं आइसोटोप प्रौद्योगिकी बोर्ड / BOARD OF RADIATION & ISOTOPE TECHNOLOGY
रेडियोसक्रियता परीक्षण प्रमाण-पत्र / RADIOACTIVITY TEST CERTIFICATE

306 A 30554

RADIOACTIVITY TEST CERTIFICATE

Ref: BRIT/RAL/D/40-43/MISC/36-39/15-16 JUN. 05, 2015

This is regarding the "ASH" sample submitted by you vide letter Ref. No. RWPL/LABORATORY/15-16/002 dated 25.04.2015 for radioactivity analysis.
The sample was analysed for U-238, Th-232, Ra-226 & K-40 radioactivity content and the values obtained are as follows:

SAMPLE DESCRIPTION : FLY ASH

DATE OF SAMPLING : 25.04.2015

PLACE OF SAMPLING : THERMAL PLANT ASH SILO

SR NO	SAMPLE DETAILS	U-238 (Bq/Kg)	Ra-226 (Bq/Kg)	Th-232 (Bq/Kg)	K-40 (Bq/Kg)
1	FLYASH	55.6 ± 0.02	57.9 ± 0.03	75.4 ± 0.05	269.8 ± 0.3

The measurement values are below the clearance level for radionuclides of natural origin in bulk solid materials, as per AERB directive 01/2010 (table-3) dated 26/11/2010.

(This report pertains to the given sample only. The sample will be retained in this laboratory for a period of one month from certificate date and thereafter it will be disposed off.)

05/06/2015

एन. जयचंद्रन / N. Jayachandran
प्रभारी अधिकारी / Officer-In-Charge
रेडियोवैश्लेषक प्रयोगशाला / Radioanalytical Laboratory
विकिरण एवं आइसोटोप प्रौद्योगिक बोर्ड
Board of Radiation and Isotope Technology
सेक्टर /Sector-20, वाशी संकुल / Vashi Complex
नवी मुंबई / Navi Mumbai - 400 703.

M/S. RAJ WESTPOWER LIMITED
VILLAGE & POST : BHADRESH
DISTRICT : BARMER – 344001 (RAJASTHAN)

ToR -44

Fuel analysis shall be provided. Details of auxiliary fuel, if any, including its quality, quantity, storage etc, should also be furnished.

REPLY:-

Lignite based flyash analysis which is given for cement making analysed,

LDO will be sourced from retailers and stored in existing tanks (2 x 1000 KL).

Quality- as per BIS Specs

Quantity required: 1-2 ml/kwh

SHRIRAM INSTITUTE FOR INDUSTRIAL RESEARCH
(A unit of Shriram Scientific and Industrial Research Foundation)
An ISO - 9001:2008 Certified Institute

TEST CERTIFICATE 000368110

Issued to :
RAJ WESTPOWER LTD
VILLAGE BHADRESH
DISTT BARMER - 344001,RAJASTHAN

J. O. No. 505-184-1833
Reg. No. 1373395
Date 19-05-2015
GC-01 (REV-04)
Your Ref. No. WO NO WO/RWPL/164 0000095 DT 8.4.2015

Kind Attn: MR DILIP D. NARWANI , DGM-ENVIRONMENT & CHEMISTRY
Sample Particulars :
One sample described as Fly Ash was received.

Date 25.04.2015

The sampling was not carried out by SHRIRAM INSTITUTE FOR INDUSTRIAL RESEARCH.
The sample particulars provided in the Test Certificate are based on the declaration by the Party.

TEST RESULTS

S.No.	Test Carried Out	Test Value
1.	Lead (as Pb), % by mass	Less than 0.01
2.	Chromium (as Cr), % by mass	0.04
3.	Nickel (as Ni), % by mass	0.01
4.	Cobalt (as Co), % by mass	Less than 0.01
5.	Arsenic (as As), PPM	Less than 0.01
6.	Selenium (as Se), PPM	Less than 0.01
7.	Mercury (as Hg), PPM	Less than 0.01

Protocol Used: Standard method of chemical analysis of N.H.Furman & ICP-OES, AAS-VGA.

****

D.O.R: 04.05.2015
D.O.C: 18.05.2015

AUTHORISED SIGNATORY
(EMPLOYEE CODE-5065)

19, University Road, Delhi - 110007.
E-Mail: sridlhi@vsnl.com Website: http://www.shriraminstitute.org
Ph: 91-11-27667267, 27667983, 27667860
Fax: 91-11-27667676, 27667207

ANALYSIS OF LIGNITE FROM EXISTING MINES

Proximate Analysis			**Design Lignite**
1	Fixed carbon	%	20
2	Volatile matter	%	25
3	Moisture	%	35
4	Ash	%	20
5	GCV (HHV)	Kcal/kg	2900
Ultimate Analysis			
6	Carbon	% weight	29
7	Hydrogen	% weight	2.2
8	Sulphur	% weight	1.2
9	Nitrogen	% weight	0.6
10	Oxygen	% weight	7.0
11	Moisture	% weight	40
12	Ash	% weight	20

Flyash obtained from Lignite was analysed through Sri Ram Test House, Delhi. Ni-0.01%, Cr-0.04%, Pb-<0.01%, Co-<0.01%. Se, Hg and As were found to be less than 0.01 ppm.

ToR - 45

Quantity of fuel required, its source and characteristics and documentary evidence to substantiate confirmed fuel linkage shall be furnished. The Ministry's Notification dated 02.01.2014 regarding ash content in coal shall be compiled. For the expansion projects, the compliance of the existing units to the said Notification shall also be submitted.

Fuel for 1x660 MW : Lignite

Quantity for 660 MW: 4.75 MTPA

Source: Jalipa and Kapurdi mines of BLMCL - Govt of Rajasthan

Production as per existing EC:

6 + 3.75 = 9.75 MTPA

Present link to RWPL- 7 MTPA

Balance available – 2.75 MTPA

Expansion proposed: 2 MTPA

BLMCL
Barmer Lignite Mining Company Limited
(A Govt. of Rajasthan Enterprise)

Corporate Office:
Office No. 2 & 3, 7th Floor
Man Upasana Plaza
C-44, Sardar Patel Marg,
C-Scheme, Jaipur – 302001 (INDIA)
CIN : U14109RJ2007SGC023687
Website : www.blmcl.in
E-Mail : blmcl@blmcl.in
Ph: +91-141-2369772
Fax: +91-141-2369774

Ref No: BLMCL/Genl/RWPL/2015-16/17 Date: 27/04/2015

To
The Incharge and Plant Head
RajWest Power Limited, Bhadresh.
Distt – Barmer, Rajasthan.

Sub: Your letter no RWPL/Expansion/15-16/002 dated 25th April 2015 seeking confirmation regarding supply of Lignite to RWPL.

Dear Sir,

Regarding supply of Lignite to RWPL it is to confirm that-

1. As per geological reports Kapurdi and Jalipa Lignite Mine was having a total extractable reserve of (Kapurdi – 129.79 + Jalipa 310.89) 440.58 million tonnes, among which 16.22 million tonnes has already been mined till 31st March 2015.
2. At present both the above mine is having Clearance to mine Lignite at the rate of 9 MTPA.
3. As per Implementation Agreement signed between Government of Rajasthan and RWPL, BLMCL is undertaking the Mining work at Kapurdi & Jalipa Lignite Mine and entire Lignite produced there is being supplied to RWPL only.
4. As per present Fuel Supply Agreement BLMCL is committed to supply Lignite to RWPL at the rate of maximum 9.0 MTPA for total 30 years. Maximum Lignite which will be used as per present agreement will be 270 million tonnes only and 170.58 million tonnes will remain available for further mining.
5. Kapurdi Lignite mine has already achieved it's rated capacity.
6. The feasibility study indicated that Production Capacity of Jalipa Lignite mine could be enhanced from 6 MTPA to 9 MTPA. The additional Lignite so produced may be supplied to RWPL. Prior Consent and Clearances from various Government authorities is required to be obtained for the purpose.

This is for your kind information and records.
Thanking you.

For Barmer Lignite Mining Co Ltd.

Amrendra Kumar
Vice President (Operations)

Regd Office:
Khanij Bhawan, Udyog Bhawan Campus, Tilak Marg, C- Scheme, Jaipur – 302005 (INDIA)

ToR -46 & 47

Details of transportation of fuel from the source (including port handling) to the proposed plant and its impact on ambient AAQ shall be suitably assessed and submitted. If transportation entails a long distance, it shall be ensured that rail transportation to the site shall be first assessed. Wagon loading at source shall preferably be through silo/ conveyor belt.

REPLY:- Lignite will be transported from mines to plant using belt conveyors.

For proposal based on imported coal, inland transportation and port handling and rolling stocks/ rail movement bottle necks shall be critically examined and details furnished. The approval of the Port and Rail Authorities shall be submitted.

REPLY:- The project is not based on imported coal.

ToR - 48

Details regarding infrastructure facilities such as sanitation, fuel, restrooms, medical facilities, safety during construction phase etc. to be provided to the labour force during construction as well as to the casual workers including truck drivers during operation phase should be adequately catered for and details furnished.

REPLY:-

Labour force shall be taken from surrounding villages.

Toilets, drinking water, canteen, rest rooms for truck drivers, medical checkup and first aid facilities and safety equipment shall be provided to all labour force.

Rest room with beds, toilet and bathing facility has been provided to all truck drivers

ToR – 49

EMP to mitigate the adverse impacts due to the project along with item-wise cost of its implementation in a time bound manner shall be specified.

Environment Management Department exists at RWPL

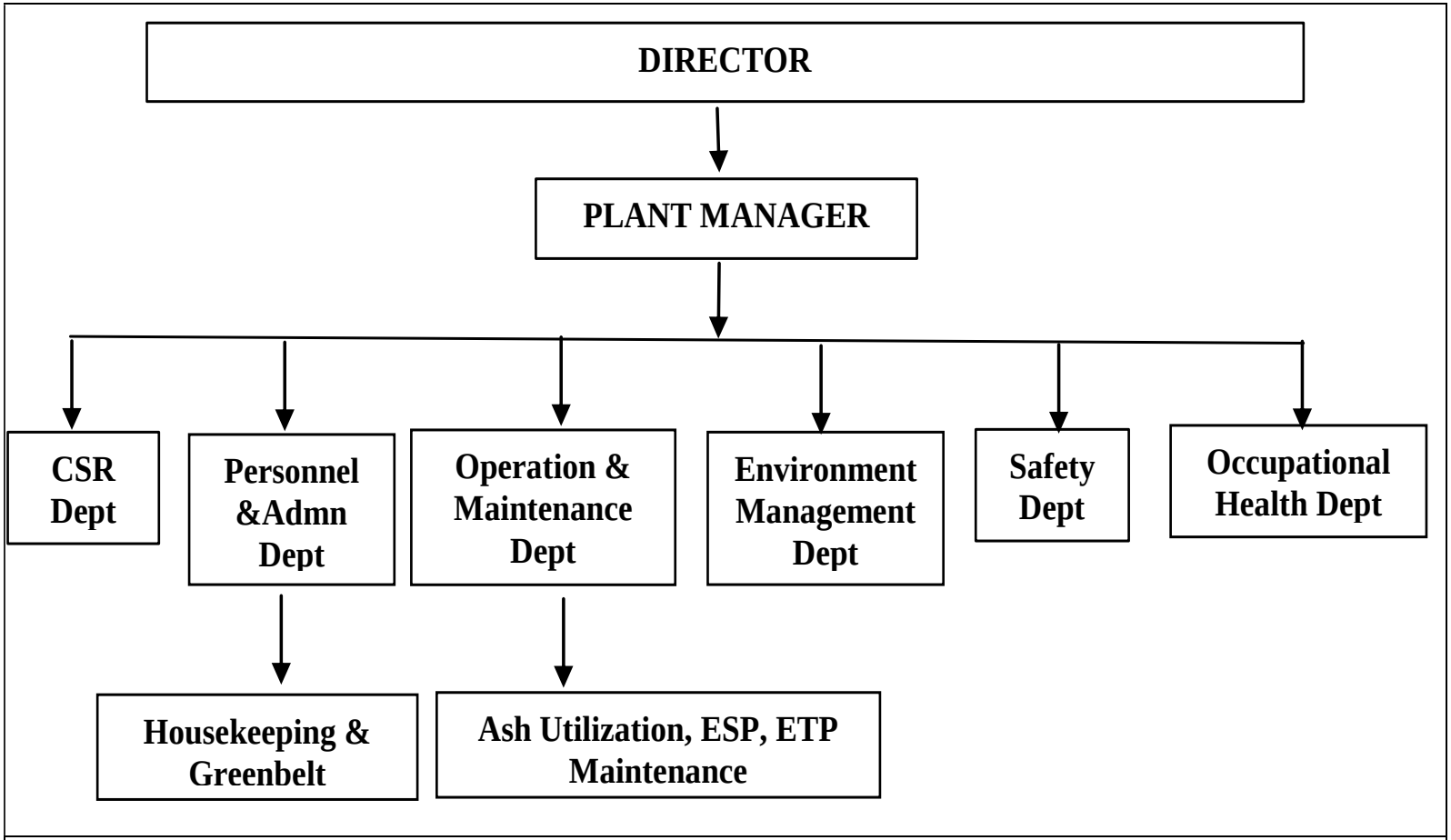


Figure 9.1 Structure of Environmental Management Department (EMD)

ToR – 49

EMP to mitigate the adverse impacts due to the project along with item-wise cost of its implementation in a time bound manner shall be specified.

The functions of EMD are as follows:

- **Obtaining Consent order from SPCBs.**
- **Regular environmental monitoring.**
- **Analysis of environment data, reports preparation and transmission of report to statutory authorities, Corporate Centre etc.**
- **Compliance with guidelines and statutory requirements.**
- **Coordination with statutory bodies, functional groups of the station, Corporate EMG / Engineering etc.**
- **Interaction for evolving and implementation of modification programmes to improve the availability / efficiency of pollution control devices / systems.**
- **Environmental Appraisal (Internal) and Environmental Audit.**

Item-wise cost to mitigate adverse impact

Sr. No.	Description	Amount (in crores Rs)
1	Electrostatic Precipitator	198.0
2	275 m tall Stack	54.0
3	FGD System	200.0
4	Dust Extraction & Suppression System	5.0
5	Cooling Towers to maintain COC of 10	60.0
6	DM Plant Waste Treatment System	5.0
7	CMB and ETP	20.0
8	Sewerage Collection, Treatment & Disposal	4.0
9	Ash Dyke/ HCSD System	30.0
10	Environmental Lab Equipment	1.5
11	Green Belt, Afforestation & Landscaping	2.5
12	Noise control system	1.0
13	Occupational health cell	1.0
14	Risk Mitigation measures	5.0
	Total	587

ToR -50 & 51

A Disaster Management Plan (DMP) along with risk assessment study including fire and explosion issues due to storage and use of fuel should be carried out. It should take into account the maximum inventory of storage at layout map clearly showing which of the proposed activities would be affected in case of an accident taking place. Based on the same, proposed safeguard measures should be provided. Measures to guard against fire hazards should be invariably provided. Mock drills shall be suitably carried out from time to time to check the efficiency of the plans drawn

The DMP so formulated shall include measures against likely Fires/Tsunami/ Cyclones/ Storm Surges/ Earthquakes etc. as applicable. It shall be ensured that DMP consists of both on-site and off-site plans, complete with details of containing likely disaster and shall specifically mention personnel identified for the ask. Smaller version of the plan for different possible disasters shall be prepared both in English and Local languages and circulated widely.

DMP

- **Liquid fuel tanks (2 x 1000 KL LDO Tanks) are available inside the plant. Additional fuel tanks not proposed.**
- **Disaster Management Plan has been prepared for the existing plant which is implemented in an institutionalized manner by RWPL.**
- **Fire is the credible risk for which all risk mitigation measures has been implemented.**
- **The existing DMP (on-site emergency response plan) structure will remain same but suitably augmented to meet the additional requirement of the proposed expansion.**

ToR -52 & 53

- **Detailed plan for raising green belt of native species of appropriate width (50 to 100 m) and consisting of at least 3 tiers around plant boundary with tree density of 2000 to 2500 trees per ha with a good survival rate of about 80% shall be submitted. Photographic evidence must be created and submitted periodically including NRSA reports in case of expansion projects. A shrub layer beneath tree layer would serve as in effective sieve of dust and sink for CO_2 and other gaseous pollutants and hence stratified green belt should be developed.**

- **Over and above the green belt, as carbon sink, additional plantation shall be carried out in identified blocks of degraded forests, in close consultation with the District Forests Department. In pursuance to this the project proponent shall formulate time bound Action plans along with financial allocation and shall submit status of implementation to the Ministry every six months.**

Green Belt

- Total land available with Raj WestPower Limited is 1186 acres
- RWPL already developed greenbelt on 392 acres (33%)
- About 200000 trees planted.
- Despite the adverse climatic and soil conditions of the Thar Desert, RWPL successfully developed dense greenbelt inside the premises by ensuring about 80% survival rate.
- This has been achieved by removing the sand and bentonite layer, grading the ground, adding soil and manure, using extensive drip irrigation covering 60 ha land area and providing fencing.
- Horticulture expert has been recruited with a team of gardeners to look after the development of greenbelt.
- Nursery has been developed inside the premises, from where saplings are supplied.

Green Belt

The name of plant species that has been successfully used for greenbelt development in RWPL is given below.

1. Trees: Neem, Shisham, Siris, Cassia shyma, Akash neem, Parkinsonia

2. Avenue Trees: Gulmohar, Amaltaas, Arjun, Kajelia, Terminalia ashok, Semal, Casurina

3. Fruit Trees: Olives, Pomegranate, Citrus, Aamla, Dates, Jamun

4. Ornamental Trees: Ficus, Palm, Junipers, Plumeria,

5. Shrubs: Cassia biflora, Bottle brush, TMC, Tecoma, Kaner, Lagerstromia, Calendra, Peltaforum, Gulmohar, Bougainvilla

Green Belt

Nursery for Green Belt

ToR - 54

Corporate Environment Policy

i. Does the company has a well laid down Environment Policy approved by its Board of Directors? If so, it may be detailed in the EIA Report.

ii. Does the Environment Policy prescribe for standard operating process/ procedures to bring into focus any infringement/ deviation/ violation of the environmental or forest norms/ conditions? If so, it may be detailed in the EIA Report.

iii. What is the hierarchical system or Administrative order of the company to deal with the environmental issues and for ensuring compliance with the environmental clearance conditions. Details of this system may be given.

iv. Does the company has compliance management system in place wherein compliance status along with compliances / violations of environmental norms to the CMD and the Board of Directors of the company and/ or shareholders or stakeholders at large. This reporting mechanism should be detailed in the EIA Report.

All the above details should be adequately brought out in the EIA Report and in the presentation to the Committee.

ENVIRONMENT, HEALTH & SAFETY POLICY

RWPL is committed to:

- **Comply /better the statutory limits, norms and organizational requirements of environment, occupational health and safety.**
- **Conserve the natural resources, protect the environment, and minimize solid, liquid and gaseous waste by continual improvement through systematic use of skill & technology in conducting its business.**
- **Effective communication of OH & S and environment policies, objectives and obligations to all employees and interested parties.**
- **Earn recognition from society as an environmental friendly company.**
- **Implement, corrective, preventive and upgrade measures in the area of occupational health, safety and environment through periodic reviews, hazard identification and risk assessment with the involvement of all employees and outsourced personnel wherever needed.**

The Head of EMD directly reports to the Project Manager (PM).

The Head of Safety and Occupational Health directly reports to the Project Manager.

The Project Manager reports to CEO of the Plant.

The CEO reports to JMD. JMD represents the Board of Directors.

Daily review meetings are conducted by PM and minutes are sent to JMD.

In case the HOD notes any non-compliance or violation of environmental, safety or health law/ regulations, the same is brought to the notice of the PM

In case the non-compliance or violation is of manageable nature, PM issues instruction and sanction budget and resources to rectify the same. Otherwise PM obtains financial approval from the JMD.

All matters of non-compliance and violations are brought to the notice of the JMD and action taken report submitted on weekly basis, till the problem is rectified.

ToR -55

Details of litigation pending or otherwise with respect to project in any court, tribunal etc. shall invariably be furnished.

REPLY:-

RWPL has given Undertaking that no litigation is pending against the project, in any court, tribunal, etc.

Is the project intended to have CDM intent

CDM for this project will be decided during plant commissioning, depending upon the applicable rules. Carbon intensity and amount of CO_2 expected to be reduced from baseline shall be worked out during the preparation of project design document

Thank You

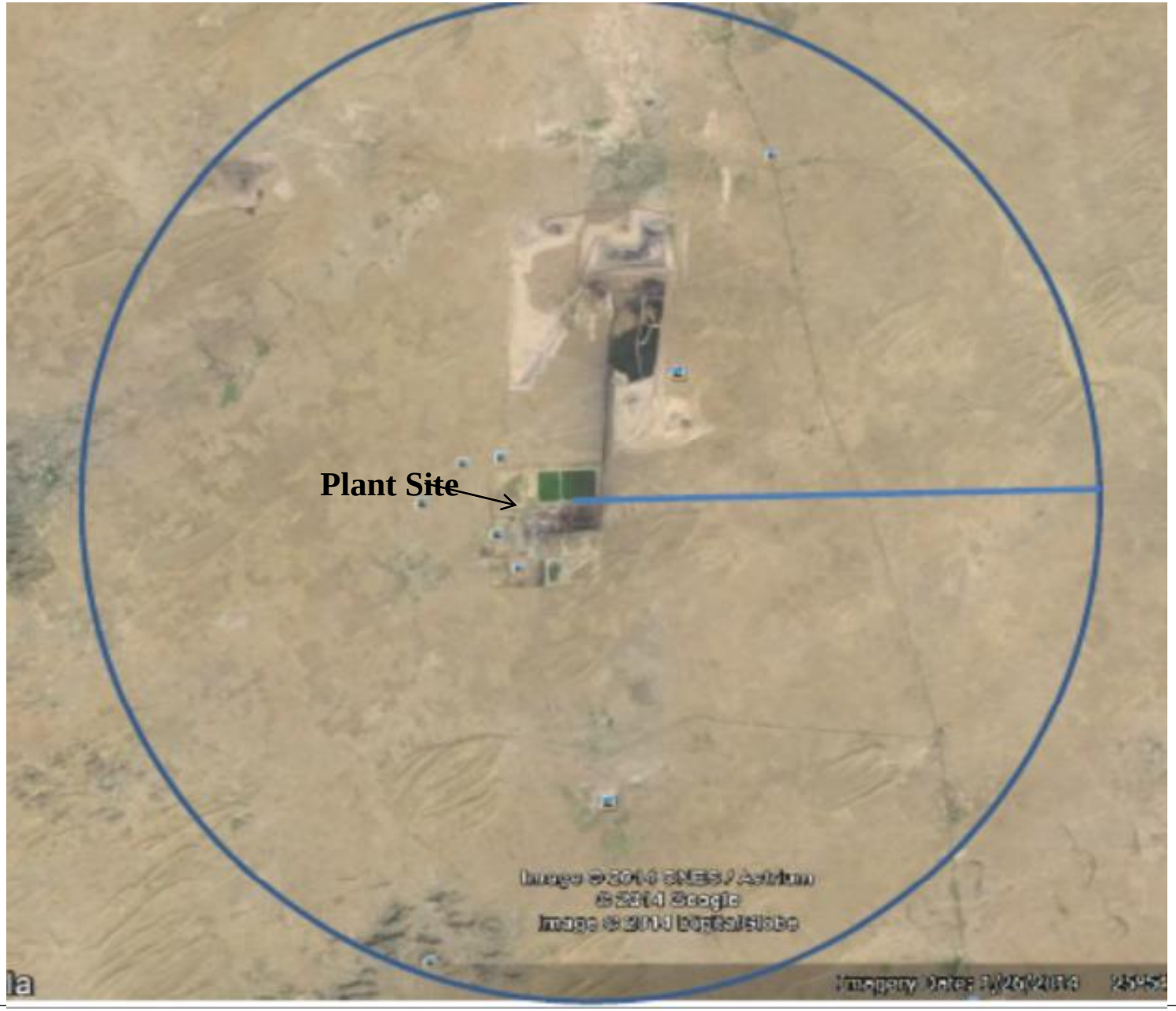
Wildlife Census of Barmer Forest Division

	Name of Animals	Number, 2011-12	Number, 2012-13	Number, 2013-14
1	Siyaar /Geedar	72	80	26
2	Jarakh (Hynae)	43	48	1
3	Jungle cat	45	56	16
4	Goh (Monitor lizard)	18	14	29
5	Maru Lomri / Desert fox	88	76	116
6	Bhedia / Indian wolf	10	6	4
7	Bijju / Civet cat	7	7	-
8	Kala Hiran / Black buck	26	20	-
9	Neel Gai / Blue bull	471	578	492
10	Chinkara / Gazelle	1604	2270	2290
11	Jangli suar / Wild boar	5	15	50
12	Sahi / Porcupine	32	35	3
13	Langoor	37	36	-
14	Newla / Mongoose	64	83	28
15	Rabbit	129	155	142
16	Titar	1125	1100	899
17	Peacock/ Peafoul	1574	1722	1900
18	Cheel	6	3	5
19	Bater / sand grouse	163	146	105
20	Jhahu chuha / mouse	20	28	24
21	Bhartiya Lomri / Jackal	4	7	17

Land-use Pattern of Villages of the Study Area

	Name of Village	Total (ha)	Unirrigated including fallow (ha)	Waste including goucher (ha)	Not available for cultivation (ha)
1	Bhadresh Gandhav	2342.00	1867.00	397.00	78.00
2	Bhurtiya	1458.71	1355.00	81.00	22.71
3	Bola	3555.43	2914.16	230.56	410.71
4	Chhitar Kapar	4834.46	4191.73	529.69	113.04
5	Giral 1	1470.93	995.86	439.38	35.69
6	Hapon ki Dhani	987.06	740.19	39.66	207.21
7	Kapoordi	3821.99	3699.36	41.28	81.35
8	Meethari Khurd	1609.00	777.00	1.00	817.00
9	Nagarda	2482.36	1235.36	1042.00	205.00
10	Purohiton ki Basti 1	1267.93	1074.88	140.84	52.21
11	Ranigaon	1879.10	1375.00	100.00	404.10
12	Ratnalinadi	1248.50	1004.87	216.11	27.52
13	Rohili	4435.92	4295.48	86.61	53.83
14	Sejuon ki Dhani	4136.84	2937.72	25.09	878.60
15	Shivkar	910.57	19.02	614.74	276.81

GOOGLE IMAGE SHOWING 10 KM AREA AROUND SITE

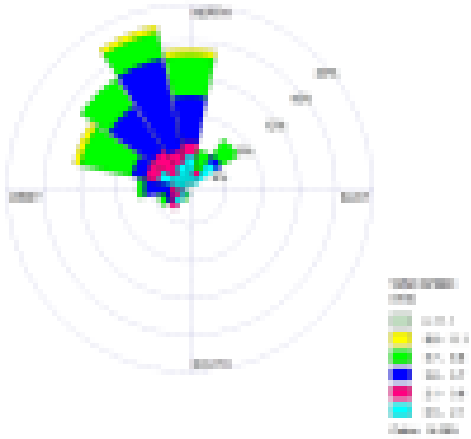


Meteorology

Historical Meteorological Data of Barmer

Month	Temperature (deg C) daily		Relative Humidity, %		Rainfall (mm) Monthly Total	Wind speed kmph	Pre-dominant wind direction (from)	Cloud cover (Oktas)
	Max	Min	Max	Min				
January	25.4	10.6	52	29	0.9	6.1	NW, N	1.7
February	29.0	13.3	49	27	1.8	6.5	NW, N	1.6
March	34.6	19.0	44	23	4.6	7.9	NW, W	1.9
April	39.2	24.4	42	23	1.6	9.9	W,SW	1.6
May	42.0	26.7	53	23	7.2	12.2	SW,W	1.0
June	40.3	27.3	67	34	33.2	13.1	SW,W	3.1
July	36.7	26.4	77	50	78.5	11.1	SW,W	5.4
August	34.9	25.4	79	54	84.9	9.8	SW,W	5.4
September	35.8	24.6	74	46	43.3	8.2	SW,W	2.9
October	36.8	22.1	56	31	2.7	6.3	NW, N	0.9
November	32.1	16.6	50	31	3.6	5.0	NW, N	1.0
December	27.3	12.1	53	32	0.6	5.7	NW, N	1.6

AMBIENT AIR QUALITY MONITORING LOCATION



Code	Name of Location	Distance& Direction from site	Terrain Features	Coordinates
AQ-1	Project Site (Guest House)	Near Site	Flat terrain, surrounded by fallow land and settlement.	25°54'23.9" N 71°19'47.7" E
AQ-2	Bhadresh Village	1.5 km W (upwind)	Rural, surrounded by fallow land, upwind	25°53'17.2" N 71°18'27.1" E
AQ-3	Chuli Village	3 km S (downwind)	Rural, surrounded by fallow land, downwind	25°51'21.6" N 71°20'20.7" E
AQ-4	Kapurdi Village	3.3 km SE (downwind)	Rural, surrounded by fallow land, downwind	25°53'23.0" N 71°22'15.5" E

LOCATION 1 : ScrapYard Unit : µg/m^3.

Month	$PM_{2.5}$			PM_{10}			NO_2			SO_2		
	MIN	MAX	AVG	MIN	MAX	AVG	MIN	MAX	AVG	MIN	MAX	AVG
JAN	29.4	32.3	30.8	56.3	64.3	60.3	15.9	19.2	17.4	9.7	13.7	11.9
FEB	25.8	32.6	28.7	54.2	65.4	58.0	15.4	19.2	17.4	8.3	12.1	10.2
MAR	20.7	23.8	22.3	45.0	60.5	53.6	9.8	16.1	12.8	5.4	9.7	7.17
APR	27.8	30.5	28.8	47.9	55.9	51.8	14.6	16.9	15.6	14.6	16.9	15.7
MAY	26.3	31.2	28.7	50.4	60.2	55.5	15.1	16.7	15.9	14.2	16.1	15.3
JUN	27.2	30.8	28.9	50.6	58.9	53.9	15.2	16.6	15.8	14.2	16.6	15.1
JUL	21.8	27.3	24	48.6	62.5	53.3	14.2	17.2	15.7	12.4	15.7	13.8
AUG	28.6	31.3	29.5	51.5	58.6	55.3	14.8	16.8	15.6	14.8	16.8	15.7
SEP	22.4	30.7	26.3	52.8	60.1	56.7	15.2	17.2	16.0	10.1	13.8	12.8
OCT	21.7	29.3	25.0	55.5	63.1	59.6	15.9	19.1	16.8	7.0	9.9	8.6
NOV	27.6	34.3	30.3	51.0	68.0	58.8	13.8	19.9	16.5	7.5	13.9	10.6
DEC	29.7	35.4	31.7	50.4	67.2	57.3	16.6	19.3	17.8	9.6	12.4	10.9

LOCATION: 2 MAIN GATE Unit : µg/m^3.

Month	$PM_{2.5}$			PM_{10}			NO_2			SO_2		
	MIN	MAX	AVG	MIN	MAX	AVG	MIN	MAX	AVG	MIN	MAX	AVG
JAN	25.3	29.6	27.4	47.3	59.3	52.1	14.8	17.6	16.45	10.3	13.0	11.8
FEB	23.8	30.1	27.0	38.8	46.7	42.3	11.1	18.4	16.05	8.2	10.5	9.3
MAR	23.4	25.2	24.2	46.9	63.3	55.7	10.4	19.9	15	5.8	11.1	7.7
APR	27.6	34.2	31.3	35.5	45.6	39.9	14.2	17.2	15.3	13.6	15.9	14.6
MAY	29.5	33.8	31.3	42.3	55.6	49.7	14.9	16.8	15.8	14.2	16.5	15.3
JUN	28.6	33.2	31.4	43.4	52.8	48.1	14.3	16.5	15.5	14.4	16.1	15.1
JUL	22.6	31.2	28.0	43.2	51.2	47.2	14.8	16.8	15.9	12.7	15.8	14.2
AUG	29.2	32.1	30.7	45.7	56.8	51.6	15.3	16.3	15.9	14.8	16.6	15.7
SEP	29.4	31.8	30.5	44.1	54.8	49.8	14.8	15.7	15.3	9.7	14.0	12.4
OCT	27.3	31.4	29.7	41.1	51.0	46.4	14.7	15.7	15.2	7.5	10.1	8.8
NOV	21.3	29.5	25.2	38.0	61.0	49.8	11.6	18.0	15.2	8.8	12.8	10.5
DEC	24.1	28.6	26.4	33.7	42.3	38.2	7.3	16.8	16.4	8.1	11.4	9.6

LOCATION 5 : BISHALA VILLAGE Unit : µg/m^3.

Month	$PM_{2.5}$			PM_{10}			NO_2			SO_2		
	MIN	MAX	AVG	MIN	MAX	AVG	MIN	MAX	AVG	MIN	MAX	AVG
JAN	20.6	22.0	21.1	35.2	46.1	41.2	15.1	16.9	16.2	9.4	12.2	11.2
FEB	17.9	21.5	19.9	28.7	40.8	35.5	14.5	18.1	16.3	7.3	9.3	8.5
MAR	19.4	22.3	21.2	43.5	62.6	51.2	10.0	15.7	12.2	5.0	8.1	6.7
APR	17.2	21.9	19.7	28.9	35.5	31.2	13.4	16.2	14.8	11.9	14.9	13.5
MAY	21.9	25.9	24.1	30.2	40.3	34.4	13.2	15.6	14.3	13.2	15.2	14.2
JUN	22.3	26.3	24.5	31.8	41.3	36.6	13.4	15.5	14.3	13.2	15.1	14.3
JUL	21.2	22.6	22.0	34.7	41.2	37.9	14.3	17.2	15.4	10.8	13.1	12.5
AUG	24.6	27.1	25.3	35.4	43.4	39.1	13.9	15.0	14.4	14.3	15.2	14.7
SEP	19.2	24.3	21.3	35.2	42.4	39.2	14.1	15.2	14.6	9.8	12.9	11.6
OCT	17.3	22.4	19.9	32.8	44.3	39.4	16.0	17.2	16.6	7.5	9.2	8.26
NOV	18.6	20.7	19.5	30.0	46.0	39.8	13.6	17.4	15.8	7.4	11.9	10.0
DEC	18.8	21.4	20.1	24.6	38.6	31.5	13.9	18.7	15.8	7.4	9.4	8.14

LOCATION 4 : BHADRESH VILLAGE Unit : $\mu g/m^3$.

Month	$PM_{2.5}$			PM_{10}			NO_2			SO_2		
	MIN	MAX	AVG	MIN	MAX	AVG	MIN	MAX	AVG	MIN	MAX	AVG
JAN	23.3	26.9	25.6	37.9	48.6	44.2	16.5	18.2	17.5	9.5	12.8	11.5
FEB	23.8	29.6	26.4	34.2	48.5	41.8	15.9	19.3	17.5	7.2	9.5	8.2
MAR	21.5	23.0	22.2	45.0	64.5	54.0	5.6	9.1	7.3	5.6	9.1	7.2
APR	18.2	21.9	19.9	27.3	35.6	30.3	13.6	15.2	14.3	12.2	16.2	14.0
MAY	20.2	25.2	22.3	28.9	40.3	35.7	13.6	15.8	14.4	13.6	15.4	14.4
JUN	20.8	26.3	23.8	31.6	40.2	34.9	13.9	15.4	14.6	13.6	15.3	14.3
JUL	21.4	24.2	22.8	31.8	38.4	34.6	12.5	17.2	14.8	11.9	13.8	12.7
AUG	23.9	27.6	25.6	32.5	41.5	38.2	14.4	15.2	14.7	13.7	15.3	14.3
SEP	21.6	27.4	23.6	34.3	43.8	40.3	15.2	16.0	15.5	8.9	12.9	11.3
OCT	20.4	25.9	22.6	38.2	48.7	44.9	16.9	17.8	17.3	7.3	9.3	8.3
NOV	20.5	23.5	22.4	40.0	51.0	45.5	14.7	19.1	17.6	8.3	13.0	10.3
DEC	22.9	27.9	25.0	29.6	43.3	37.1	15.3	19.6	17.3	7.6	9.4	8.4

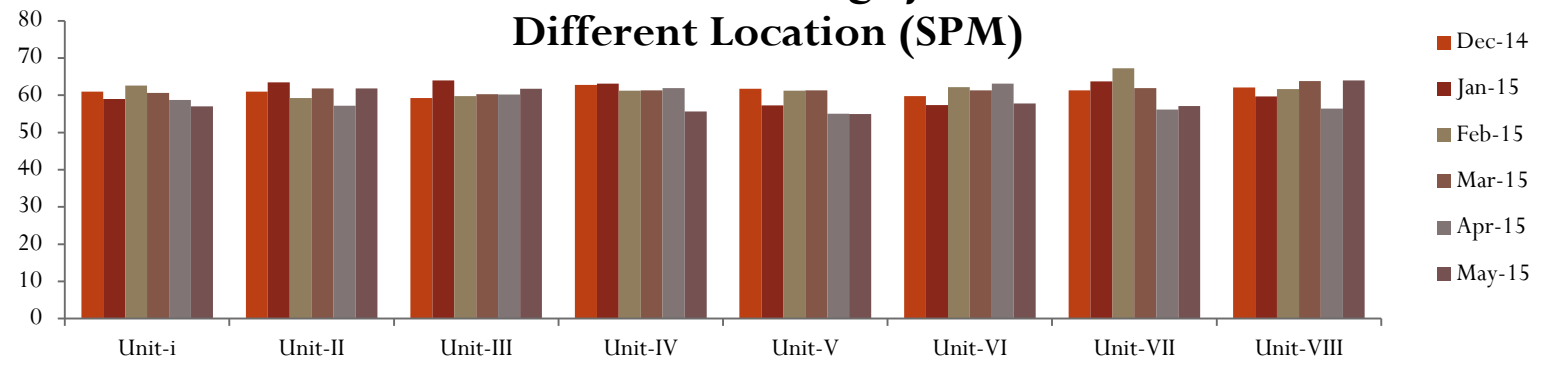
LOCATION 3: GUEST HOUSE Unit : µg/m³.

Month	$PM_{2.5}$			PM_{10}			NO_2			SO_2		
	MIN	MAX	AVG	MIN	MAX	AVG	MIN	MAX	AVG	MIN	MAX	AVG
JAN	23.7	28.7	26.7	44.9	50.8	47.3	15.7	17.4	16.7	10	12.7	11.2
FEB	24.8	29.4	26.8	38.5	50.1	43.3	13.8	16.9	15.5	7.2	10.3	8.5
MAR	20.9	23.4	22.1	46.1	60.2	52.9	7.6	16.7	11.7	5.2	10.3	7.1
APR	25.3	32.2	29.0	28.3	38.3	32.3	28.3	38.3	33.3	12.3	15.2	13.9
MAY	26.2	30.2	28.2	38.2	48.6	43.2	14.4	16.5	15.1	13.6	16.2	14.8
JUN	28.5	32.3	29.4	39.4	47.5	42.6	14.3	16.3	15.0	13.2	16.8	14.9
JUL	24.8	29.3	27.3	35.4	46.2	40.6	14.5	16.8	15.7	12.9	13.6	13.1
AUG	29.6	31.2	30.7	40.8	46.4	44.1	14.6	16.2	15.2	14.4	16.1	15.0
SEP	29.1	30.7	30.0	41.4	47.1	44.8	14.8	16.4	15.4	9.4	13.0	11.8
OCT	27.2	29.4	28.2	42.7	48.5	45.6	15.3	16.9	15.9	7.3	9.3	8.5
NOV	23.7	28.2	25.8	40.0	53.0	45.7	13.8	18.0	15.7	8.1	12.4	10.2
DEC	22.9	27.9	25.7	37.6	45.7	41.1	12.7	17.2	15.4	7.8	9.3	8.6

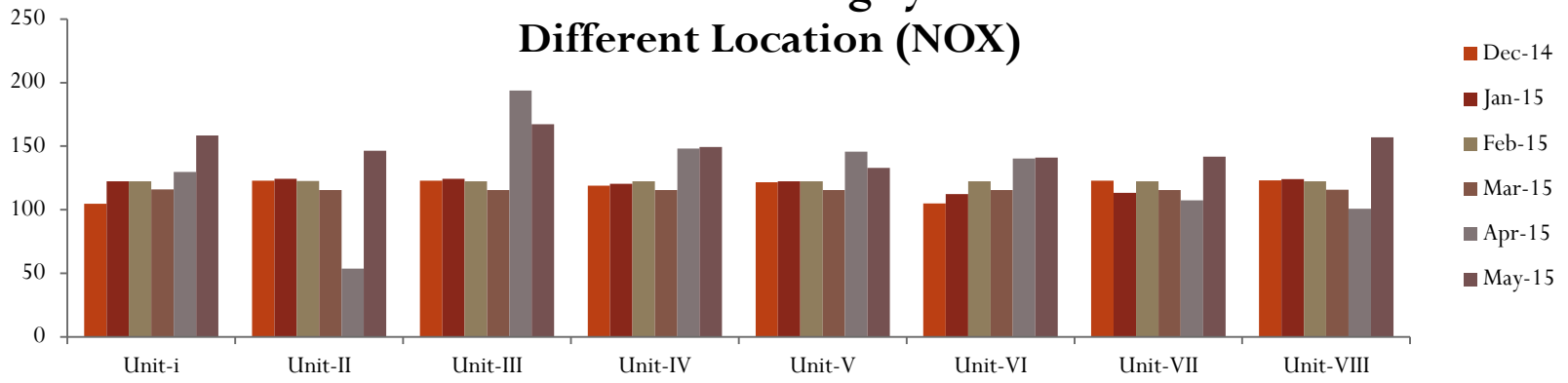
LOCATION 6: CHULI VILLAGE Unit : µg/m^3.

Month	$PM_{2.5}$			PM_{10}			NO_2			SO_2		
	MIN	MAX	AVG	MIN	MAX	AVG	MIN	MAX	AVG	MIN	MAX	AVG
JAN	18.5	21.7	20.1	37.2	45.1	41.2	15	17.2	16.2	9.3	11.7	10.5
FEB	18.7	21.6	19.9	21.8	34.8	29.7	14.9	18.6	16.7	7.3	10.4	8.6
MAR	20.8	21.9	21.4	44.6	60	51.8	9.5	15.3	12.0	5.0	9.2	7.0
APR	17.6	21.3	19.6	26.8	36.6	31.1	12.6	15.2	13.8	11.4	13.2	12.1
MAY	18.9	21.3	19.9	30.5	41.2	36.6	11.8	15.2	13.4	12.1	14.2	12.9
JUN	19.1	24.3	21.5	32.3	41.3	36.9	12.0	15.5	13.7	12.8	14.5	13.5
JUL	19.6	21.6	20.7	37.9	42.4	39.9	14.1	17.4	15.4	10.6	13.2	11.8
AUG	23.4	26.5	24.6	34.8	40.6	38.2	13.6	15.1	14.1	13.2	14.2	13.8
SEP	18.7	21.4	19.9	35.2	41.5	38.3	13.9	15.3	14.4	8.9	12.0	10.9
OCT	18.8	21.1	19.9	32.8	43.2	38.5	17.1	18.9	17.8	7.2	8.6	8.0
NOV	18.1	20.5	19.3	32.0	47.0	41.5	13.8	18.3	16.2	7.7	11.5	9.6
DEC	18.7	21.6	19.9	21.8	34.8	29.7	14.9	18.6	16.7	7.3	10.4	8.59

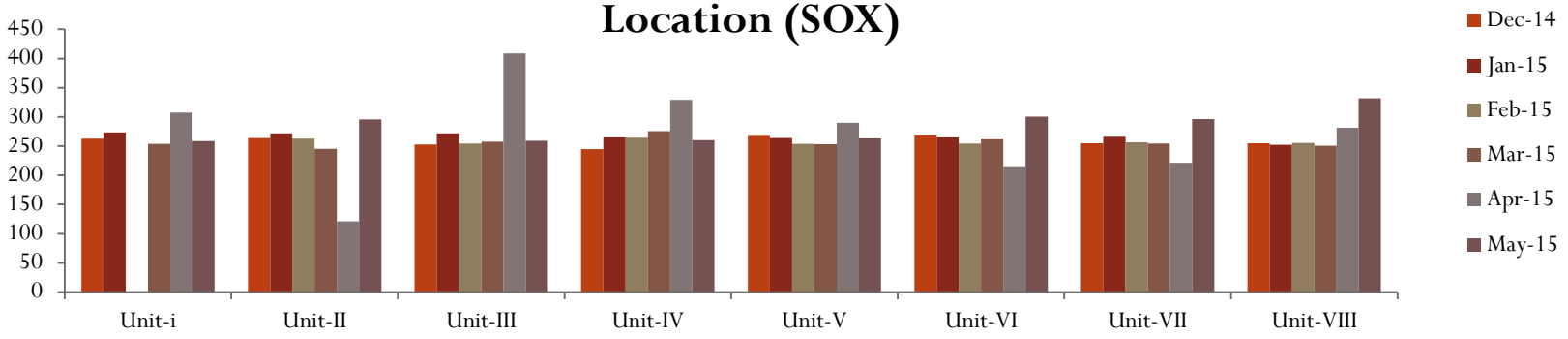
Continuous Emission Monitoring System-CEMS DATA of Different Location (SPM)



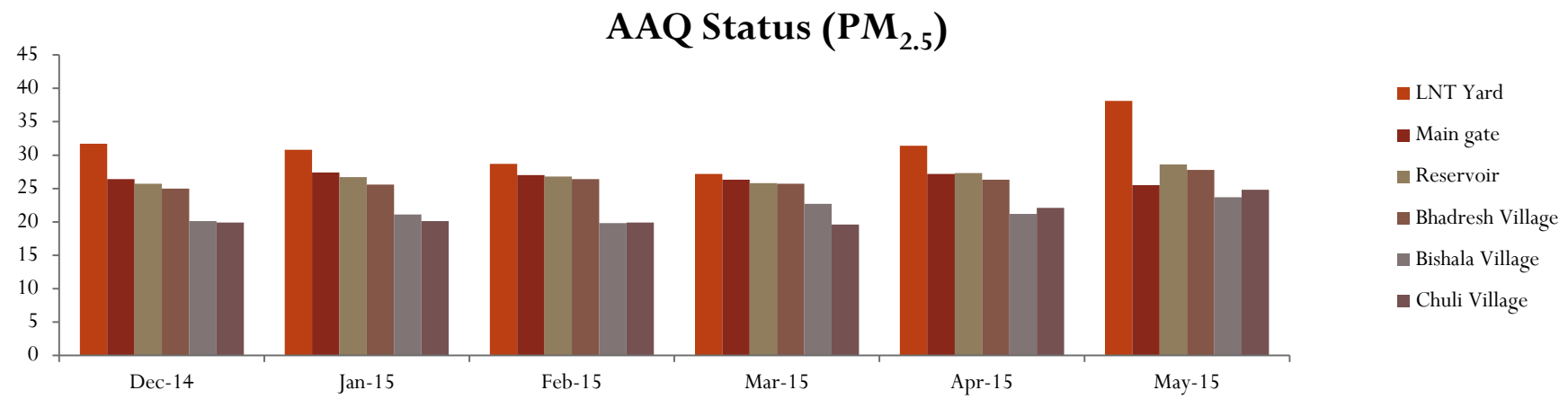
Continuous Emission Monitoring System-CEMS DATA of Different Location (NOX)

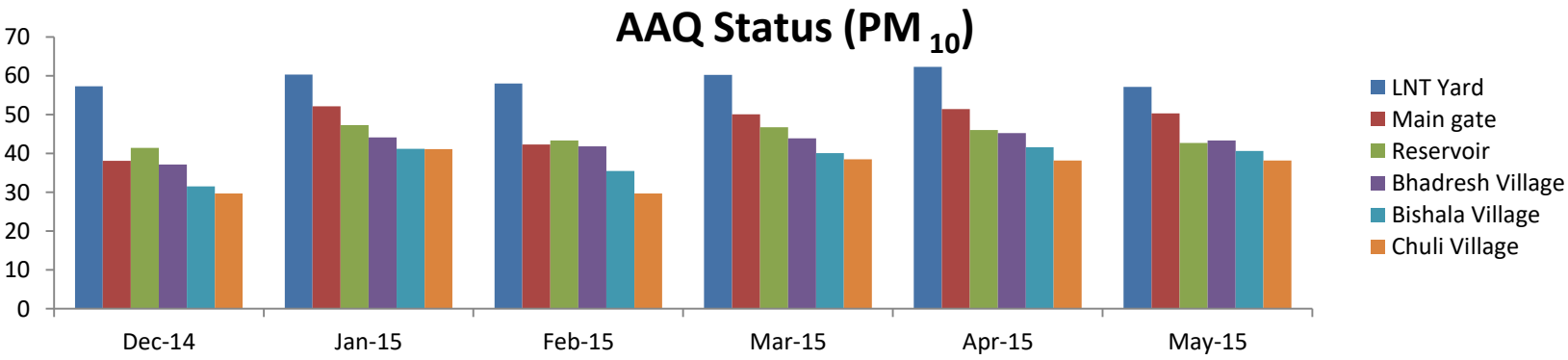


Continuous Emission Monitoring System-CEMS DATA of Different Location (SOX)

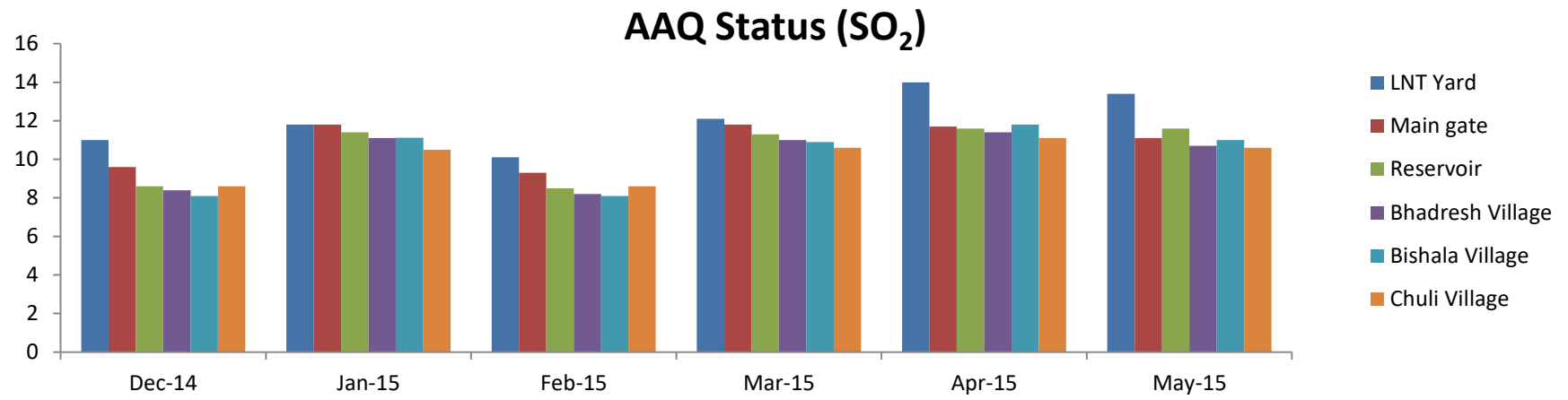


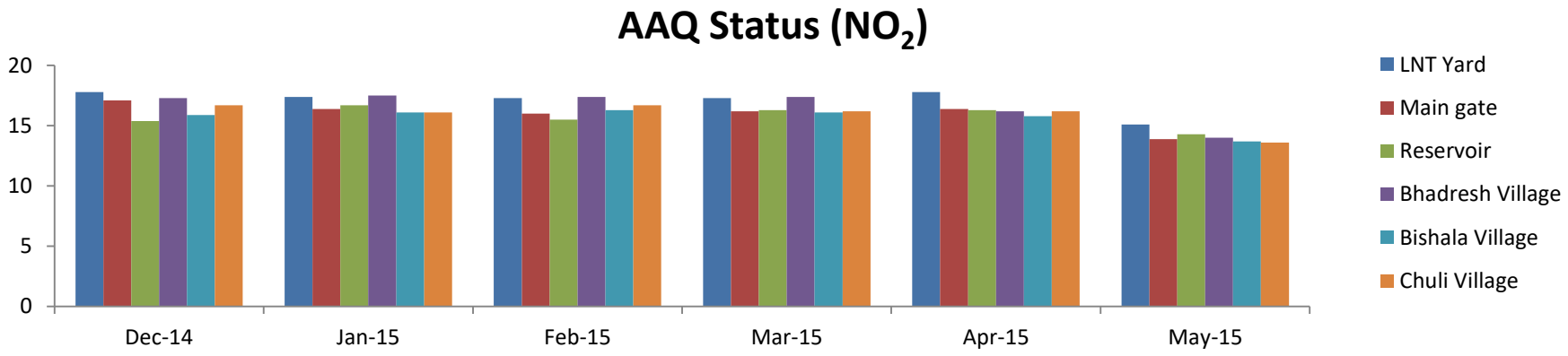
RWPL- CAAQMS Data (April – September 2015 (dBA)



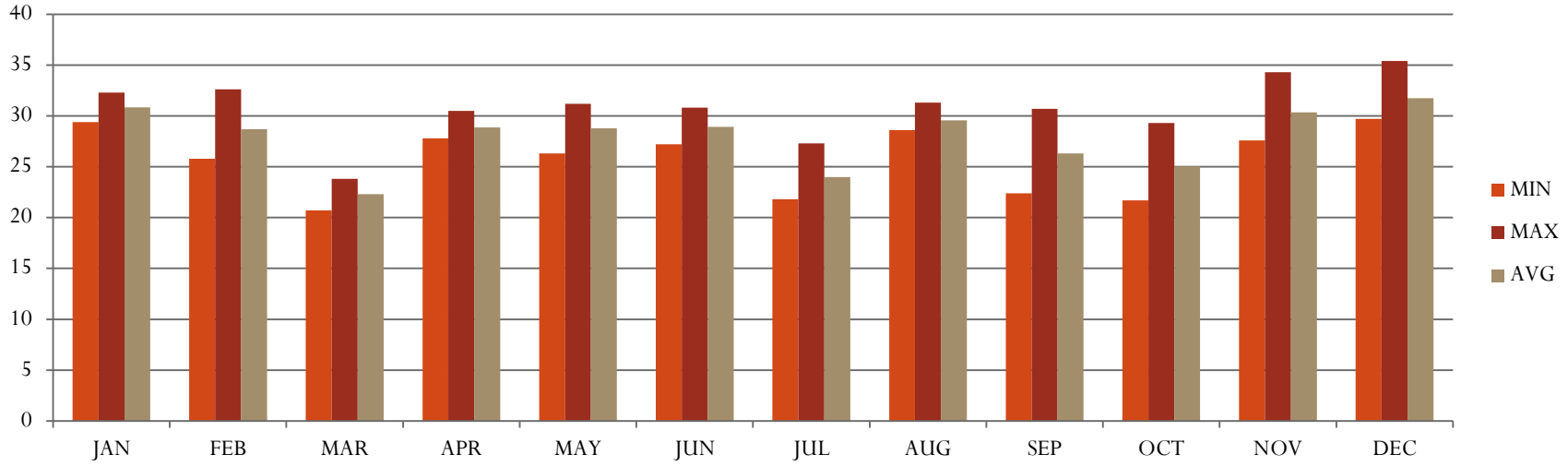


RWPL- CAAQMS Data (April – September 2015 (dBA)

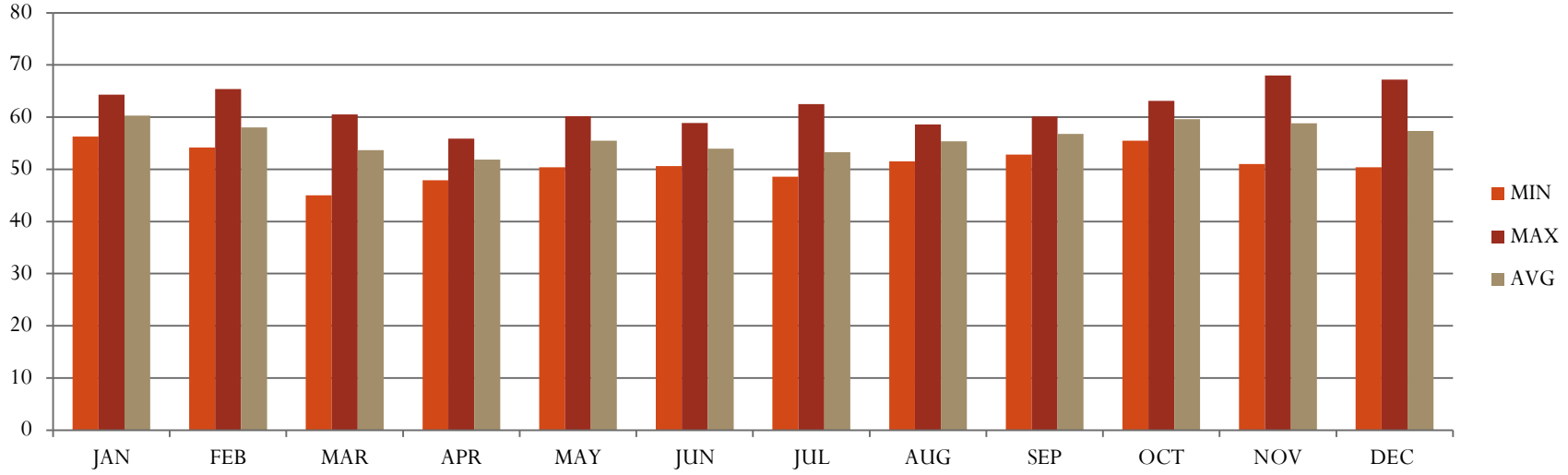




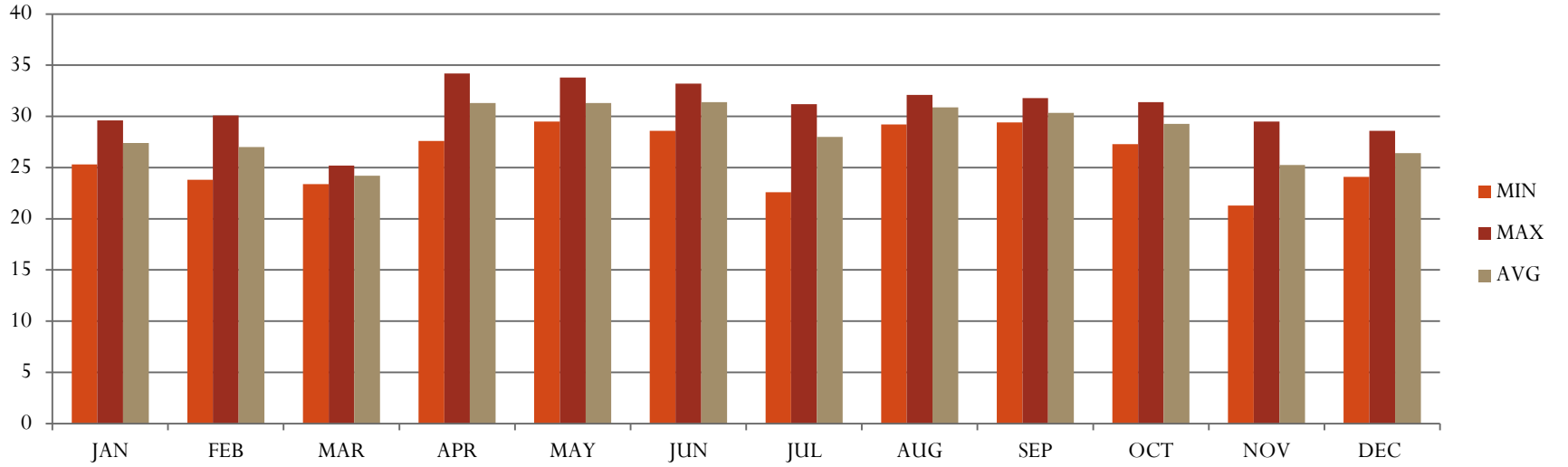
Month wise AAQ Status of Location 1 – SCRAP YARD ($PM_{2.5}$)



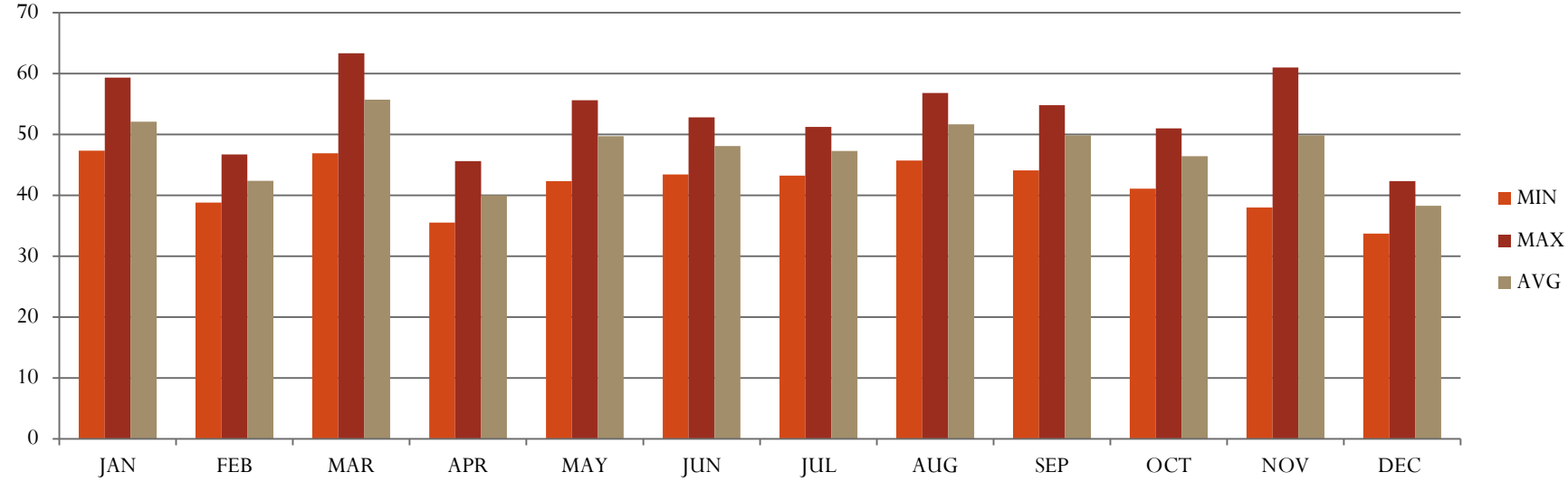
Month wise AAQ Status of Location 1 – Scrap Yard (PM_{10})



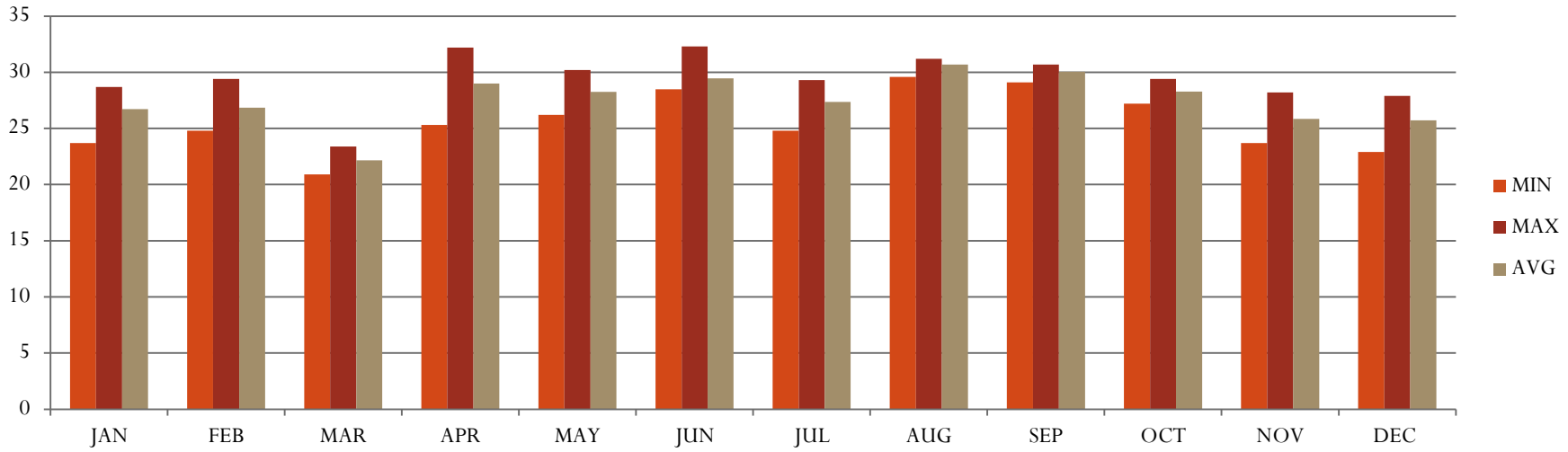
Month wise AAQ Status of Location 2–Main Gate ($PM_{2.5}$)



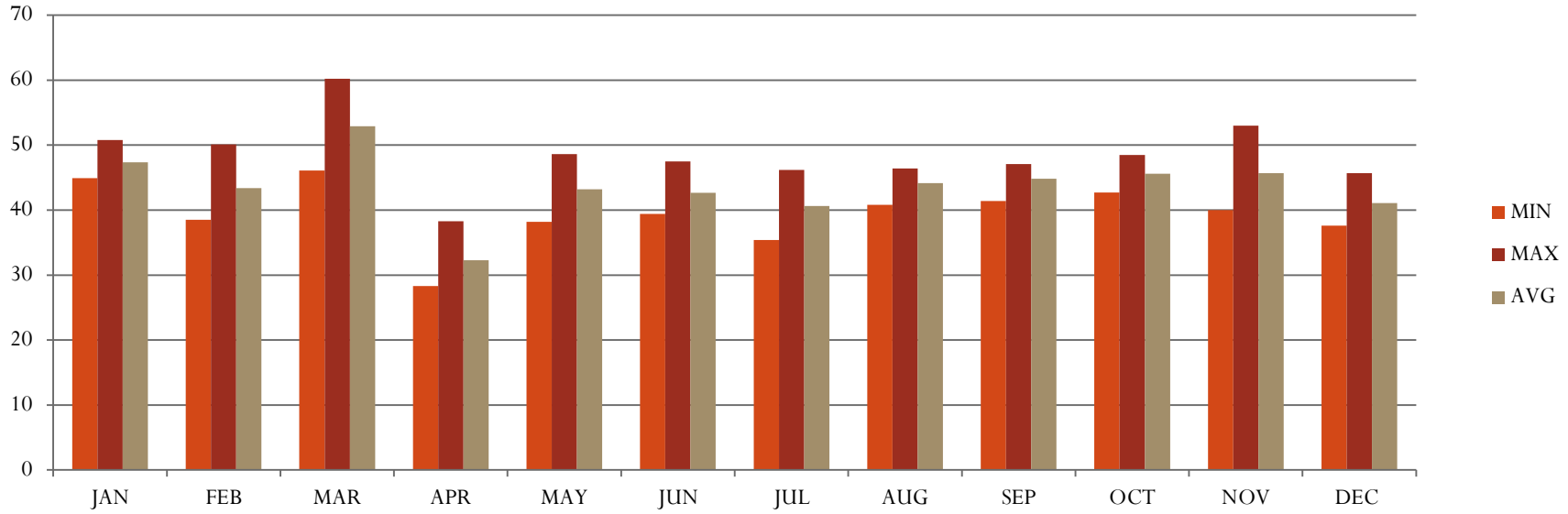
Month wise AAQ Status of Location 2–Main Gate (PM_{10})



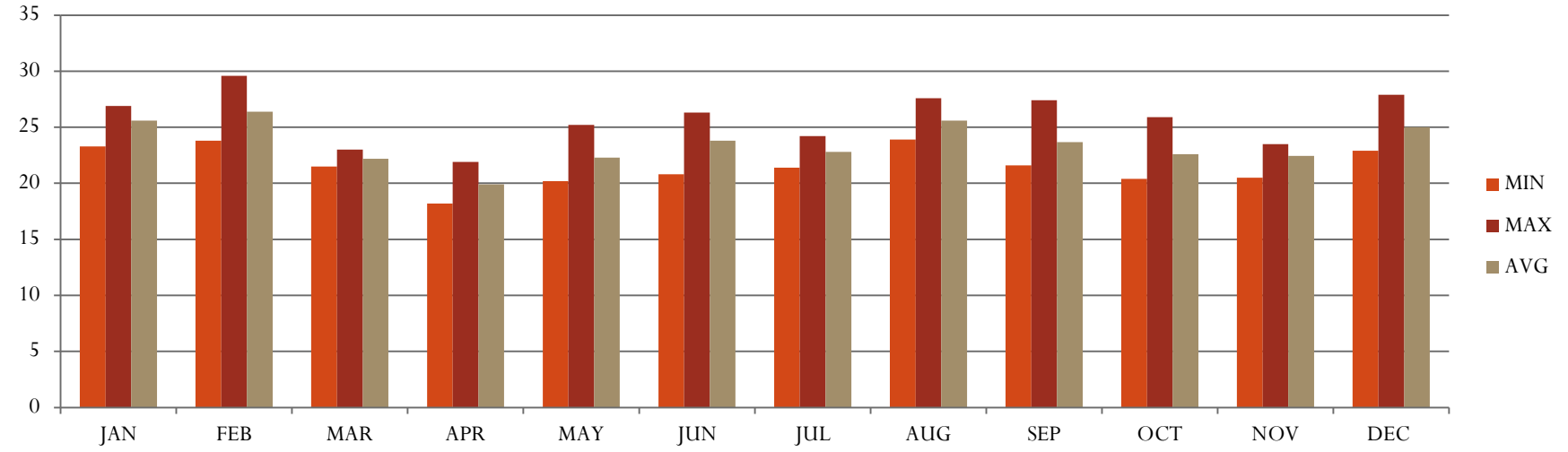
Month wise AAQ Status of Location 3–Guest House ($PM_{2.5}$)



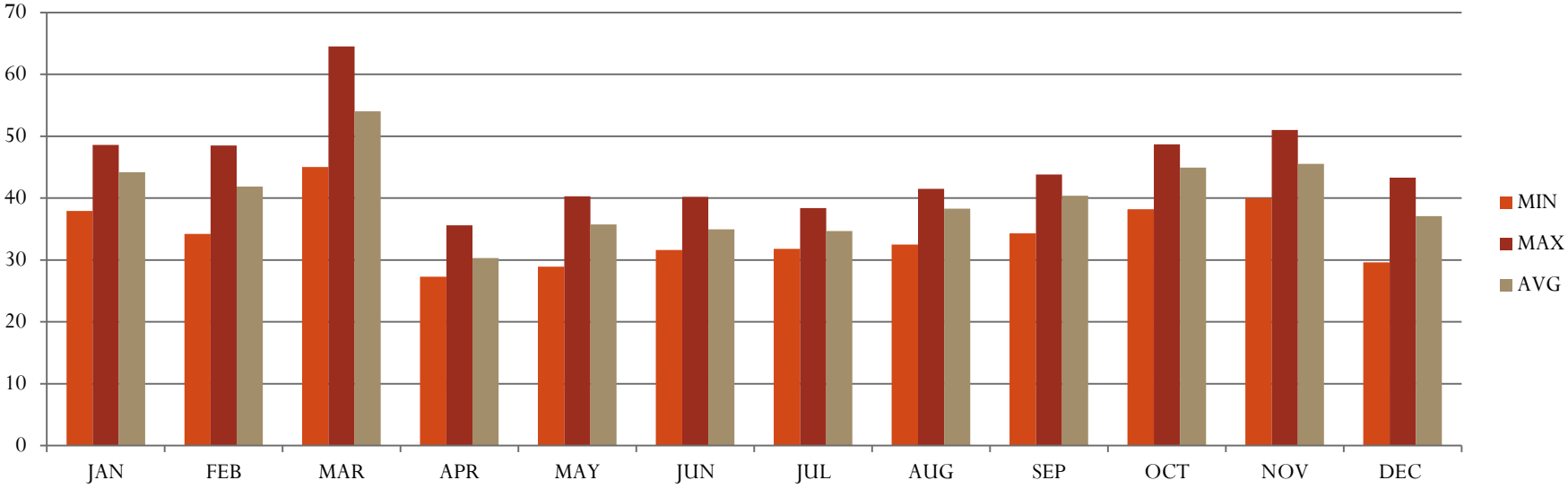
Month wise AAQ Status of Location 3–Guest House (PM_{10})



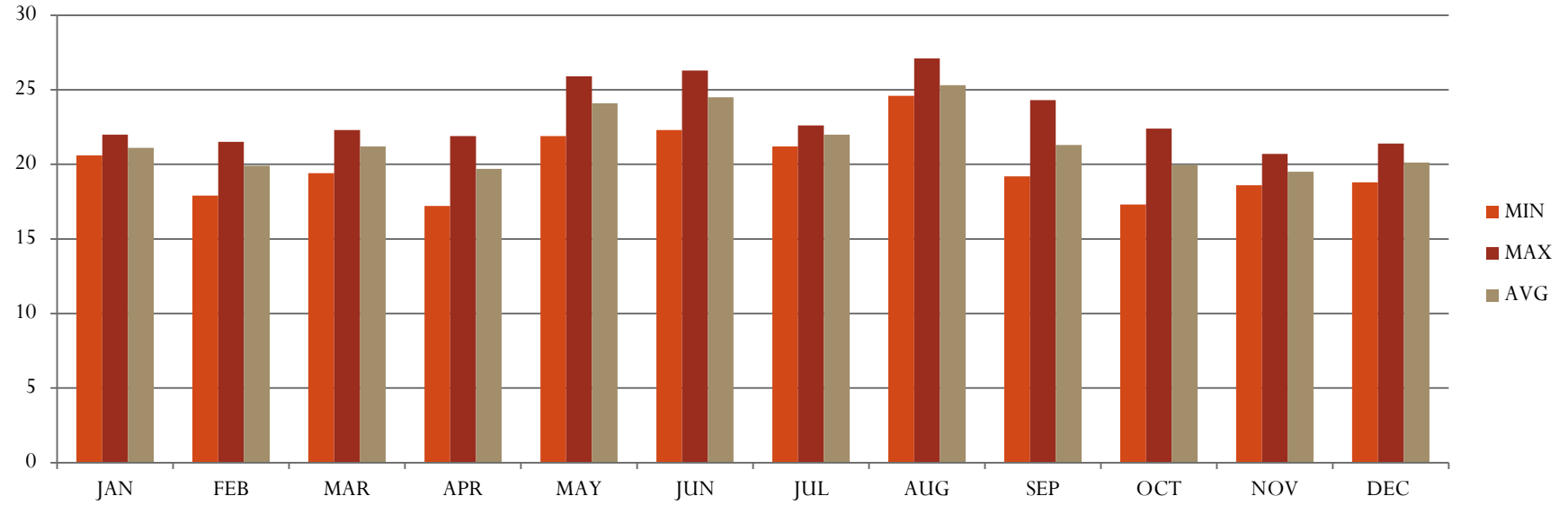
Month wise AAQ Status of Location 4 – Bhadresh (PM $_{2.5}$)



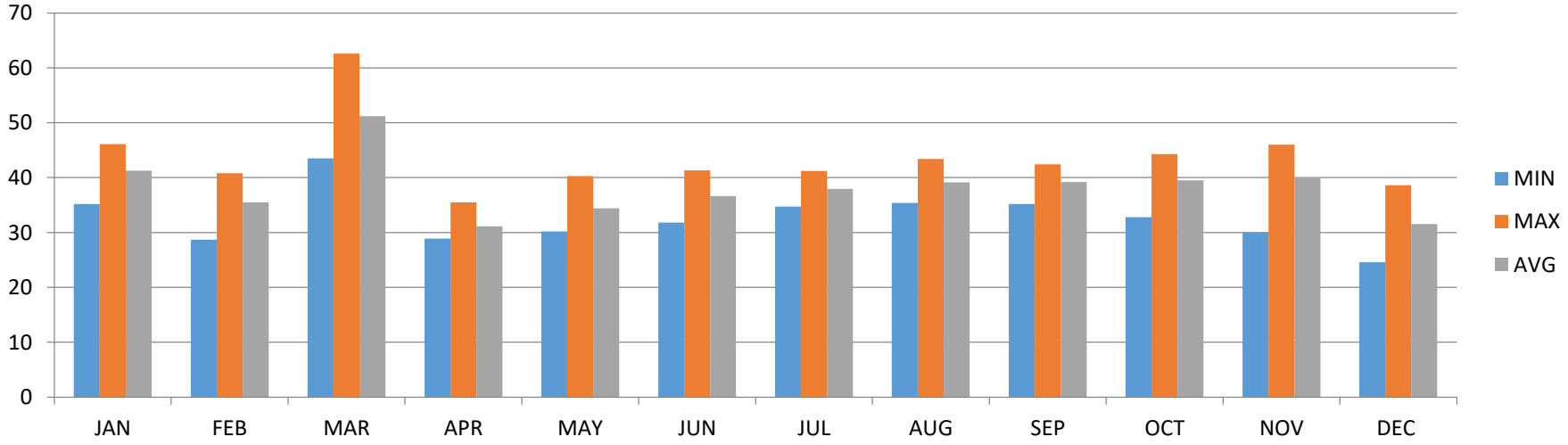
Month wise AAQ Status of Location 4 – Bhadresh (PM $_{10}$)



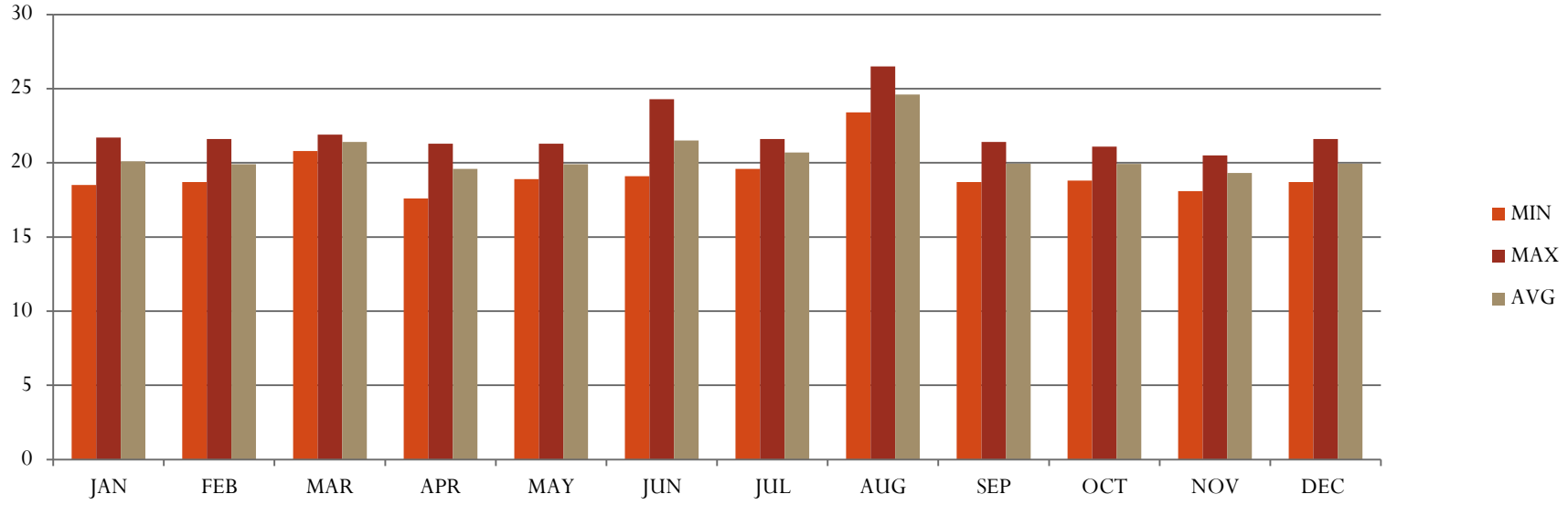
Month wise AAQ Status of Location 5 – Bishala ($PM_{2.5}$)



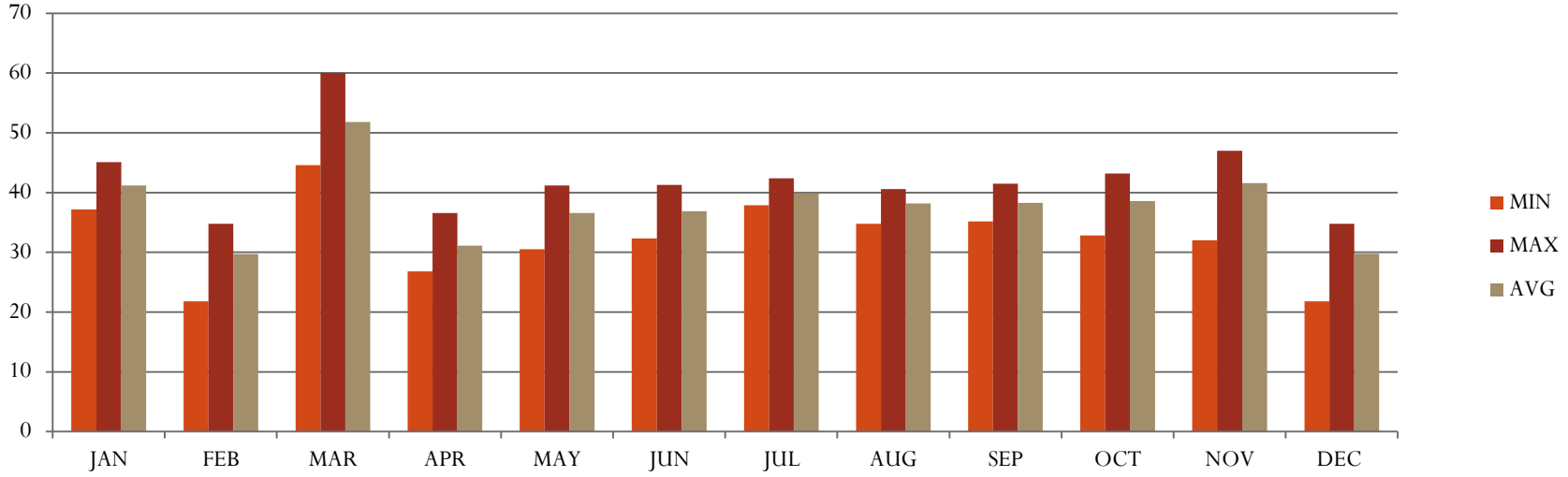
Month wise AAQ Status of Location 5 – Bishala (PM_{10})



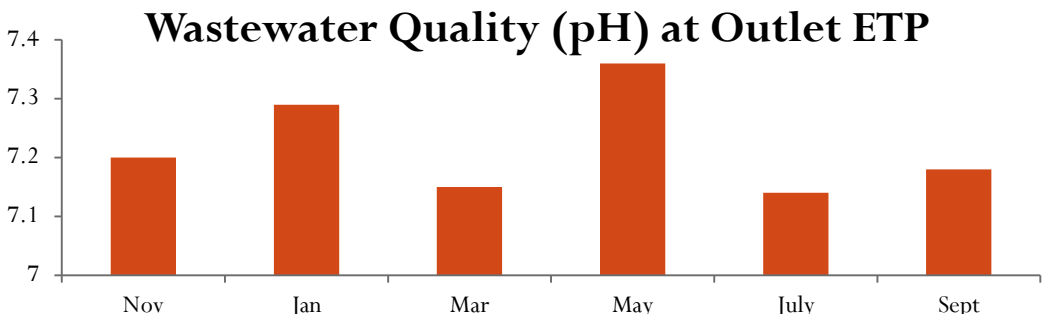
Month wise AAQ Status of Location 6 – Chuli ($PM_{2.5}$)

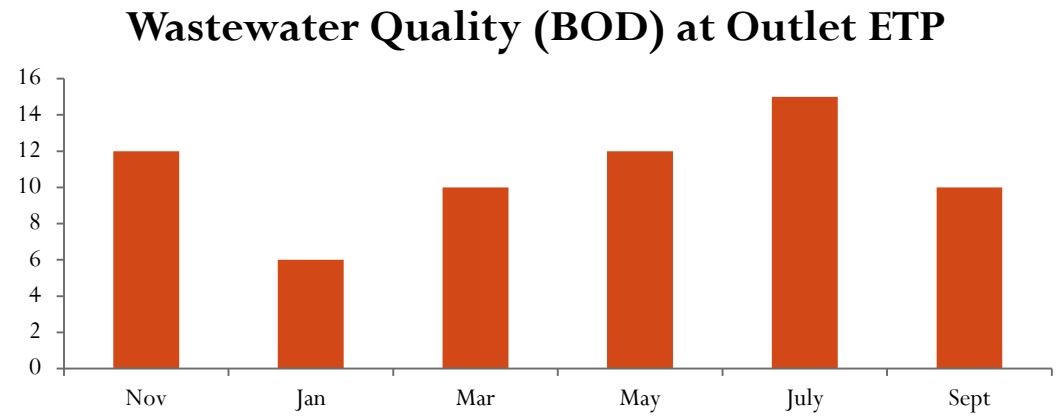


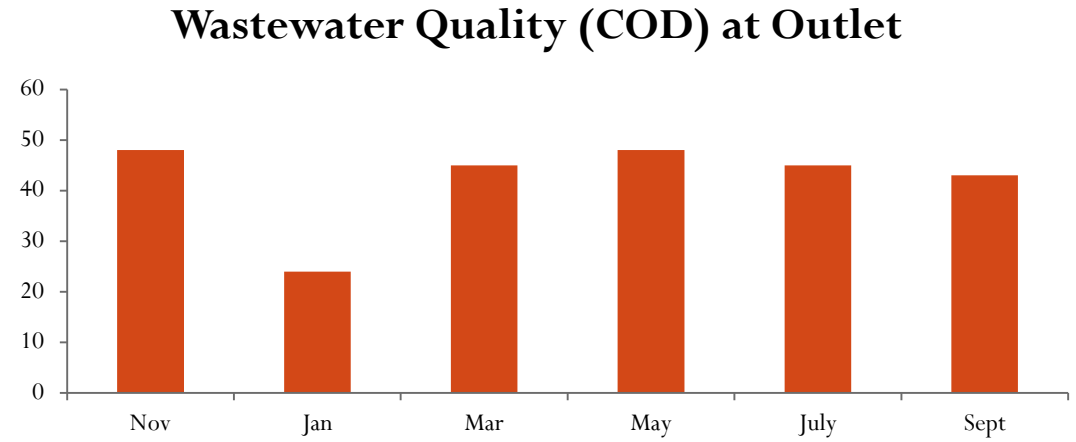
Month wise AAQ Status of Location 6 – Chuli (PM_{10})



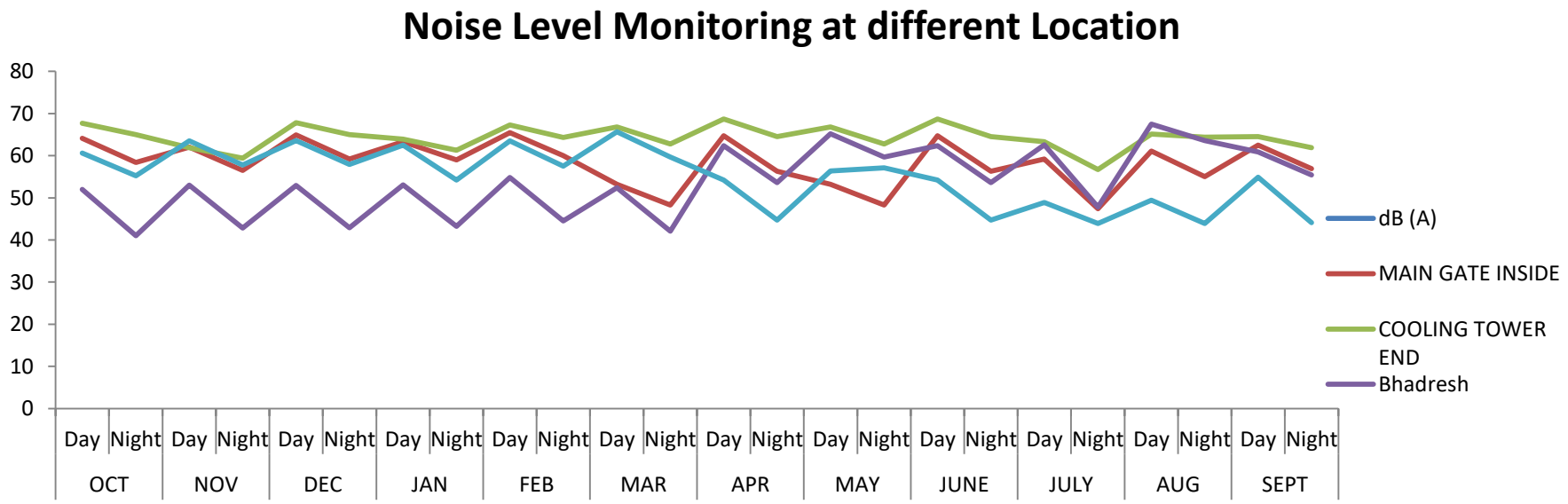
RWPL- ETP Outlet Data (April – September 2015 (dBA)



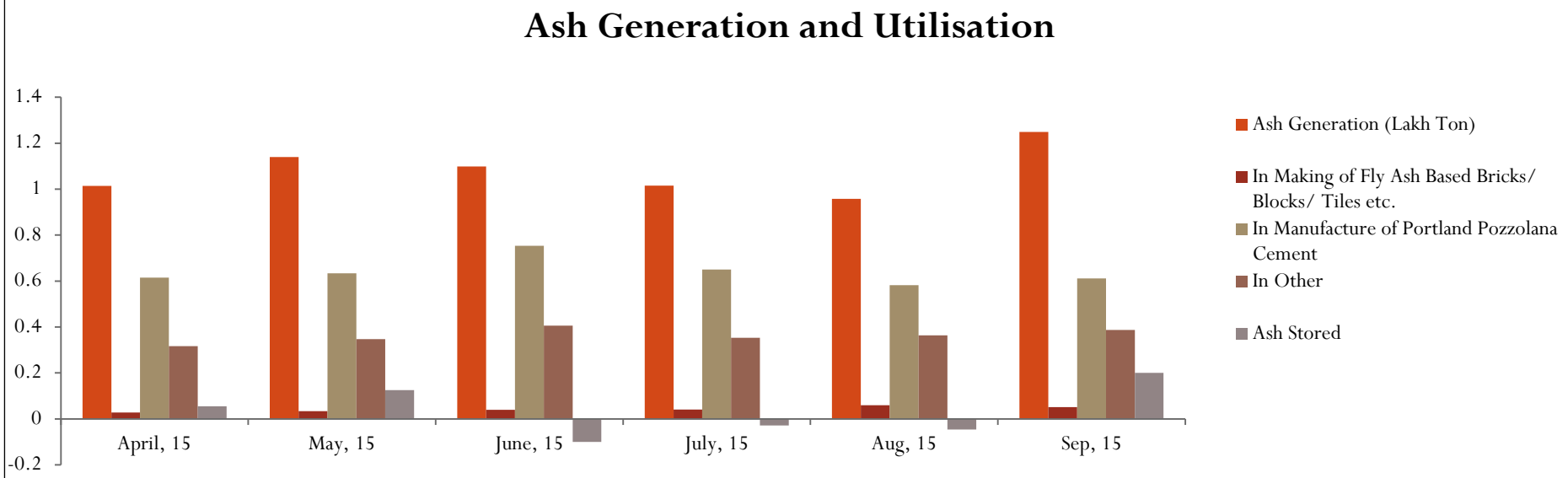




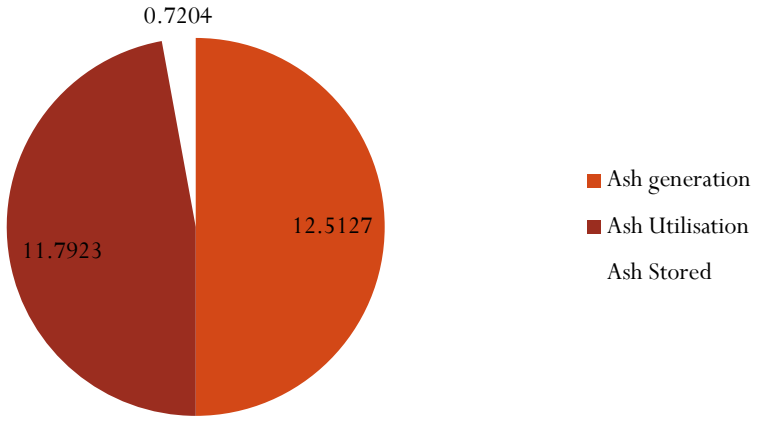
RWPL- Noise Level in Day & Night (April – September 2015 (dBA)



RWPL- Ash Utilization Pattern (April – September 2015 (Lakh Tons)



RWPL- Ash Generation & Utilization (April – September 2015 (Tons)



Ash Generation and Utilization from existing plant (1080 MW)

Month	Coal Consumed (Lakh Ton)	LimeCoal Consumed (Lakh Ton)	Ash Content of Coal (Percentage)	Ash Generation (Lakh Ton)	Ash Utilised (Lakh Ton)	Ash Utilisation (Percentage)	In Making of Fly Ash Based Bricks/ Blocks/ Tiles etc.	In Manufacture of Portland Pozzolana Cement
(2)	(3)		(4)	(5)	(6)	(7)	(8)	(9)
April, 14	5.687	0.107	16.60	1.0385	0.8184	78.8	0.01675	0.31746
May, 14	6.190	0.147	18.45	1.2717	1.0517	82.7	0.01191	0.31010
June, 14	5.909	0.145	18.82	1.2396	1.0196	82.3	0.01469	0.38240
July, 14	6.152	0.167	17.47	1.2217	1.0017	82.0	0.02464	0.51730
Aug, 14	5.575	0.145	19.30	1.2031	0.9831	81.7	0.02536	0.38825
Sep, 14	5.886	0.120	16.76	1.0922	0.8722	79.9	0.02440	0.54001
Oct, 14	5.746	0.170	14.12	0.9605	0.4285	43.7	0.01798	0.372
Nov, 14	5.026	0.133	15.77	0.9148	0.6365	69.6	0.00936	0.504
Dec, 14	4.841	0.121	16.61	0.9109	0.7901	86.7	0.02667	0.602
Jan, 15	5.515	0.140	17.68	1.0982	0.9064	82.5	0.03717	0.633
Feb, 15	5.620	0.150	16.47	1.0715	0.8669	80.9	0.03642	0.568
Mar, 15	5.710	0.190	16.35	1.0913	0.8570	81.9	0.03717	0.597
April, 15	5.1158	0.158	17.11	1.0145	0.9601	94.6	0.02835	0.61476
May, 15	5.3242	0.163	18.71	1.1395	1.0146	89.0	0.03421	0.63383
June, 15	4.9983	0.132	19.65	1.0987	1.1987	109.1	0.03946	0.75329
July, 15	5.0360	0.104	18.34	1.0153	1.0440	102.8	0.04109	0.64975
Aug, 15	4.9681	0.099	17.53	0.9583	1.0047	104.8	0.05928	0.58156
Sep, 15	5.8790	0.183	18.50	1.2485	1.0482	84.0	0.05051	0.61108

राजस्थान सरकार

कार्यालय आयुक्त, क्षेत्रीय विकास, इन्दिरा गांधी नहर परियोजना, बीकानेर।

क्रमांकः– प017(3974) आक्षेवि/रेगु/2015/ 31 दिनांक 15/01/2016

मुख्य अभियन्ता,
इन्दिरा गॉधी नहर परियोजना,
बीकानेर ।

विषयः– चौधरी कुभाराम आर्य लिफ्ट नहर में अनिवार्य आवश्यकता में पैयजल हेतु 28.46 क्यूसेक अतिरिक्त पानी के संबंध में।

प्रसंगः– आपका पत्रांक एफ37/2/मुअ/इंगानप/494 दिनांक 12.01.16

महोदय,

उपर्युक्त विषयान्तर्गत इस कार्यालय के पत्रांक प017(3955) आक्षेवि/रेगु/ 2015/838 दिनांक 31.12.2015 द्वारा इंगानप की नहरों को दिनांक 03.01.16 से 06.02.16 तक चलाये जाने के अनुमोदित चक्रीय कार्यक्रम की निरन्तरता में आपके प्रासंगिक पत्र, जिसके द्वारा चौधरी कुम्भाराम आर्य लिफ्ट नहर में पैयजल हेतु 30 क्यूसेक के स्थान पर 58.46 क्यूसेक पानी अनिवार्य आवश्यकता में सम्मिलित करने की मांग की गई थी, को इन्दिरा गॉधी नहर परियोजना के वर्तमान चक्रीय कार्यक्रम के आगामी रोटेशन दिनांक 20.01.16 से सम्मिलित करने की स्वीकृति प्रदत्त की जाती है एवं तदानुसार अनिवार्य आवश्यकता उपरोक्त संशोधन उपरान्त संलग्नानुसार होगी।

संलग्नः– उपरोक्तानुसार।

भवदीय,

आयुक्त
क्षेत्रीय विकास, इंगांनप,
बीकानेर।

क्रमांकः– प017(3974) आक्षेवि/रेगु/2015/ 32 दिनांक 15/01/2016

प्रतिलिपिः निम्न को सूचनार्थ एवं आवश्यक कार्यवाही हेतुः–
(उक्त कार्यक्रम ई–मेल पर प्रस्तुत/प्रेषित है एवं विभागीय वेबसाईट www.cad.rajasthan.gov.in पर भी उपलब्ध है)।

फसल रबी 2015–16 के दौरान दिनांक 20.1.2016 सायं 6:00 बजे से दिनांक 06.02.2016 सायं 6–00 बजे तक नहरों को 4 में से 2 समूहों में चलाने हेतु (संशोधित) "अनिवार्य आवश्यकता, समूहों का विवरण एवं चक्रीय कार्यक्रम"

अनिवार्य आवश्यकता

		(सभी मात्राएं क्यू. में)
(अ)	**हरिके हैड से इन्दिरा गांधी मुख्य नहर की आर.डी. 243 तक**	
1	हरिके हैड से विरधवाल हैड तक पानी के लोसेज	530
2	रावतसर शाखा के माध्यम से पीने का पानी	55
3	सूरतगढ़ ताप बिजलीघर के लिए	75
4(i)	कवरसैन जलोत्थान नहर	148
4(ii)	सूरसागर झील बीकानेर शहर में भण्डारण हेतु	2
5	साहवा जलोत्थान नहर 30+28.46	58.46
	योग–अ	**868.46**
(ब)	**इ.गा.मु.नहर की बुर्जी 243 से 620 तक**	
1	विरधवाल हैड से आर.डी. 620 तक पानी के लॉसेज	200
	योग–ब	**200**
(स)	**इ.गा.मु.न. की आर.डी. 620 से 1254 तक**	
1	इगानप की आरडी 620 से आर.डी. 1254 तक पानी के लॉसेज	255
2	पीने का पानी बीकानेर शहर के लिए शोभासर जलाश्य के माध्यम से	76
3	बरसिंहसर थर्मल प्लांट	25
4	नागौर लिफ्ट के लिए पीने का पानी	30
5	मैसर्स वी.एस. लिग्नाईट पावर प्रोजेक्ट प्रा.लि. गुढा	5
6	पीने का पानी जोधपुर लिफ्ट	195
7	सोलर पॉवर प्रोजेक्ट मैसर्स गोदावरी ग्रीज एनर्जी लिमिटेड	1.6
8	पोकरण फलसूण्ड पेयजल योजना	30
	योग–स	**617.60**
(द)	**इ.गा.मु.नहर की आर.डी. 1254 के नीचे**	
1	इगामुन की बुर्जी 1254 के नीचे लॉसेज	115
2	पीने का पानी ग्रामीण क्षेत्र के लिए	70
3	पीने का पानी जैसलमेर शहर	30
4	रामगढ़ गैस विद्युत परियोजना	25
5	गिराल परियोजना हेतु	24
6	राजवेस्ट परियोजना हेतु	40
7	बाडमेर लिफ्ट परियोजना हेतु	16
	योग–द	**320**
	योग अ+ब+स+द	**2006.06**

WATER SAMPLING LOCATIONS

Code	Name of Location	Distance & Direction from Site	Source	Coordinates
W-1	Dudhio ki Dhani	2.8 km WNW	Supply water	25°54'21.7" N 71°20'22.3" E
W-2	Kapurdi village	3.2 km S	Supply water	25°53'23.0" N 71°22'15.7" E
W -3	Jalipa Agar	6.5 km S	Supply water	25°50'12.8" N 71°23'11.0" E
W -4	Urgra Ram Ki Dhani	5.0 km SW	Supply water	25°52'42.0" N 71°16'29.7" E
W -5	Jalipa	9.0 km SSE	Supply water	25°49'42.9" N 71°23'45.1" E
W -6	Project Site	Site	Supply water	25°54'23.9" N 71°19'47.7" E
W -7	Bhadresh	1.5 km W	Dug Well (Beri)	25°53'17.1" N 71°18'27.1" E
W -8	Chuli village	3 km S	Dug Well (Beri)	25°51'21.6" N 71°20'20.6" E

WATER QUALITY RESULTS

	Parameters	Unit	Dudion Ki Dhani	Kapurdi village	Jalipa Agar	Ugra Ram Ki Dhani
1	pH	-	7.92	7.89	7.88	7.95
2	Conductivity	μmhos/cm	260	258	264	256
3	Turbidity	NTU	2	2	2	2
4	Total Dissolved Solids	mg/l	198	196	202	198
5	Total Hardness as $CaCO_3$	mg/l	100	100	100	100
6	Calcium as Ca	mg/l	32	32	32	32
7	Magnesium as Mg	mg/l	4.9	4.9	4.9	4.9
8	Sulphate	mg/l	6.8	6.5	7.0	7.5
9	Chlorides as Cl	mg/l	26	25	26	24
10	Nitrates as NO_3	mg/l	5.8	5.4	6.0	6.8
11	Fluoride as F	mg/l	0.68	0.67	0.68	0.68
12	Iron as Fe	mg/l	0.014	0.015	0.014	0.015
13	Oil & Grease	mg/l	Nil	Nil	Nil	Nil
14	Total coliform	MPN/100 ml	Nil	Nil	Nil	Nil

WATER QUALITY RESULTS

	Parameters	Unit	Jalipa village	Project Site	Bhadresh Village	Chuli Village
1	pH	-	7.91	8.35	7.58	8.07
2	Conductivity	μmhos/cm	262	340	560	1150
3	Turbidity	NTU	2	2	2	3
4	Total Dissolved Solids	mg/l	200	258	428	862
5	Total Hardness as $CaCO_3$	mg/l	100	50	160	270
6	Calcium as Ca	mg/l	32	12	24	20
7	Magnesium as Mg	mg/l	4.9	4.9	24.3	55.9
8	Sulphate	mg/l	6.8	7.8	14.6	42.8
9	Chlorides as Cl	mg/l	25	22	18	40
10	Nitrates as NO_3	mg/l	6.2	5.8	17.8	18.6
11	Fluoride as F	mg/l	0.66	0.74	1.16	1.15
12	Iron as Fe	mg/l	0.012	0.016	0.018	0.034
13	Oil & Grease	mg/l	Nil	Nil	Nil	Nil
14	Total coliform	MPN/100 ml	Nil	Nil	Nil	Nil

Table 3. Forest cover (km^2) in India, Rajasthan province and in Barmer district

Category	India	Rajasthan	Barmer
Geographic Area	3,287,263	342,239	28173.32
Very Dense Forest	51,285	14	-
Moderately Dense Forest	339,279	4,482	-
Open Forest	287,769	11,330	54.00
Total	678,333	15,826	54.00
Percent	20.64 %	4.62 %	0.19%
Tree Cover	99,896	8638	
Non Forest Cover			
Scrub	40,269 km^2		103.00
Non forest **	2,568,661 km^2		28016.32

** excludes scrubs and includes water bodies
(Source: FSI, 2003).

Table 4. Different types of land use in India and Rajasthan (m ha)

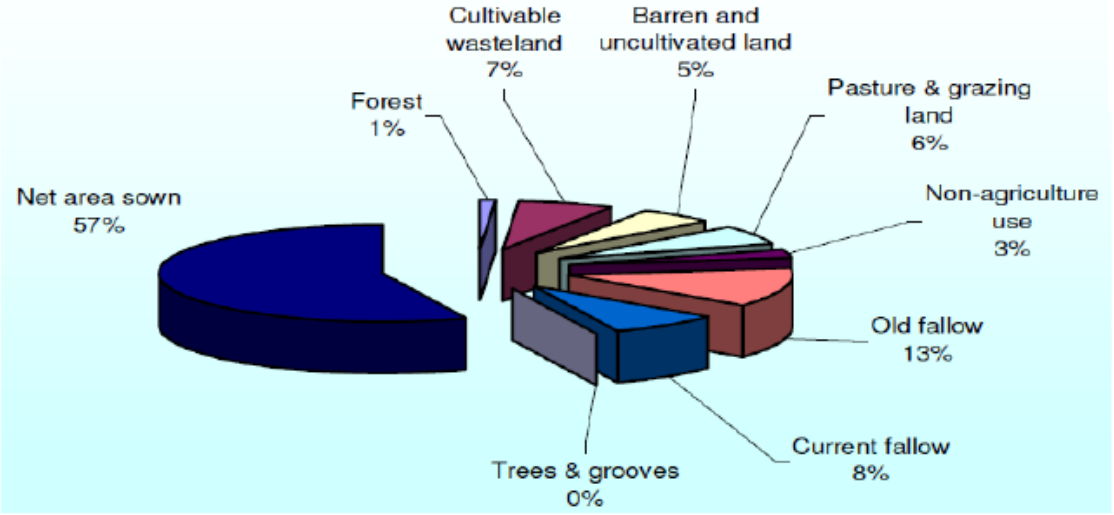
Land use	India	Rajasthan	Barmer (ha)
Forest	68.75	2.48	28523
Pasture	11.93	1.74	203560
Not-available	19.54	4.33	231397
Misc. crop & grooves	3.57	0.014	57.00
Culturable wasteland	13.94	5.04	231397
Fallowland	23.21	3.85	599718
Net area sown	146.82	16.79	1552114

Table 3. Land use pattern (ha) of the district under consideration.

(Source: Envis 2003)

Land uses (ha)	Barmer
Forest cover	28523
Cultivable wasteland	231397
Barren and uncultivated land	128339
Pasture and grazing land	203560
Non-agriculture use	73624
Old Fallow	391769
Area under current fallow	207949
Tree and grooves	57.00
Net area sown	1552114
Total Area	2817332

Land use pattern in Barmer






Left to right; Top: vegetation in protected area of Khudala; Bottom: *C. jwarncussa* and *P. antidotale* and goat grazing in plantation area of Khudala forest

Left to right, Top: *P. cineraria*, *T. aphylla* and *A. nilotica* along a pond near Bandra; Bottom: *A. jacquemontii*, *S. oleoides* associated with *C. phlomides*, and *E. caducifolia*.

Fig 1. Traditional methods of rainwater harvesting for drinking purposes in dry region.

भारत सरकार
पर्यावरण, वन एवं जलवायु परिवर्तन मंत्रालय
क्षेत्रीय कार्यालय (मध्य)
Government of India
Ministry of Environment, Forests & Climate Change
Regional Office (Central Region)

सत्यमेव जयते

जहाँ है हरियाली ।
वहाँ है खुशहाली ॥

केन्द्रीय भवन, पंचम तल, सेक्टर–एच, अलीगंज, लखनऊ–226 024
Kendriya Bhawan, 5th Floor, Sector 'H' Aliganj, Lucknow-226 024 Telefax: 2326696, 2324340, 2324047, 2324025
Email: (Env.) m_env@rediffmail.com, (Forest) goimoefrolko@gmail.com

Speed Post

File No. IV/ENV/R/Th.-39/679/2008 /1063

Dated: 20.01.2015

To,

Dr. Saroj,
Scientist 'F'
IA division,
Ministry of Environment, Forest & Climate Change,
Indira Paryavaran Bhawan, Jor Bag Road,
Aliganj, New Delhi-110 003.

Sub.: 1000 MW lignite based power plant M/s Raj West Power, Barmer, Rajasthan

Ref: Environment Clearance letter no J-13011/58/2006.IA.II(t) dated: 25.03.2010

Madam,

I am directed to inform you that this project site was monitored by Dr. K.K. Garg, Scientist 'F' on 14.07.2014. The compliance status of the above said project has been enclosed for your kind perusal.

Sincerely,

20.01.15

(Dr. Satya)
Scientist 'C'

Copy to:
Dy. Manager(Env & Chemistry), Office No. 2 & 3, 7th Floor, Man Upasana Plaza, C-44, Sardar Patel Marg, C-Scheme, Jaipur, 302 001, Rajasthan.

20.01.15

(Dr. Satya)
Scientist 'C'

भारत सरकार
पर्यावरण, वन एवं जलवायु परिवर्तन मंत्रालय
क्षेत्रीय कार्यालय (मध्य)
Government of India
Ministry of Environment, Forests & Climate Change
Regional Office (Central Region)

केन्द्रीय भवन, पंचम तल, सेक्टर–एच, अलीगंज, लखनऊ–226 024
Kendriya Bhawan, 5th Floor, Sector 'H' Aliganj, Lucknow-226 024 Telefax: 2326696, 2324340, 2324047, 2324025
Email: (Env.) rn_env@rediffmail.com, (Forest) goimoefrolko@gmail.com

Monitoring Report

S.No.	Items	Details
1.	Name of the Project	1000 MW lignite based power plant M/s Raj West Power, Barmer, Rajasthan
2.	Address of project authorities	Mr. K.N. Dubey, Dy. Manager(Env & Chemistry) 308-311, Geetanjali Tower, Ajmer Road, Jaipur Rajasthan-06
3.	Clearance letter no. & Date	J-13011/58/2006.IA.II(t) dated: 25.03.2010
4.	Regional Office File no.	IV/ENV/R/Th.-39/679/2008
5.	Date of site visit	14.07.2014
6.	Status of Construction/Operation	All the eights units of this project have been in operation since April, 2013

7. **Observations made during the site visit:**

Project authorities have complied or are in process of complying the environmental conditions stipulated for this project (conditions wise compliance status enclosed). The compliance status could be termed as satisfactory

8. **Action taken (if any):** Not required

(Dr. K.K. Garg)
Scientist 'F'

S.No.	Specific Condition	Compliance Status
I.	**No land in excess of 468 ha. shall acquired for any activity of the project:** Land acquisition has been carried at the time of setting up the Power Project. No additional land been acquired for this Project.	Complied
II.	**The water requirement for the project shall not exceed 35.5 cusecs. No ground water shall be abstracted for activity of the project.** Water in excess of the mandated 37.3 cusecs would not be drawn during the operation of the Project. IGNP supplied water is being used for generation of Electricity as per EC conditions.	Being Complied
III.	**Closed circuit cooling system with induce draft cooling towers shall be installed.** Four numbers of closed circuit cooling tower blocks with induced draft cooling towers have been erected and are in operation.	Complied
IV.	**Treated effluents conforming to the prescribed standards shall be re-circulated and reused within the plant. No effluents snail be discharged outside the plant boundary.** A common ETP **(Aeration – Clarifier – Filtration – Ultra Filtration – Reverse Osmosis)** to cater to all the 8 power generating units has erected. All the process effluents generated are treated in this ETP and reused within the plant ensuring zero discharge outside the plant boundary.	Being Complied
V.	**Lignite with ash content not exceeding 20% and sulphur content not exceeding 2.0% shall be used.** Lignite with ash content less than 20% and sulphur content less than 2% being used. Third party analysis report submitted to this office.	Being Complied
VI.	**Space provision for FGD shall be made, if required at a later stage.** The Project is based on Circulating Fluidized Base Combustion technology for fuel firing and involves injection of lime, which absorbs Sulphur. As such, there is no requirement for FGD. However space provision has been made for FGD.	Complied
VII.	**Four stacks of 122 m height each with exit velocity of at least 20m/s shall be provided with continuous online monitoring system.** A total of four bi-flue stacks, each flue of 122 m height, shall release the flue gases to the atmosphere. All these stacks being equipped with Continuous Emission Monitoring Systems (CEMS), to ensure the emission of PM, SO2, NOx & CO to be within prescribed levels.	Complied
VIII.	**Low NOx burners shall be installed.** The boiler is designed on Circulating Fluidized Bed Combustion, system self attains to very low NOx generation.	Complied

J-13011/58/2006-IA.II(T)

IX.	**High efficiency electrostatic precipitator (ESPs) having efficiency of 99.9% shall be installed so as to ensure that particulate emissions do not exceed 100mg/Nm3.** High efficiency ESPs are installed to maintain PM emission levels at less than 100 mg/Nm^3.	Complied
X.	**Fly ash shall be collected in dry form and its 100% utilization shall be ensured within 3 years from the day of the commissioning of the plant. Ash to be disposed off in the ash pond shall be through HCSD system.** Fly ash is being collected in dry form from the currently operational all the eights Units and is being lifted by M/s Shree Cement, M/s. JK Lakshmi, M/s. Ambuja Cement Limited & M/s Binani Cements and many Local Brick and Tiles Block manufacturer. Unutilized ash, if any, would be disposed off to the emergency ash pond through HCSD system. They are in process to establish HCSD system and will be established before September 2014.	Being Complied
XI.	**Ash pond shall be lined with 0.5 mm thick HOPE geo-membrane lining.** The ash pond is lined with 0.5 mm thick HDPE geo-membrane, to avoid any leachate to the ground.	Complied
XII.	**Details of compensation to be paid to the land ousters along with number of land ousters shall be worked out and submitted to this Ministry within three months from the date of issue of this letter or before the start of work on the project whichever is earlier.** Resettlement Action Plan (RAP) was compiled and submitted to the MOEF on 30-07-2007.	Complied
XIII.	**Necessary prior clearance from NHAI shall be obtained before laying the pipeline.** All necessary prior clearance from NHAI was obtained before laying the pipeline and a copy Submitted.	Complied
XIV.	**Necessary prior clearance from Indian Air Force shall be obtained for construction of stacks of requisite height before starting the work on the project.** Before commencing the civil work on the stacks, necessary clearance was obtained from the Indian Air Force.	Complied
XV.	**Adequate measures shall be taken up to maintain the sanctity and protection from any adverse impact from the proposed power project to the temple of Sant Ishardas Samadhi.** The Temple is outside the plant premises. In consultation with the local population, suitable developmental measures such as supply of lighting and electricity have been taken for this temple.	Being Complied
XVI.	**Regular monitoring of ground water quality including heavy metals shall be undertaken in the project area to ascertain the change, if any, in the water quality due to leaching of contaminants from the ash disposal area.** There is hardly any ground water within 20 km of the Project area.	Not applicable
XVII.	**Noise levels shall be limited to 75 dBA. For people working in the high noise area, protective devices such as earplugs etc. shall be provided.** The machinery has been designed to limit the noise levels to 75 dB (A). All personnel working in the Plant are issued PPEs.	Being Complied
XVIII.	**A greenbelt shall be developed all around the plant boundary and ash pond covering an area of 154 ha.** A total of 1,00,000 saplings have been planted so far in the designated greenbelt area covering 100 Ha.	Being Complied
XIX.	**Regular monitoring of the air quality shall be carried out in and around the power plant and records shall be maintained. The location of monitoring stations and frequency of monitoring shall be finalized I consultation with SPCB. Six monthly reports shall be submitted to this Ministry.** Regular monitoring of AAQ is being carried out in and around the power plant at locations and frequency finalized in consultation with the RSPCB and records are maintained.	Being Complied
XX.	**For controlling fugitive dust, regular sprinkling of water in lignite handling area and other vulnerable areas of the plant shall be ensured.** Regular sprinkling of water is being practiced to minimize the fugitive dust emissions.	Being Complied
XXI.	**The project proponent should advertise at least in two local newspapers widely circulated in the region around the project, one of which should be in the vernacular language of the locality concerned, informing that the project has been accorded environmental clearance and copies of clearance letters are available with the State Pollution Control Board/Committee and may also be seen in the Website of the Ministry of Environment and Forests in the http://envfor.nic.in.**	Complied
XXII.	**A separate environment monitoring cell with suitable qualified staff should be set up for implementation of the stipulated environmental safeguards.** A dedicated environment monitoring cell with qualified staff has been established and is operative.	Being Complied
XXIII.	**Half yearly report on the status of implementation of the conditions and environmental safeguards should be submitted to this Ministry, its Regional Office, CPCB and SPCB.**	Being Complied
XXIV.	**EIA and EMP should be submitted to Regional Office, Lucknow**	Complied
XXV.	**Separate funds should be allocated for implementation of environmental protection measures along with item-wise break-up. These cost should be included as part of the project cost. The funds earmarked for the environment protection measures should not be diverted for other purposes and year-wise expenditure should be reported to the Ministry.** The funds earmarked for environmental protection measures will not be diverted for other purposes.	Being Complied
XXVI.	**Full cooperation should be extended to the Scientists/Officers from the Ministry and its Regional Office at Lucknow /the CPCB/the SPCB during monitoring of the project.**	Being Complied

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XXVI.	**Full cooperation should be extended to the Scientists/Officers from the Ministry and its Regional Office at Lucknow /the CPCB/the SPCB during monitoring of the project.**	Being Complied

Parameter mg/l / ppm	Raw Water Quality inlet of DM Plant	DM Water Quality outlet of DM Plant	Anion Regeneration Wastewater DM Plant	Cation Regeneration Wastewater DM Plant	DM Wastewater after Mixing and Neutralization in Tank
Volume, l/h	90000	90000	50000 l/d	50000 l/d	100000 l/d
TDS	170	-	3820	4100	2850
pH	7.9	6.8	11.7	2.4	6.9
Hardness	82	-	Nil	1480	820
Chloride	44	-	1380	Nil	740

RAW WATER ANALYSIS REPORT			
WATER ANALYSIS			
Sl.No	Constituents	Units	Values
1	Total suspended solids	ppm	Oct-30
2	PH	number	7.62 - 8.2
3	Total Hardness as CaCO3	ppm	105 - 120
4	Calcium Hardenss as CaCO3	ppm	63 - 70
5	Magnesium Hardness	ppm	42 - 50
6	Sodium Hardness as CaCO3	ppm	31 - 40
7	Sulphate as CaCO3	ppm	6.5 - 8.4
8	Chloride as CaCO3	ppm	24 - 45
9	Silica as SiO2	ppm	7.2 - 8.6
12	Total Dissolved Solids as CaCO3	ppm	160 - 230

भारत सरकार
पर्यावरण, वन एवं जलवायु परिवर्तन मंत्रालय
क्षेत्रीय कार्यालय (मध्य)
Government of India
Ministry of Environment, Forests & Climate Change
Regional Office (Central Region)

सत्यमेव जयते

जहाँ है हरियाली ।
वहाँ है खुशहाली ॥

केन्द्रीय भवन, पंचम तल, सेक्टर–एच, अलीगंज, लखनऊ–226 024
Kendriya Bhawan, 5th Floor, Sector 'H' Aliganj, Lucknow-226 024 Telefax: 2326696, 2324340, 2324047, 2324025
Email: (Env.) m_env@rediffmail.com, (Forest) goimoefrolko@gmail.com

File No. IV/ENV/R/Th.-39/679/2008 /1063

Speed Post

Dated: 20.01.2015

To,

Dr. Saroj,
Scientist 'F'
IA division,
Ministry of Environment, Forest & Climate Change,
Indira Paryavaran Bhawan, Jor Bag Road,
Aliganj, New Delhi-110 003.

Sub.: 1000 MW lignite based power plant M/s Raj West Power, Barmer, Rajasthan

Ref: Environment Clearance letter no J-13011/58/2006.IA.II(t) dated: 25.03.2010

Madam,

I am directed to inform you that this project site was monitored by Dr. K.K. Garg, Scientist 'F' on 14.07.2014. The compliance status of the above said project has been enclosed for your kind perusal.

Sincerely,

20.01.15

(Dr. Satya)
Scientist 'C'

Copy to:

Dy. Manager(Env & Chemistry), Office No. 2 & 3, 7th Floor, Man Upasana Plaza, C-44, Sardar Patel Marg, C-Scheme, Jaipur, 302 001, Rajasthan.

20.01.15

(Dr. Satya)
Scientist 'C'

भारत सरकार
पर्यावरण, वन एवं जलवायु परिवर्तन मंत्रालय
क्षेत्रीय कार्यालय (मध्य)
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वहाँ है खुशहाली ॥

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Kendriya Bhawan, 5th Floor, Sector 'H' Aliganj, Lucknow-226 024 Telefax: 2326696, 2324340, 2324047, 2324025
Email: (Env.) m_env@rediffmail.com, (Forest) goimoefrolko@gmail.com

Monitoring Report

S.No.	Items	Details
1.	Name of the Project	1000 MW lignite based power plant M/s Raj West Power, Barmer, Rajasthan
2.	Address of project authorities	Mr. K.N. Dubey, Dy. Manager(Env & Chemistry) 308-311, Geetanjali Tower, Ajmer Road, Jaipur Rajasthan-06
3.	Clearance letter no. & Date	J-13011/58/2006.IA.II(t) dated: 25.03.2010
4.	Regional Office File no.	IV/ENV/R/Th.-39/679/2008
5.	Date of site visit	14.07.2014
6.	Status of Construction/Operation	All the eights units of this project have been in operation since April, 2013

7. Observations made during the site visit:

Project authorities have complied or are in process of complying the environmental conditions stipulated for this project (conditions wise compliance status enclosed). The compliance status could be termed as satisfactory

8. Action taken (if any): Not required

(Dr. K.K. Garg)
Scientist 'F'

S.No.	Specific Condition	Compliance Status
I.	**No land in excess of 468 ha. shall acquired for any activity of the project:** Land acquisition has been carried at the time of setting up the Power Project. No additional land been acquired for this Project.	Complied
II.	**The water requirement for the project shall not exceed 35.5 cusecs. No ground water shall be abstracted for activity of the project.** Water in excess of the mandated 37.3 cusecs would not be drawn during the operation of the Project. IGNP supplied water is being used for generation of Electricity as per EC conditions.	Being Complied
III.	**Closed circuit cooling system with induce draft cooling towers shall be installed.** Four numbers of closed circuit cooling tower blocks with induced draft cooling towers have been erected and are in operation.	Complied
IV.	**Treated effluents conforming to the prescribed standards shall be re-circulated and reused within the plant. No effluents snail be discharged outside the plant boundary.** A common **ETP (Aeration – Clarifier – Filtration – Ultra Filtration – Reverse Osmosis)** to cater to all the 8 power generating units has erected. All the process effluents generated are treated in this ETP and reused within the plant ensuring zero discharge outside the plant boundary.	Being Complied
V.	**Lignite with ash content not exceeding 20% and sulphur content not exceeding 2.0% shall be used.** Lignite with ash content less than 20% and sulphur content less than 2% being used. Third party analysis report submitted to this office.	Being Complied
VI.	**Space provision for FGD shall be made, if required at a later stage.** The Project is based on Circulating Fluidized Base Combustion technology for fuel firing and involves injection of lime, which absorbs Sulphur. As such, there is no requirement for FGD. However space provision has been made for FGD.	Complied
VII.	**Four stacks of 122 m height each with exit velocity of at least 20m/s shall be provided with continuous online monitoring system.** A total of four bi-flue stacks, each flue of 122 m height, shall release the flue gases to the atmosphere. All these stacks being equipped with Continuous Emission Monitoring Systems (CEMS), to ensure the emission of PM, SO2, NOx & CO to be within prescribed levels.	Complied
VIII.	**Low NOx burners shall be installed.** The boiler is designed on Circulating Fluidized Bed Combustion, system self attains to very low NOx generation.	Complied

IX.	**High efficiency electrostatic precipitator (ESPs) having efficiency of 99.9% shall be installed so as to ensure that particulate emissions do not exceed 100mg/Nm3.** High efficiency ESPs are installed to maintain PM emission levels at less than 100 mg/Nm^3.	Complied
X.	**Fly ash shall be collected in dry form and its 100% utilization shall be ensured within 3 years from the day of the commissioning of the plant. Ash to be disposed off in the ash pond shall be through HCSD system.** Fly ash is being collected in dry form from the currently operational all the eights Units and is being lifted by M/s Shree Cement, M/s. JK Lakshmi, M/s. Ambuja Cement Limited & M/s Binani Cements and many Local Brick and Tiles Block manufacturer. Unutilized ash, if any, would be disposed off to the emergency ash pond through HCSD system. They are in process to establish HCSD system and will be established before September 2014.	Being Complied
XI.	**Ash pond shall be lined with 0.5 mm thick HOPE geo-membrane lining.** The ash pond is lined with 0.5 mm thick HDPE geo-membrane, to avoid any leachate to the ground.	Complied
XII.	**Details of compensation to be paid to the land ousters along with number of land ousters shall be worked out and submitted to this Ministry within three months from the date of issue of this letter or before the start of work on the project whichever is earlier.** Resettlement Action Plan (RAP) was compiled and submitted to the MOEF on 30-07-2007.	Complied
XIII.	**Necessary prior clearance from NHAI shall be obtained before laying the pipeline.** All necessary prior clearance from NHAI was obtained before laying the pipeline and a copy Submitted.	Complied
XIV.	**Necessary prior clearance from Indian Air Force shall be obtained for construction of stacks of requisite height before starting the work on the project.** Before commencing the civil work on the stacks, necessary clearance was obtained from the Indian Air Force.	Complied
XV.	**Adequate measures shall be taken up to maintain the sanctity and protection from any adverse impact from the proposed power project to the temple of Sant Ishardas Samadhi.** The Temple is outside the plant premises. In consultation with the local population, suitable developmental measures such as supply of lighting and electricity have been taken for this temple.	Being Complied
XVI.	**Regular monitoring of ground water quality including heavy metals shall be undertaken in the project area to ascertain the change, if any, in the water quality due to leaching of contaminants from the ash disposal area.** There is hardly any ground water within 20 km of the Project area.	Not applicable

XVII.	**Noise levels shall be limited to 75 dBA. For people working in the high noise area, protective devices such as earplugs etc. shall be provided.** The machinery has been designed to limit the noise levels to 75 dB (A). All personnel working in the Plant are issued PPEs.	Being Complied
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XXII.	**A separate environment monitoring cell with suitable qualified staff should be set up for implementation of the stipulated environmental safeguards.** A dedicated environment monitoring cell with qualified staff has been established and is operative.	Being Complied
XXIII.	**Half yearly report on the status of implementation of the conditions and environmental safeguards should be submitted to this Ministry, its Regional Office, CPCB and SPCB.**	Being Complied
XIV.	**EIA and EMP should be submitted to Regional Office, Lucknow**	Complied
XXV.	**Separate funds should be allocated for implementation of environmental protection measures along with item-wise break-up. These cost should be included as part of the project cost. The funds earmarked for the environment protection measures should not be diverted for other purposes and year-wise expenditure should be reported to the Ministry.** The funds earmarked for environmental protection measures will not be diverted for other purposes.	Being Complied
XVI.	**Full cooperation should be extended to the Scientists/Officers from the Ministry and its Regional Office at Lucknow /the CPCB/the SPCB during monitoring of the project.**	Being Complied

सत्यमेव जयते

FAUNISTIC SURVEY WITH SPECIAL REFERENCE TO SCHEDULE SPECIES FOUND AROUND RAJ WESTPOWER LIMITED, BHADRESH, BARMER, RAJASTHAN AND THEIR CONSERVATION PLAN

Zoological Survey of India
M-Block, New Alipore,
Kolkata – 700 053

MAY 2016

Published:

Zoological Survey of India
Prani Vigyan Bhawan,
535, M-Block, New Alipore,
Kolkata – 700 053 (West Bengal)
E.mail : zsi.kolkata@gmail.com

Anonymous, 2016. Report of Study on Faunistic survey with special reference to schedule species found around Raj Westpower Limited, Bhadresh, Barmer, Rajasthan and their Conservation Plan. Zoological Survey of India, Kolkata.

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Photographs© Dr.G.Sharma, Dr.G. Maheswaran, Dr.B.Tripathy, Dr.K. Chandra

FAUNISTIC SURVEY WITH SPECIAL REFERENCE TO SCHEDULE SPECIES FOUND AROUND RAJ WESTPOWER LIMITED, BHADRESH, BARMER, RAJASTHAN AND THEIR CONSERVATION PLAN

Zoological Survey of India
M-Block, New Alipore,
Kolkata – 700 053

MAY 2016

DISCLAIMERS

1. The Zoological Survey of India (ZSI) is not responsible for the outcome of the STUDY ON FAUNISTIC SURVEY WITH SPECIAL REFERENCE TO SCHEDULE SPECIES FOUND AROUND RAJ WESTPOWER LIMITED, BHADRESH, BARMER, RAJASTHAN AND THEIR CONSERVATION PLAN.

2. The Report submitted by ZSI to M/s Raj WestPower Limited on the STUDY ON FAUNISTIC SURVEY WITH SPECIAL REFERENCE TO SCHEDULE SPECIES FOUND AROUND RAJ WESTPOWER LIMITED, BHADRESH, BARMER, RAJASTHAN AND THEIR CONSERVATION PLAN is solely on the request of M/s Raj WestPower Limited.

3. The report on the STUDY ON FAUNISTIC SURVEY WITH SPECIAL REFERENCE TO SCHEDULE SPECIES FOUND AROUND RAJ WESTPOWER LIMITED, BHADRESH, BARMER, RAJASTHAN AND THEIR CONSERVATION PLAN submitted by ZSI to M/s Raj WestPower Limited is not binding on the part of the State Environmental Impact Assessment Authority of Rajasthan/ Ministry of Environment, Forest and Climate Change, Govt. of India or any concerned agency to issue the NoC/ Environmental Clearance for the said project or any other statutory clearance of central and state government. Also there is no legal binding on the result of the report by ZSI submitted to M/s Raj WestPower Limited.

4. All expenses related to the field/ office expenditure for the study were borne by M/s Raj WestPower Limited, for the purpose.

5. There was no financial involvement from Zoological Survey of India, Kolkata for the study and there was no honorarium or otherwise raised by the study team from M/s Raj WestPower Limited, for the study.

Zoological Survey of India,
Kolkata

CONTENTS

Acknowledgements

We are thankful to:

- M/s Raj WestPower Limited (RWLP), Bhadresh, Rajasthan
- DFO, Barmer, Rajasthan State Forest Department, Barmer
- Mr. Aditya Agrawal, Plant Head, RWPL, Bhadresh
- Mr. Dilip Narwani, Dy. General Manager (Environment & Chemistry), RWPL, Bhadresh
- Shri Abhishekh Chakrabarti, RWPL, Barmer
- Dr. K.A. Subramanian, Scientist, Zoological Survey of India, Southern Regional Centre, Chennai
- Mr. Karnidan, Village-Bhadresh

ZSI-RWPL-Wildlife Study Team,
Zoological Survey of India,
Kolkata

1. INTRODUCTION

1.1. Background:

Power (electricity energy) is not only a fundamental requisite for society but also essential for industrial and commercial growth require for development of the nation economically. Among the various options for power generation, thermal power is common method of power generation in the country considering the presence of vast natural wealth of fossil fuel. One of such power plant is set up by M/s Raj West Power Ltd. (RWPL) with a capacity of 1080 MW (8 x 135 MW). The JSW Barmer (Jallipa-Kapurdi) lignite based Power Plant by JSW is located near village Bhadresh in Barmer district of Rajasthan (Lat. 25.8888 E, Long. 71.3236N). It comprises eight 135MW units to produce 1,080MW of power with the first unit was known to have been commissioned in 2009 and the last in 2013. The plant is set up based on the CFBC technology, which allows the use of low-grade fuel such as lignite. CFBC technology enables the plant to use the low-calorific coal, which also has high moisture level. Lignite is a low grade coal that RWPL, currently sources from the captive mine at Kapurdi in Barmer. Its close proximity to the fuel source - the Jalipa and Kapurdi lignite mines - gives the pithead power station an advantage, which is just 3.5 km and lignite is transported to power plant site by conveyors. Fly ash generated from the power units is known to be sold to cement plants. It is the first PPP module plant in the state of Rajasthan under the power purchase Agreement (PPA) with the Government of Rajasthan to sell its entire output.

The project site is approachable by rail from Barmer situated at a distance of 25 km. The site is 10 km from National Highway-15 (Barmer-Jaisalmer). The elevation of the plant site from the Mean Sea Level (MSL) is about 188m to 197m. The plant site boundary is located about 15 km northwest of Barmer town (aerial distance) near villages Bhadresh (1.2 km on west side), Kumbharki Dhani (0.5 km on north side), Nagniyon ki Dhani (1.5 km on northeast side), Bhurji ki Dhani (1 km on east side), Chuli (3 km on south side) Bishala 5 km. The lignite mines is located on the east and north side of the power plant.

1.2. Genesis for the study:

RWPL now proposes to setup an additional 660MW Super Critical Lignite coal-based power plant unit at the same site at Bhadresh village in Barmer district Rajasthan. The expansion project of 1x660MW will have interlinks with existing operating 8 x 135MW project to optimize the existing resources and facilities. RWPL purchased 1186 acres of land to establish the power plant, water reservoir and ash pond. 220 acres land is remaining with RWPL, which will be used to locate the 1

x 660MW unit. This available land will be used for the project by most optimized layout. The present land is adequate and no additional land requirement is envisaged. The boiler and turbine will be located and aligned with the existing boilers and turbines. 33% land of total 1186 acres has been already earmarked for greenbelt development (sketch map is presented in Figure 1).

The Raj WestPower Limited (RWPL) had applied to Ministry of Environment, Forest and Climate Change, New Delhi for the expansion of 660 MW and for this purpose, the Ministry of Environment, Forest and Climate Change, New Delhi, while considering the proposal by the Expert Appraisal Committee (Thermal Power) during its 30th meeting held during 29th and 30th January 2015 for determination of the Terms of References (TOR) for undertaking detailed EIA study in accordance with the provisions of the EIA Notification dated 14th September 2006, prescribed TOR for preparation of EIA and EMP Report. The TOR for EIA study of the proposed 1x660 MW expansion unit were prescribed by the Ministry of Environment & Forests (MoEF) vide letter No.J-13012/01/2015/-IA.I (T) dated 25th February 2015. Under the TOR, the committee has highlighted the following points in terms of issues related to wildlife, ecology and environment of the area.

i) A detailed study of wildlife in the study area shall be carried out and if any scheduled species are found, a conservation plan shall be submitted duly approved by the state government.
ii) Location of any National Park, Sanctuary, Elephant/Tiger Reserve (existing as well as proposed), migratory routes / wildlife corridor, if any within 10 km of the project site shall be specified and marked on the map duly authenticated by the Chief Wildlife Warden of the state or an officer authorized by him.

1.3. Scope of the study:

The M/s Raj WestPower Ltd., Barmer-DGM (Environment & Chemistry) requested the Director, Zoological Survey of India, Kolkata (vide RWPL Letter No. RWPL/CA/15, 02.09.2015) for conducting a detailed study of wildlife in the study area and conservation plan for any scheduled species are found in consultation and approved by the State Government, as per the TOR for EIA study of the proposed 1x660 MW expansion unit were prescribed by the Ministry of Environment & Forests (MoEF) vide letter No.J-13012/01/2015/-IA.I (T) dated 25th February 2015 and highlighted points in terms of issues related to wildlife, ecology and environment of the area.

Accordingly, a proposal and terms and conditions was sent to M/s RWPL to undertake a study on faunistic survey with special reference wildlife and conservation plan for schedule species around Raj West Power Limited in the project location and on the basis of the proposal submitted by ZSI to M/s RWPL, a Work Order was released by M/s RWPL for the "Study on faunistic survey with special reference wildlife and conservation plan for schedule species around Raj West Power Limited, Bhadresh, Rajasthan" to ZSI as per below objectives:

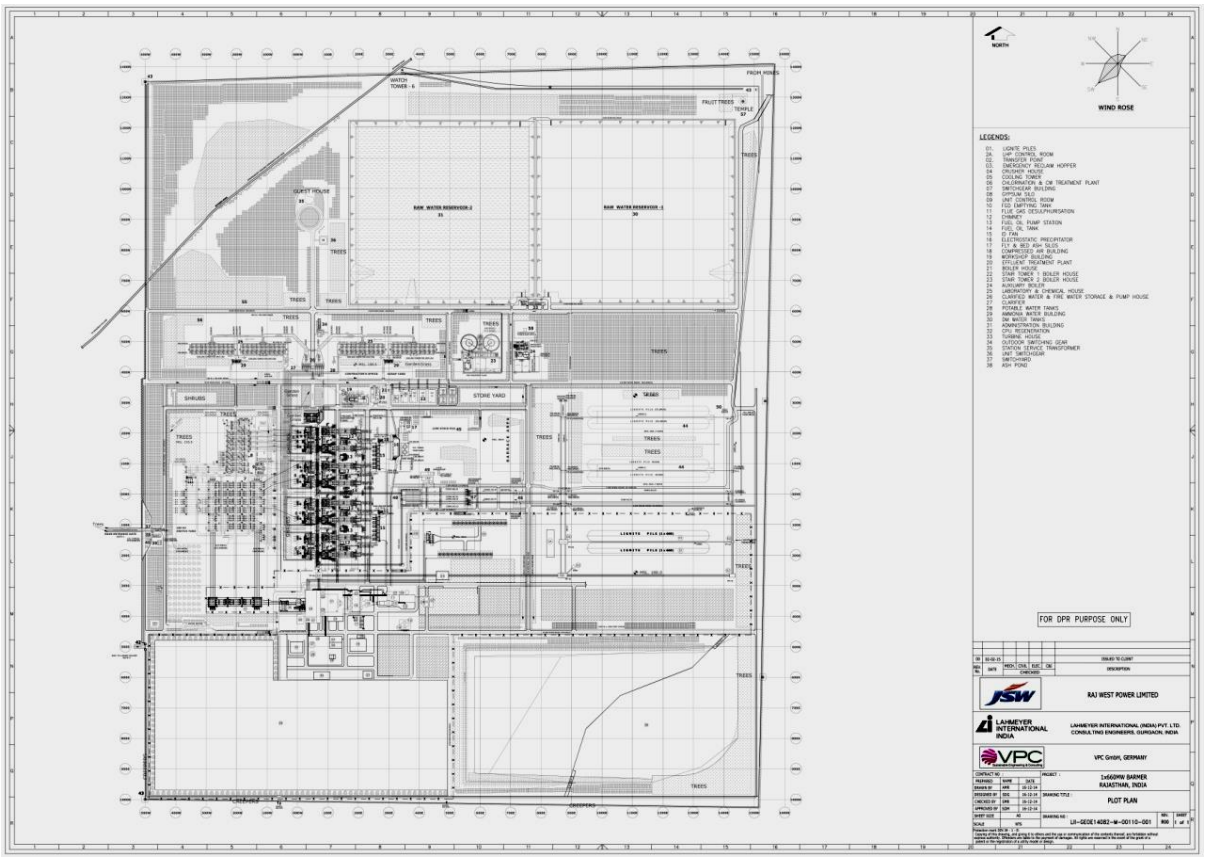

Fig.1. Sketch Map of RWPL and proposed expansion site for additional units of 660MW

2. OBJECTIVES

i) To carry out a detailed study of wildlife in the study area (in and around Raj WestPower Limited, Bhadresh, Barmer)

ii) To prepare and submit a conservation plan for scheduled species found if any in the area.

In this background, "Study on faunistic survey with special reference wildlife and conservation plan for schedule species around Raj Westpower Limited, Bhadresh, Rajasthan" was carried out by ZSI during February to May 2016 and report submitted to M/s Raj Westpower Limited, Barmer.

3. DESCRIPTION OF THE STUDY

3.1. Study duration:

Since, there is already an EIA report available for the proposed developmental plan, and faunistic survey report with special reference wildlife and conservation plan for schedule species are require to be submitted for approval of the project, on the request of M/s. RWPL, a rapid survey was done for duration of four months from February 2016 to May 2016 and the field work was conducted twice during second week of February 2016 and first week of May 2016 (Details are presented in Table 1).

The following were the team members for the study.

1. Dr. Kailash Chandra, Scientist-G & Director, ZSI, Coordinator
2. Dr. Basudev Tripathy, Scientist-D, ZSI HQ, Kolkata, Team Member
3. Dr. Gaurav Sharma, Scientist-D, ZSI HQ, Kolkata, Team Member
4. Dr. G. Maheswaran, Scientist-D, ZSI HQ, Kolkata, Team Member

Fig.2. View of Plant site and surrounding (Google Imegery) [Inset – Rajasthan / Barmer]

3.2. Description of the Project:

3.2.1. Location:

The proposed power plant is near Bhadresh village in Barmer District in Rajasthan and is ~26 km from Barmer town and the National Highway (NH-15) connecting Barmer and Jaisalmer runs at a distance of ~ 13 km (Fig.2; Fig.3). The elevation of the plant site from the Mean Sea Level (MSL) is about 188m to 197m. The plant site boundary is located about 15 km northwest of Barmer town (aerial distance) near villages Bhadresh (1.2 km on west side), Kumbharki Dhani (0.5 km on north side), Nagniyon ki Dhani (1.5 km on northeast side), Bhurji ki Dhani (1 km on east side), Chuli (3 km on south side) Bishala 5 km. The lignite mines is located on the east and north side of the plant site. The 220 Acre land is available for proposed expansion project in the existing operational plant premises.

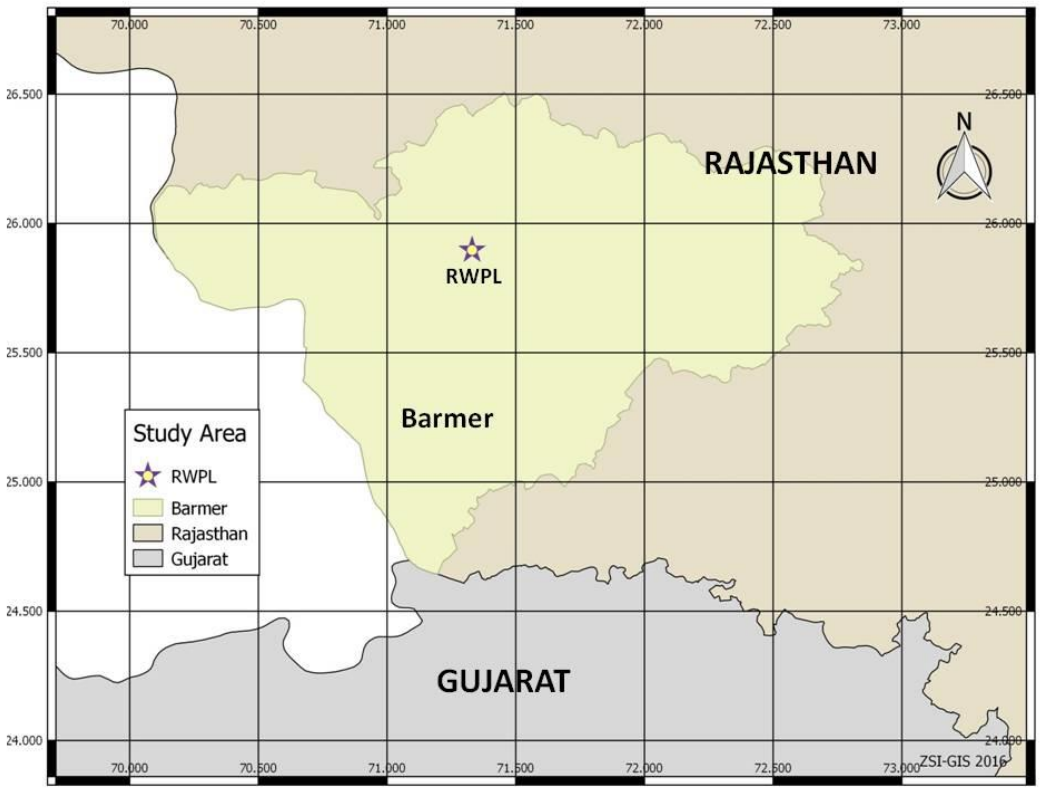

Fig. 3. Map of Barmer showing RWPL plant site

3.2.2. Landscape

In and around the power plant, the area is generally plain with the presence of occasional sand dunes. A thick blanket of sand covers the entire area. The entire land considered for the plant is semi-arid desert type and is free from any habitation. Due to arid climate, there is no well-developed drainage pattern in the area and there are no steams. There are no surface water bodies viz. lakes, except few small check dams, ponds and small nallas present in the study area and get completely dried off during the winter/summer season.

4. METHODOLOGY

4.1. Review of Literature

The Barmer district constitutes one of the 14 districts of the Thar Desert of Rajasthan and thus offers an unique habitat for significant populations of several rare and endangered faunal species *viz.* Chinkara (*Gazellla benettii*), Desert Cat (*Felis silvestris*), Desert Fox (*Vulpus vulpus pusilla*), Desert Monitor Lizard (*Varanus griseus*), etc. In spite of low density of trees and shrubs, quite a variety of wildlife has been reported from this xeric environment. The Indian gazelle, locally known, as Chinkara is fairly common while the desert hares (*Lepus nigricollis*) are sparsely distributed in the area. The porcupine (*Hystrix indica*) occurs in the hilly habitat. The carnivorous fox and the desert cat (*Felis sylvestris*) are occasionally seen.

The earlier faunal diversity study pertaining to the study area are that of Alfred *et* al. (2001) on the habitat suitability study on Chinkara, Baqri (2004) studies on faunal diversity in the Thar Desert (unpublished report, 2004), Jhunjhunwala *et* al. (2001), documented desert birds as part of the Important Bird Areas Programme in India, Kankane (2000) carried out status Survey of Chinkara and Desert Cat in Rajasthan, Kumar (2006) prepared a geo-spatial Atlas for the wetland with special reference to birds of Thar Desert, Prakash (1963;1964;1975;1994) work on taxonomical and ecological account of the mammals of Rajasthan Desert and Rahmani's work (1997) on the effect of Indira Gandhi Nahar Project on the Avifauna of the Thar Desert. Besides, recently ZSI has undertaken studies on Environmental Impact Assessment of Lignite Mining on Fauna in Kapurdi and Jalipa Blocks during 2007-08 (Annymous, 2008) and faunal study in respect of EIA/EMP - Kapurdi lignite mines of Barmer District, Rajasthan during 2014-16 (unpublished report of ZSI-DRC, Jodhpur).

In Rajasthan, the population of Chinkara is confined to southwest part of the Thar Desert where 89% of them have been counted (Kankane, 2000). In Barmer block of the district Barmer their density was calculated to 0.22 Chinkara/km^2 (Alfred et al. 2001). Rahmani (1997) has reported nearly 250 species from Thar desert. He also provided detailed notes for 213 species, including about 35 species of birds from Barmer district. While Kumar *et al.* (2006) in their '*Geo-spatial Atlas for the Wetland Birds of Thar Desert, Rajasthan*' made a mention of 53 species of wetland birds from the district Barmer (an area of c. 28,387 sq. km). Only four Species are categorized as the Biome Restricted Species (BRS) and of these, three species, *viz.* Indian Peafowl (*Pavo cristatus*), Ashy-crowned Sparrow-Lark (*Eremopterix grisea*) and Indian Robin (*Saxicoloides fulicata*) are from the Indo-Malayan Tropical Dry Zone- Biome (11); and the remaining one species, viz., White-eared Bulbul (*Pycnonotus leucotis*) from Saharo-Sindian Desert- Biome (13) (Jhunjhunwala et al. 2001).

4.2. Site-specific field surveys:

The entire study area was covered using a four-wheel driven vehicle. All the water bodies visited in the radius of 10 km were visited twice (Map 2; Table 2). Night surveys were also undertaken for observations on the nocturnal animals using a battery-operated searchlight. Animal sighting were locations were recorded using a handheld GPS (Garmin 72H, Garmin Inc.) to prepare a geo-spatial map of distribution of various animal species in the study area. Visual observation was made with the help of 8x40 field binocular (Nikon). Also, photographic record of animals observed was attempted wherever possible with help of a Digital Camera (Nikkon D-700; 18-56; 400 mm zoom). Locality-wise details of faunal surveys conducted are summarised in Table 2 and represented in figure 4.

Table 1. Details of the faunal surveys conducted in and around 10 km radius including water bodies of RWPL proposed expansion project.

Sl. No.	Areas	Date	Season
1	RWPL Power Plant, Kapurdi, Jalipa mining blocks and surrounding zone of 10 km radius including water bodies/forest/dunes therein	14-17 February 2016	Winter
2	RWPL Power Plant, Kapurdi, Jalipa mining blocks and surrounding zone of 10 km radius including water bodies/forest/dunes therein	31 April – 03 May 2016	Summer

The nomenclature and systematic position of mammals as prescribed by Wilson and Reeder, 2005; Sharma *et* al. (2015), birds as given by Manakadan & Pittie (2001) and reptiles by Boulenger (1890), Smith (1931, 1935, 1943) and Murthy (2010) were followed. The conservation status presented here is as assigned by BNHS (2002), Jhunjhunwala *et* al. (2001) and IUCN (2015).

Table 2. Details of sites visited within 10 km radius of the proposed expansion units of RWPL during February and May 2016

Sl.No.	Sites visited	GPS-WP	Geo-coordinates		Observation/Remarks
			Latitude	Longitude	
1	Jalipanadi	WP-60	25.82161	71.40239	Natural waterbody, ~ 9.95 km from RWPL, on the Jaisalmer National Highway
2	Jalipanadi- shrubs	WP-61	25.88661	71.40179	
3	Kapurdi Mines	WP-62	25.94027	71.36035	~ km from RWPL, mining area, with wastage water from dredging, small waterbodies formed in site the mines
4	Kapurdi Mines-site1	WP-63	25.94056	71.35004	
5	Kapurdi Mines-site2	WP-64	25.92702	71.34023	
6	Kapurdi Mines – waterbody-site1	WP-65	25.92703	71.34023	

7	Kapurdi Mines – waterbody-site2	WP-66	25.93507	71.34618	
8	RWPL Plant-southern boundary	WP-67	25.88997	71.33879	Plantation done as part of green belt covering around plant area
9	RWPL Proposed Expansion site	WP-69	25.89085	71.32385	Flat area with shrubs, desert grasses
10	Samaniyon ki Dhani - Gehun Pahad	WP-70	25.77236	71.31811	~ 10 km from RWPL, Rocky area with xeric vegetation, cattle grazing
11	Dhanoda village	WP-71	25.85586	71.26305	~ 5 km from plant, stone crusher units
12	Dhanoda village-On the way	WP-72	25.87181	71.2448	
13	Sonnadi Mines	WP-73	25.96254	71.26352	Open cast mining of coal/lignite
14	Bandoro ki Dhani/Rajputoki Dhani	WP-74	25.9716	71.30584	~ 8.5 km from site, stable sand dunes on the way
15	Rajputoki Dhani-On the way	WP-75	25.97142	71.32598	
16	Bandoro ki Dhani - On the way	WP-76	25.98084	71.33683	
17	Cairne Oil well	WP-77	25.97177	71.34715	Oil wells by Cairne company, boundary of RWPL area
18	Tirsingda villaga	WP-34	25.87176	71.24479	~ 5 km from plant site, small rocky hills, shrubs and xeric vegetation
19	Sonnadi Mines - On the way	WP-38	25.96271	71.26355	
20	Dhanoda village – near Sand dune	WP-33	25.85585	71.26306	Stable sand dunes
21	RWPL Plant site	WP-68	25.89116	71.32368	
22	Cairne Oil well – from Road	WP-77	25.98085	71.33682	
23	Bothianadi – waterbody	WP-48	25.9718	71.34712	
24	Kapurdi Mines – conveyer belt	WP-46	25.94027	71.36037	Conveyer belt from Mining area for supply to lignite to RWPL
25	Jalipanadi - waterbody	WP-43	25.82161	71.4024	
26	Lakhetali village	WP-39	25.88.953	71.4041	A small waterbody, dried up
27	Bhadresh village	WP-31	25.88.865	71.30.779	~ 1 km from plant, CSR activities by RWPL
28	Lunu village	WP-42	25.81.946	71.32.645	~ 8 km from RWPL, sand dunes with xeric vegetation, shrubs
29	SelariNadi-waterbody	WP-44	25.89.914	71.41.976	6.5 km from RWPL, a small waterbody, dried up

5. ECOLOGICAL ASSESSMENT

5.1. Flora

The vegetation of the area is sparse and dry deciduous type consisting of a small range of slow-growing thorny trees, shrubs and grasses that has adapted it to the harsh conditions. The most commonly found tree species are the ubiquitous Khejri (*Prosopis cineraria*) and various types of acacia, which are extremely drought resistant, due to their deep root system. Another tree that dots the area is the Rohira (*Tecoma undulata*). The various shrubs occurring being: the Phog (*Calligonum polygonoides*), Khair (*Capparis decidua*), Ak (*Calotropis procera*) and Thor (*Euphorbia caduca*). While important grasses include the Sewan (*Lasiurus sindicus*), Dhaman (*Cenchrus ciliaris*), Boor (*Cenchrus jwarancusa*) and Bharut (*Cenchrus catharticus*).

On sandy plains, the most frequently found trees are *Salvadora oleoides* and *Prosopis cineraria*; the common shrubs being *Calotropis procera* (Ak) and *Capparis deciduas* (Khair); while widely spread herbs are *Solanum suranttense* and *Fagonia cretica*; and the grasses and sedges being *Cenchrus setigerus*, *Eragrostis ciliaris* and *Ochthochloa compressa*.

On sand dunes, the more common trees are *Prosopis cineraria, Salvadora oleoides* and *Tecomella undulata*; among shrubs being *Calotropis procera* and *Aerva pseudotomentosa*; herbs *Indigofera cordifolia* and *Convovulus microphyllus*; and grasses *Panicum tugidum* and *Dactyloctenium sindicum*.

On rocky and gravelly buried pediments, the common trees are *Salvadora oleoides* and *Acacia senegal*; among shrubs being *Caparis deciduas, Calotropis procera* and *Prosopis juliflora*; herbaceous *Fagonia cretica* and *Indigofera cordifolia;* and grasses include *Aristida mutabilis* and *Ochthochola compressa.*

5.2. General Fauna

5.2.1. Mammals:

A total of 19 species of mammals belonging to 16 genera, 11 families and 5 orders have so far been reported from in and around Rajwest Power Plant including Kapurdi and Jalipa mining blocks of Barmer district of Rajasthan (Table 3). An order-wise analysis of the species reported indicates that the order Rodentia, dominates the scene with 7 species, followed by Carnivora (6), Artiodactyla (3), Insectivora (2) and Lagomorpha (only one species) (Table 3). Of the different species of mammals reported from the area, the sighting for the following species *viz.* Jackal, Chinkara, Nilgai, Wild Boar, Desert Hare, Indian Gray Mongoose and Northern Palm Squirrel

have been recorded during the field study. Also, inside the RWPL site, Chinkara and Wild Boar were sighted during the surveys. Though there are number of other animals reported from the area including Hyaena, by local people when they were interviewed, we could not find any direct and indirect evidence during the field work.

All the above-mentioned 19 mammalian species known from the area are widely or sparsely distributed not only in the study area, but also throughout their distributional range including district Bikaner. In other words, none of these species is endemic only to the study area.

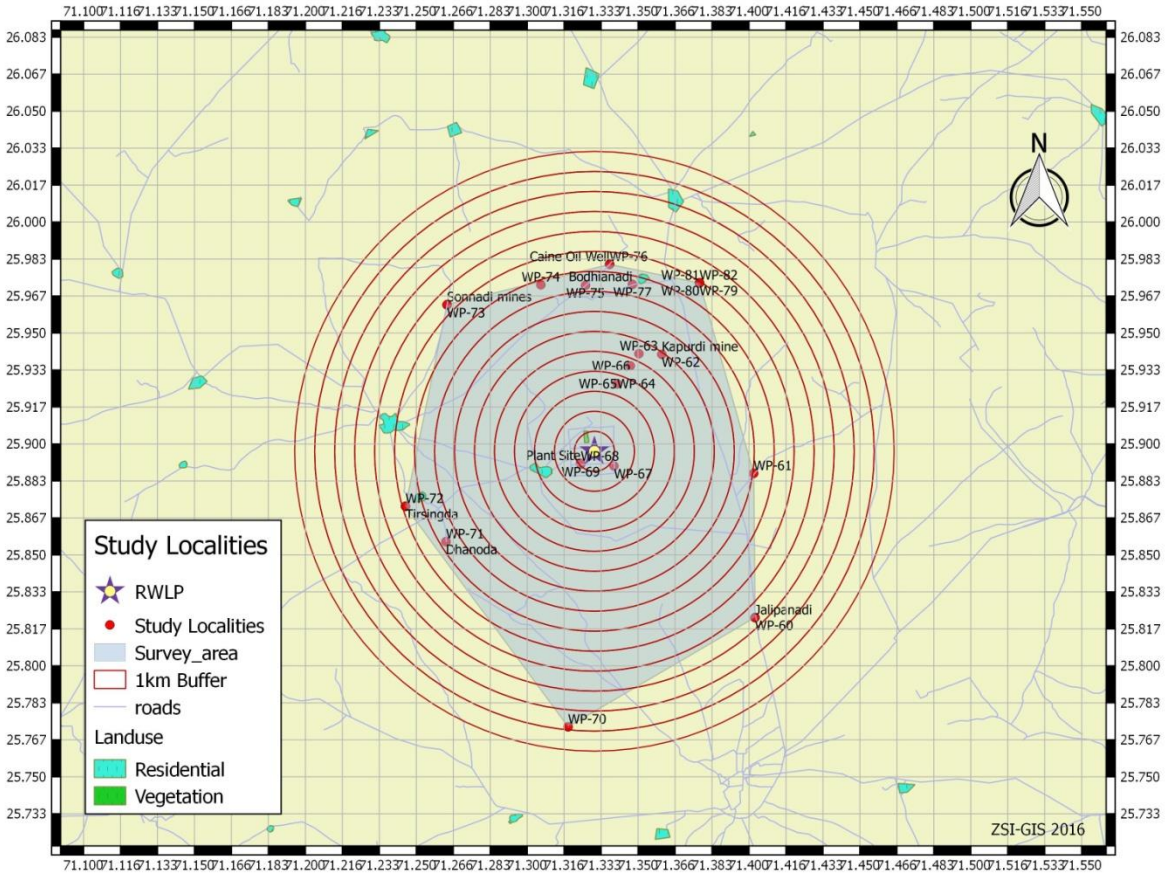

Fig. 4. Sites covered within the radius of 10 km from the proposed expansion of RWPL (Polygons joining sites on extreme visited with 1 km contour)

Table 3. Systematic list of mammalian species reported from the study area

Sl.No.	Order	Family	Genus	Species	Common Name	Schedule of IWLPA, 1972
1	Insectivora	Erinacidae	*Hemiechinus*	*collaris*	Indian Long-eared Hedgehog	IV
2	Insectivora	Erinacidae	*Hemiechinus*	*micropus*	Indian Hedgehog	-
3	Carnivora	Canidae	*Canis*	*aureus*	Asiatic Jackal	II
4	Carnivora	Canidae	*Vulpes*	*bengalensis*	Indian Fox	II
5	Carnivora	Canidae	*Vulpes*	*vulpes*	Desert Fox	II
6	Carnivora	Felidae	*Felis*	*silvestris*	Desert Cat	I
7	Carnivora	Herpestidae	*Herpestes*	*edwardsii*	Indian Gray Mongoose	IV
8	Carnivora	Herpestidae	*Herpestes*	*javanicus*	Small Indian Mongoose	IV
9	Artiodactyla	Suidae	*Sus*	*scrofa*	Wild Boar	III
10	Artiodactyla	Bovidae	*Gazella*	*bennettii*	Chinkara	I
11	Artiodactyla	Bovidae	*Boselaphus*	*tragocamelus*	Blue Bull	III
12	Rodentia	Sciuridae	*Funambulus*	*pennantii*	Northern Palm Squirrel	IV
13	Rodentia	Muridae	*Gerbillus*	*gleadowi*	Indian Hairy-footed Gerbil	V
14	Rodentia	Muridae	*Meriones*	*hurrianae*	Indian Desert Gerbil	V
15	Rodentia	Muridae	*Rattus*	*rattus*	Black Rat or House Rat	V
16	Rodentia	Muridae	*Mus*	*platythrix*	Indian Brown Spiny Mouse	V
17	Rodentia	Rodentia	*Tatera*	*indica*	Indian Gerbil	V
18	Rodentia	Hystricidae	*Hystrix*	*indica*	Indian Crested Porcupine	IV
19	Lagomorpha	Leporidae	*Lepus*	*nigricollis*	Desert Hare	IV

5.2.2. Birds:

As far as avifauna (birds) in and around the Rajwest Power Plant is concerned, except for the report of earlier study by ZSI on Environmental Impact Assessment of Lignite Mining on Fauna in Kapurdi and Jalipa Blocks during 2007, no bird list for the area is available. Therefore, the present study relied on field observation on occurrence of birds within the 10 km radius of the proposed expansion of the power plant.

A total of 60 species of birds belonging to 49 genera and 31 families have so far been reported from Kapurdi and Jalipa blocks of Barmer district, Rajasthan. During our recent field surveys, 12

more species of birds were recorded from within the 10 km radius of the RWPL plant, thereby increasing the total number to 72 species of birds known from the area. Interestingly, the family-wise analysis of the data collected indicates that family Anatidae of the non-passerine birds dominate the list followed by Ardeidae, Charadriidae, Scolopacidae, Columbidae, Motacillidae and Muscicapidae and so on (Table 4). Also, inside the RWPL campus, along with Grey Herons, Cormorants and other water birds, Peafowl and Grey Francolin were sighted during the surveys.

The following three species, *viz*., Eurasian Spoonbill, Eurasian Griffon, Egyptian Vulture and Indian Peafowl are listed under Schedule-I of the Indian Wildlife (Protection) Act 1972. Rest of the species reported or recorded during the surveys are in the Schedule-IV and Schedule-V and four species do not appear in any of these Schedules-NLA (Not Listed in the Act).

Table 4. List of Birds recorded and observed from in and around the RWPL site and their status as per the Wildlife (Protection), Act, 1972

Sl.No	Order	Family	Genus	Species	Common Name	Schedule of IWLPA, 1972
1	Gruiformes	Rallidae	*Gallinula*	*chloropus*	Common Moorhen	IV
2	Charadriiformes	Charadriidae	*Vanellus*	*indicus*	Red-wattled lapwing	IV
3	Charadriiformes	Recurvirostridae	*Himantopus*	*himantopus*	Black-winged Stilt	IV
4	Charadriiformes	Glareolidae	*Cursorius*	*coromandelicus*	Indian Courser	IV
5	Charadriiformes	Scolopacidae	*Tringa*	*hypoleucos*	Common Sandpiper	IV
6	Charadriiformes	Charadriidae	*Charadrius*	*placidus*	Little ringed plover	IV
7	Charadriiformes	Charadriidae	*Charadrius*	*alexandrinus*	Kentish Plover	IV
8	Coraciiformes	Meropidae	*Merops*	*orientalis*	Green Bee-eter	IV
9	Coraciiformes	Columbidae	*Columba*	*livia*	Blue Rock Pigeon	IV
10	Coraciiformes	Coraciidae	*Coracias*	*benghalensis*	Indian Roller	IV
11	Coraciiformes	Upupidae	*Upupa*	*epops*	Common Hoopoe	IV
12	Ciconiiformes	Threskiornithidae	*Pseudibis*	*papillosa*	Black Ibis	IV
13	Ciconiiformes	Phoenicopteridae	*Phoeniconaias*	*minor*	Lesser flamingo	IV
14	Galliformes	Phasianidae	*Francolinus*	*pondicerianus*	Grey Francolin	IV
15	Galliformes	Phasianidae	*Pavo*	*cristatus*	Indian Peafowl	I
16	Gruiformes	Rallidae	*Fulica*	*atra*	Common Coot	IV
17	Passeriformes	Pycnonotidae	*Pycnonotus*	*leucotis*	White-eared Bulbul	IV

18	Passeriformes	Pycnonotidae	*Pycnonotus*	*cafer*	Red-vented Bulbul	IV
19	Passeriformes	Muscicapidae	*Saxicoloides*	*fulicata*	Indian Robin	IV
20	Passeriformes	Muscicapidae	*Turdoides*	*caudatus*	Common Babbler	IV
21	Passeriformes	Nectariniidae	*Nectarinia*	*asiatica*	Purple Sunbird	IV
22	Passeriformes	Ploceidae	*Passer*	*domesticus*	House Sparrow	IV
23	Passeriformes	Sturnidae	*Acridotheres*	*tristis*	Common Myna	IV
24	Passeriformes	Dicruridae	*Dicrurus*	*macrocercus*	Black Drongo	IV
25	Passeriformes	Motacillidae	*Motacilla*	*flava*	Yellow Wagtail	IV
26	Passeriformes	Corvidae	*Corvus*	*splendens*	House Crow	IV
27	Passeriformes	Muscicapidae	*Oenanthe*	*picata*	Variable Wheatear	IV
28	Passeriformes	Muscicapidae	*Oenanthe*	*deserti*	Desert Wheatear	IV
29	Passeriformes	Motacillidae	*Motacilla*	*alba*	White Wagtail	IV
30	Passeriformes	Hirundinidae	*Riparia*	*paludicola*	Plain Martin	IV
31	Passeriformes	Muscicapidae	*Oenanthe*	*deserti*	Desert Wheatear	IV
32	Passeriformes	Muscicapidae	*Phoenicurus*	*ochruros*	Redstart	IV
33	Passeriformes	Alaudidae	*Galerida*	*cristata*	Crested Lark	IV
34	Passeriformes	Muscicapidae	*Turdoides*	*malcolmi*	Large Grey Babbler	IV
35	Passeriformes	Motacillidae	*Motacilla*	*flava*	Yellow Wagtail	IV
36	Passeriformes	Estrildidae	*Lonchura*	*malabarica*	Indian Silverbill	IV
37	Accipitriformes	Accipitridae	*Aquila*	*rapax*	Tawny Eagle	IV
38	Accipitriformes	Accipitridae	*Gyps*	*fulvus*	Eurasian Griffon	I
39	Accipitriformes	Accipitridae	*Neophron*	*percnopterus*	Egyptian Vulture	I
40	Accipitriformes	Accipitridae	*Circaetus*	*gallicus*	Short-toed Snake Eagle	I
41	Accipitriformes	Accipitridae	*Circus*	*melanoleucos*	Pied Harrier	IV
42	Charadriiformes	Scolopacidae	*Actitis*	*hypoleucos*	Common Sandpiper	IV
43	Charadriiformes	Scolopacidae	*Tringa*	*totatus*	Common Redshank	IV
44	Podicipediformes	Podicipedidae	*Podiceps*	*ruficollis*	Little Grebe	IV
45	Podicipediformes	Podicipedidae	*Tachybaptus*	*ruficollis*	Little Grebe	IV
46	Strigiformes	Tytonidae	*Tyto*	*alba*	Barn Owl	IV
47	Anseriformes	Anatidae	*Anas*	*platyrhynchos*	Mallard	IV
48	Anseriformes	Anatidae	*Anas*	*acuta*	Northern Pintail	IV
49	Anseriformes	Anatidae	*Rhodonessa*	*rufina*	Red-crested Pochard	IV
50	Anseriformes	Anatidae	*Anas*	*penelope*	Eurasian Wigeon	IV

51	Falconiformes	Falconidae	*Falco*	*tinnunculus*	Common Kestal	IV
52	Anseriformes	Anatidae	*Anas*	*crecca*	Common Teal	IV
53	Anseriformes	Anatidae	*Anas*	*poecilorhyncha*	Spot-billed Duck	IV
54	Anseriformes	Anatidae	*Aythya*	*nyroca*	Ferruginous Pochard	IV
55	Anseriformes	Anatidae	*Aythya*	*ferina*	Common Pochard	IV
56	Anseriformes	Anatidae	*Anas*	*strepera*	Gadwall	IV
57	Anseriformes	Anatidae	*Tadorna*	*ferruginea*	Brahminy Shelduck	IV
58	Ciconiiformes	Phoenicopteridae	*Phoeniconaias*	*minor*	Lesser flamingo	IV
59	Anseriformes	Anatidae	*Spatula*	*clypeat*	Northern Shoveler	IV
60	Apodiformes	Apodidae	*Apus*	*nipalensis*	House Swift	IV
61	Falconiformes	Falconidae	*Falco*	*subbuteo*	Eurasian Hobby	IV
62	Columbiformes	Columbidae	*Spilopelia*	*senegalensis*	Laughing Dove	IV
63	Columbiformes	Columbidae	*Spilopelia*	*decaocto*	Eurasian Collar Dove	IV
64	Psittaciformes	Psittaculidae	*Psittacula*	*krameri*	Rosering Parakeet	IV
65	Pelecaniformes	Threskiornithidae	*Platalea*	*leucorodia*	Eurasian Spoonbill	IV
66	Pelecaniformes	Threskiornithidae	*Threskiornis*	*melanocephalus*	Blackheaded Ibis	IV
67	Pelecaniformes	Ardeidae	*Ardea*	*alba*	Large Egret	IV
68	Pelecaniformes	Ardeidae	*Ardea*	*cinerea*	Gray Heron	IV
69	Pelecaniformes	Ardeidae	*Ardea*	*grayii*	Pond Heron	IV
70	Pelecaniformes	Phalacrocoracid	*Phalacrocorax*	*niger*	Little Cormorant	IV
71	Pelecaniformes	Threskiornithidae	*Platalea*	*leucorodia*	Eurasian Spoonbill	I
72	Pelecaniformes	Threskiornithidae	*Threskiornis*	*melanocephalus*	Black-headed Ibis	IV

Only four Species are categorized as the Biome Restricted Species (BRS) and of these, two species, *viz.* Indian Peafowl (*Pavo cristatus*), and Indian Robin (*Saxicoloides fulicata*) are from the Indo-Malayan Tropical Dry Zone- Biome (11); and the remaining one species, viz., White-eared Bulbul (*Pycnonotus leucotis*) from Saharo-Sindian Desert- Biome (13) (Jhunjhunwala *et* al. 2001) (Table 4).

The analysis of various categories and subcategories of residential status of bird species reported and recorded from the study area are summarized below (Table 5):

Table 5. Residential status of birds in and around RWPL site

Sl. No.	Status		No. of species
1	Resident widespread	(R)	41
2	Resident local sparse	(r)	03
3	Winter visitor widespread(W)		17
4	Resident as well as winter visitor widespread	(RW)	03
5	Resident as well as winter visitor local sparse	(rw)	03
6	Residential status not known (?)		05
		Total	**72 species**

All these species are widely or sparsely distributed not only in the study area, but also throughout their distributional range including the district Barmer. In other words none of these species are endemic only to the study area.

5.2.3. Herpetofauna

A total of 14 species of herpetofauna (Reptile and Amphibia) have been reported from in and around the Kapurdi-Jalipa area of Barmer district of Rajasthan through earlier study by ZSI. During the field work undertaken as part of the present study, only two species of lizard and one species of frog was recorded within 10 km radius of proposed expansion units of power plant (Table 6).

Nevertheless, out of the 11 species of reptiles reported, nine species of reptiles are included under the Wildlife (Protection) Act, 1972, the Large Bengal Monitor (*Varanus bengalensis*) and Desert Monitor (*Varanus griseus*) are listed under Schedule I of the Wildlife (Protection) Act, 1972 while one species Spiny tailed Lizard (*Uromastrix hardwickii*) is listed under Schedule II. Apart two species of snakes are included in the Schedule-I and another two species of snakes (Sand Boa) and three species of frogs are in Schedule-IV of the Act. All these species are expected to be occurring in and around the 10 km radius of the proposed expansion units of RWPL Plant, given the suitability of the habitat and known range of the species in the desert.

Table 6. List of Herpetofauna recorded and observed from in and around the RWPL site and their status as per the Wildlife (Protection), Act, 1972

Sl.No	Order	Family	Genus	Species	Common Name	Schedule of IWLPA, 1972
1	Squamata	Agamidae	*Uromastix*	*hardwickii*	Spiny-tailed Lizard	II
2	Squamata	Varanidae	*Varanus*	*bengalensis*	Bengal Monitor	I
3	Squamata	Varanidae	*Varanus*	*griseus*	Desert Monitor	I
4	Squamata	Boidae	*Eryx*	*conicus*	Common Sand Boa	IV
5	Squamata	Boidae	*Eryx*	*johnii*	Common Sand Boa	IV
6	Squamata	Elapidae	*Naja*	*naja naja*	Indian Cobra	I
7	Squamata	Viperidae	*Daboia*	*russelii*	Russell's Viper	I
8	Squamata	Varanidae	*Varanus*	*bengalensis*	Bengal Monitor	I
9	Squamata	Lacertidae	*Acanthodactylus*	*cantoris*	Indian Fringe-toed Sand Lizard	NLA
10	Squamata	Agamidae	*Calotes*	*versicolor*	Garden Lizard	NLA
11	Anura	Dicroglossidae	*Euphlyctis*	*hexadactylus*	Green Pond frog	NLA
12	Anura	Dicroglossidae	*Euphlyctis*	*cyanophlyctis*	Indian Skipping Frog	IV
13	Anura	Dicroglossidae	*Haplobatrachus*	*tigerinus*	Indian Bull Frog	IV
14	Anura	Bufonidae	*Duttaphrynus*	*melanostictus*	Common Asian Toad	IV

6. CONSERVATION ACTION PLAN FOR RWPL

The study team has conducted the surveys mainly to ascertain the occurrence of threatened species in the study area. Conservation Action Planning (CAP) should be prepared after ascertaining the exact status of the species deserve conservation for the area. During our course of surveys, the expert team had meetings with the forest officials at Barmer, to know about the species composition besides getting to know the details of management options currently practiced by the forest department.

As per the project proposal of ZSI and Work Order of RWPL, ZSI conducted two surveys each spanning for 2-5 days (February 2016 and April-May 2016) at Bhadresh. The ZSI team visited the proposed expansion site apart from the surrounding places within the radius of 10 km to record vertebrate and invertebrate diversity for preparation of Conservation Action Plan (CAP) for the wildlife species as per the Indian Wildlife (Protection) Act, 1972 and the recent IUCN Red List.

Conservation Action Planning (CAP) is a powerful tool adopted globally by the conservationists to guide teams that involve themselves towards conservation to effectively frame strategies and measures which ultimately lead to success in terms of conserving either an ecosystem or/and an associated species or a set of species in a broad area of scope.

Ever since the term, CAP was framed some 20 years ago, the Conservation Action Planning approach has been applied and adapted in projects globally. The principals and management aspects of CAP have been widely adopted and applied by various groups, right from the rural and indigenous residents, scientists, government officials, conservation and sustainable development practitioners from the non-profit sectors at various scales. In India, on 13 October 1983, an historic document has been adopted by the Indian Board for Wildlife, the apex advisory body in this field in India and this was the *National Wildlife Action Plan* (Singh, 1985). The action plan outlined the broad framework for a strategy and action programme for wildlife conservation in India.

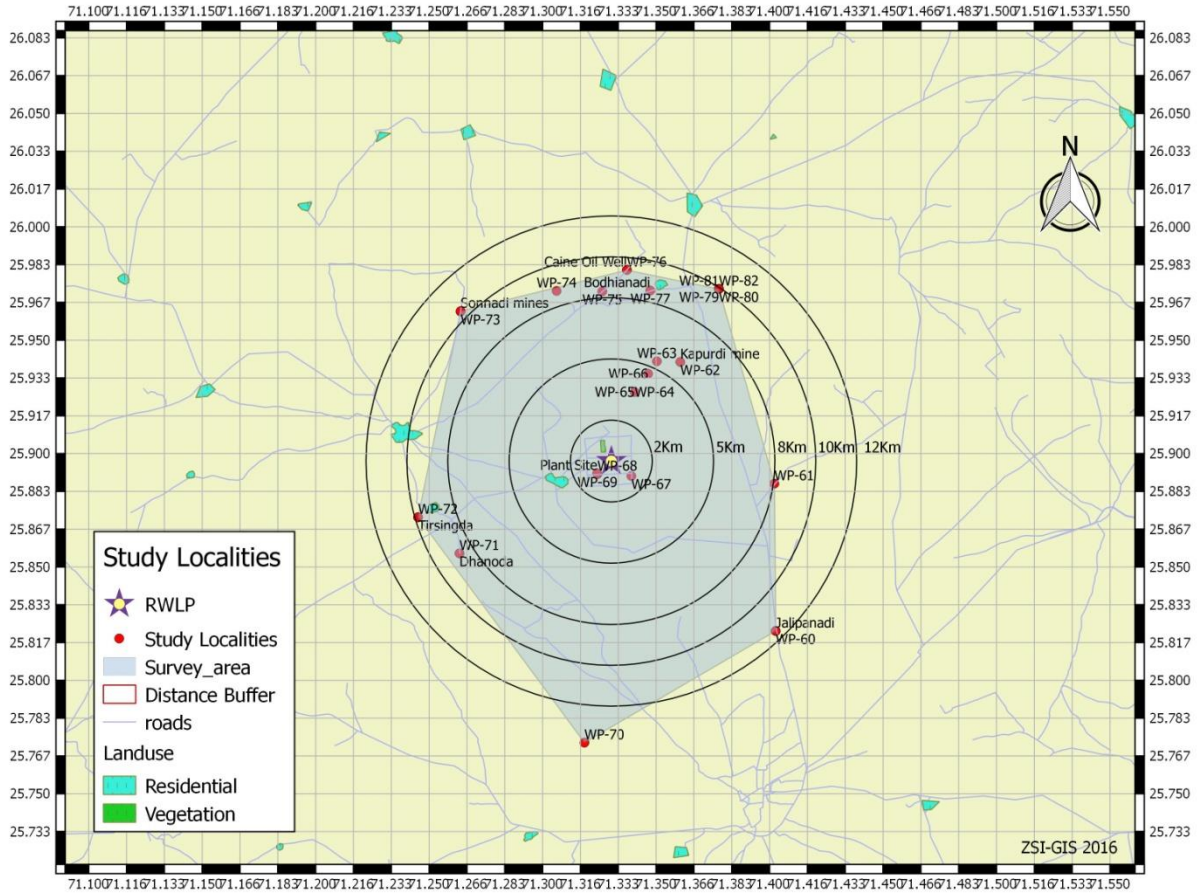

Fig.5. Sites along with water bodies within the 10 km radius of the proposed expansion of RWPL, visited during the survey with demarcation of 2 km contour for wildlife

Out of various strategies, the two important suggested strategies very well suit for the scope of conservation work are as follow:

1. The rehabilitation of threatened and schedule species and their restoration to protected portions of their former habitats, in a manner which provides some reflection of their original distribution.

2. The development of research and monitoring facilities which will provide a scientific understanding of wildlife populations and habitats essential to their proper management.

The CAP methodologies may also be used to cultivate a symbiotic relationship between the locals and native fauna, without either of these two being affected by the proposed expansion of the existing facility at RWPL.

In India, many CAPs have been prepared to conserve individual species or ecosystem in general. For example, the CAP prepared to conserve the population of vultures is been adopted at national level, whereas the present CAP will be implemented at regional or Taluk level, thus, will have its limitations.

The basic concepts of ZSI's conservation approach with respect to the proposed expansion of the RWPL units follow an adaptable management framework by setting goals and priorities besides developing strategies and taking actions in order to finally measure the results. In nutshell, CAP is a framework to help the RWPL to focus its conservation strategies on clearly defined elements of biodiversity or conservation targets and fully assess threats to these targets and to measure their success in a manner that will enable them to adapt and learn over time.

6.1. Scope and Conservation Targets for RWPL

The scope of this study was to determine and delineate an area of interest where targeted diversity spread over either at an ecosystem level or landscape level. Based on our preliminary survey, we have demarcated a boundary of 10 km radius from the proposed project site and mapped the targeted areas appropriately. Our target was to study the ecosystems along with their associated threatened fauna so as to frame the CAP at the end of the project tenure. Having identified these

aspects, the study team has prepared a detailed GIS map on which the future conservation oriented actions by RWPL (in coordination with the local forest department) should stay put.

6.2. Methodologies adopted for preparation of CAP

1. As a first step, ZSI team had discussions with the officials of both RWPL and the local forest officials (Divisional Forest Officer, Barmer) about the broad idea of what the study team would intend to do for RWPL at Bhadresh. This helped our team to gather more information in terms of what the local stakeholders perceived about the project and how they wanted this whole project to shape up in order to achieve the targets.

2. Secondly, the study team prepared a GIS map by plotting all the locations visited and species recorded which are in various Schedules based on the priorities and conservation targets with regard to the RWPL site and the proposed expansion, contour lines prepared for the species which are in frequent movement within 10 km radius of the proposed expansion site. Because, at a later stage, the RWPL must inform other stakeholders that the steps or CAP followed are suitable only for the species found within its boundary and areas under influence.

3. Thirdly, ZSI has selected a list of species as focal conservation targets to be undertaken by the RWPL. Though, there are many species such as Indian peafowl under the Schedule-I of the Indian Wildlife (Protection) Act, 1972, we have selected only a few species (see Table 7) as because by conserving these flagship species, possibly we can conserve other dependent species. Entire area has been selected as one big target area within it all these species either reside permanently or visit only during certain part of the year (for example migratory season for birds). The whole area (within 10 Km radius) has a variety of habitats from sand dunes to scrub forest, and grassland having set of species that are likely to have movement in and around the power plant (see Fig. 5) and necessitate no disturbance due to any developmental activities around it.

Table 7. Possible presence of Schedule species within 10 km radius of proposed expansion

(a)	**Mammals:**	
i)	Desert fox (*Vulpes vulpes pussila*)	Schedule I
ii)	Indian fox (*Vulpes bengalensis*)	-DO-
iii)	Chinkara (*Gazella bennettii*)	-DO-
(b)	**Aves:**	
iv)	Eurasian Spoonbill (*Platalea leucorodia*)	-DO-
v)	Tawny Eagle (*Aquila rapax*)	-DO-
vi)	Indian Peafowl (*Pavo cristatus*)	-DO-
(c)	**Reptiles:**	
vii)	Desert Monitor (*Varanus griseus*)	-DO-
viii)	Large Bengal Monitor (*Varanus bengalensis*)	-DO-

Besides the above schedule-I species, several threatened species *viz.* Asiatic Jackal, Indian Fox and Desert Fox (Schedule II); Wild Boar and Nilgai (Schedule III); Indian Long-eared Hedgehog, Indian Gray Mongoose, Small Indian Mongoose, Northern Palm Squirrel, Indian Crested Porcupine and Desert Hare (Schedule IV), and Indian Hairy-footed Gerbil, Indian Desert Gerbil, Indian Gerbil, Black Rat or House Rat and Indian Brown Spiny Mouse (Schedule V) along with several migratory and residential birds are reported to be occurring within the radius of 10 km being known habitat for the species.

Costs involved while implementing the recommendations of CAP will entirely lie with the RWPL. However, it would be ideal if RWPL set aside a quantum of money to support any major studies targeting each of the identified species over a long period of time. Hence, we strongly recommend the inclusion of future scientific studies on the identified species as part of the entire effort. Many eligible institutions and individuals often rely on funds to sustain their research work on many species of conservation importance. At this juncture, RWPL can step in and fast-track the funding process after evaluating the set of proposals by an independent committee. If anything of that sort happens, ZSI may help RWPL in scrutinizing the suitable project proposals. Local NGOs who deal with biodiversity conservation of the area should be encouraged to educate the locals about the importance of presence of above mentioned species in the vicinity of the plant and their villages.

6.3. Recommendations of ZSI on Conservation Action Plan by RWPL

1. RWPL may propose to support Forest department for creating awareness among common public especially for school children for importance and conservation of available fauna.

2. ZSI stress upon for a strong mechanism to be in place to monitor the animal populations on a long term basis. Being the dominant and wide occurrence species, an idea of conducting „" Annual Chinkara and Peafowl Counts be mooted and carried out by local forest department involving school and college students for which RWPL may earmark fund for the Forest Department. Capacity building workshop on conservation of schedule species in the Direct Impact Zone of RWPL should be organized for stakeholders including Frontline Staff of Forest Department and RWPL Employees.

Towards this, ZSI may provide support, for which M/s RWPL may consider sponsoring this event logistically.

3. RWPL may support the local forest department to monitor the animal populations especially of those Schedule species occurring within the 10 km radius of the power plant. Monitoring activities should be scientific using standard sampling techniques adopted elsewhere. Permanent monitoring plots may be randomly selected in consultation with scientific experts. The montoring may be done jointly with RWPL staff and the Forest Department for long-term monitoring of vegetation profile and associated animal density, for which RWPL may allocate fund towards the activities to the Forest Department. Digital database having information about the wildlife population in and around RWPL should be maintained by Forest department through monitoring staff.

4. Since, the transportation of the lignite from mining-pit to the power plant is being done with help of a conveyer-belt at the ground level, belts should be laid high enough at suitable places, at sufficient number of places, to provide passage for free movements of stray wild animals within the plant area.

5. Proper traffic management practice shall be implemented in the road stretch for movement of heavy vehicles (Tipplers/Dumpers) in and around the Kapurdi-Jalapa lignite mining area with proper signage for possible movement of wildlife (most frequently Chinkara) and precaution for road accidents of wildlife. RWPL should impose no-overtaking and speed limit policy for all vehicles including those carrying fly ash from the plant. As part of the CSR (corporate social responsibility), RWPL should consider putting up of signage on the Barmer-Jaisalmer Highways, that are passing through the 10 km radius of the power plant.

6. Sign boards highlighting the importance of various threatened species exists there can also be erected by RWPL with their logo and Forest Department for common public in villages under Direct Impact Zone of RWPL.

7. Lighting can affect the animal behavior and their movement being in desert, many of the wildlife species are nocturnal in habit. Therefore, effort should be made to minimize

lighting of the infrastructure and unnecessary/decorative nature of lighting should be avoided, except for security purpose.

8. Provision should be made for rescue of the Chinkara and Peafowl or any other schedule animal populations injured by road/other accident within the Direct Impact Zone and an Animal Rescue Centre may be supported by RWPL to be executed by the Forest Department.

9. As water bodies in the study area attracts many migratory species of birds (atleast 17 species of birds recorded are winter visitors), therefore, all the ponds (water bodies) available in the Direct Impact Zone of RWPL should not only be maintained throughout the year, and also may be improved, if possible. This will not only help the sustenance and survival of water birds, and the human populations residing in the area.

6.3.1. Institutions/NGOs/individuals to be involved for monitoring activities

This Conservation Action Plan should be targeted towards the local forest department as who are the custodians of faunal diversity in and around the RWPL. However, the forest department solely cannot monitor the population of various animals, hence, we propose the inclusion of various like-minded organisations, local NGOs, schools and colleges, veterinary departments and even local *panchayats* apart from individuals. Effective management of local wildlife depends upon how successfully all the species are monitored year-round by the managers. Monitoring of various animal species may be carried out by the following agencies. The list includes only a few institutions and individuals and there may be many more interested institutions and individuals who may turn up over the years to participate in the long-term monitoring activities.

List of management and research institutions proposed for monitoring activities:

(i) Chief Wildlife Warden, Rajasthan
(ii) Desert Regional Centre, Zoological Survey of India, Jodhpur
(iii) Bombay Natural History Society, Mumbai
(iv) Wildlife Institute of India, Dehradun
(v) Centre for Environment Education, Ahmedabad

The commitment towards organizing/conducting long-term monitoring activities should remain with the forest department as because the RWPL may exit the programme after committing

required funds. Indication of any successful long-term monitoring activities will get reflected in terms of publicity it generates among general public and also in terms of research publications that come out over a period of time by the researchers and institutions.

6.3.2. Financial Implications

The budget for the above mentioned specific and board recommendations given throughout the CAP is to be conceived and implemented by the RWPL in consultation with Rajasthan Forest Department. The ZSI strongly urges the RWPL to be more liberal in term of financially supporting any long-term conservation efforts.

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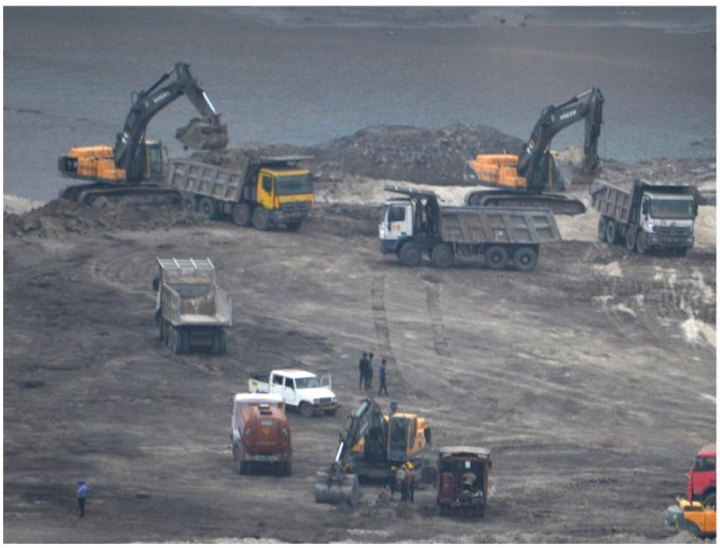
A glimpse of existed plant of Raj West Power L imited, Bhadresh, Barmer, Rajasthan

Mining Area



Machines at Mining Area

Unloading of trucks

Conveyor Belt supplying Lignite to existing RWPL Plant

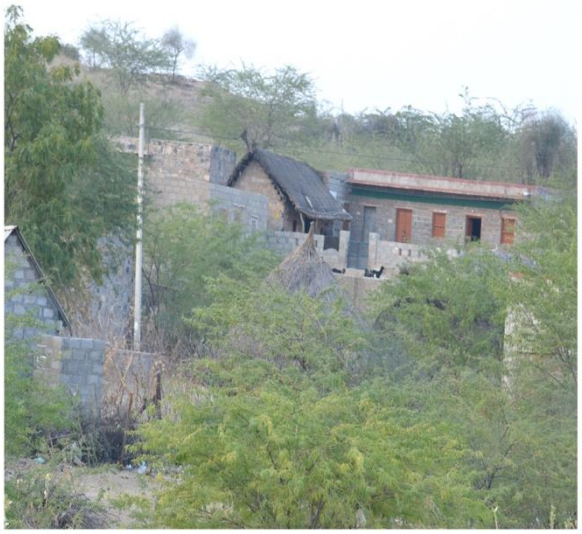
Meeting of Director, ZSI and Scientists with Project Director, RWPL and Official

Meeting of Director, ZSI and Scientists with DFO, Rajasthan Forest Dept., Barmer

Glimses of field visit by ZSI team in and around RWPL Plant area

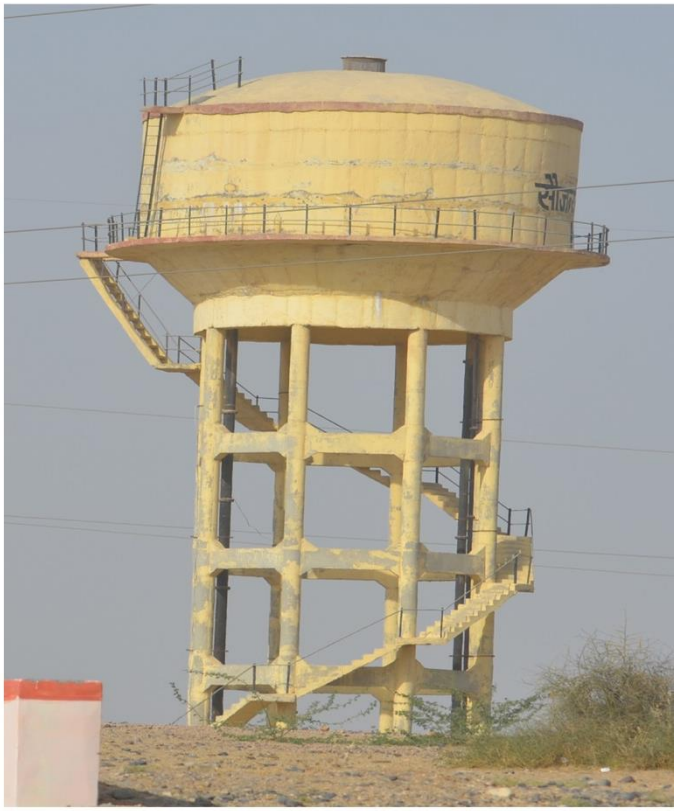
Glimpses of field visit by ZSI team in and around RWPL Plant area

Glimpses of human habitation in and around RWPL Plant area

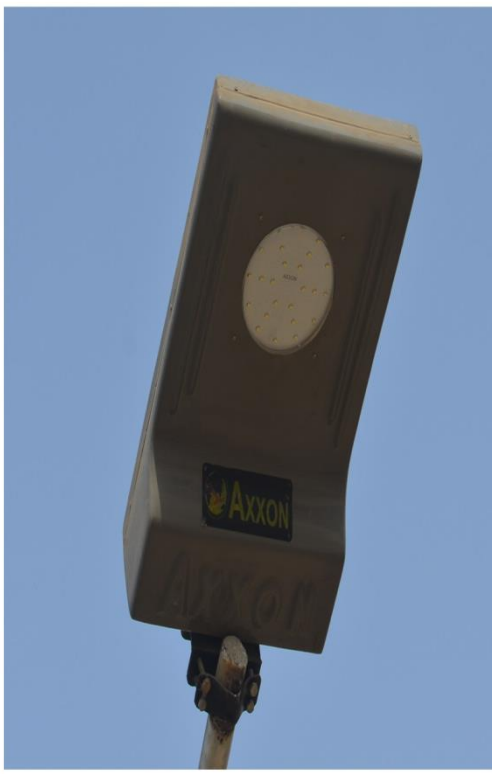


Glimpses of human life in and around RWPL Plant area

Glimpses of CSR initiatives by RWPL in Bhadresh



Water tank for supply to villages around RWPL Plant



Installation of Roadside lights in the villages as CSR initiative by RWPL

Glimpses of fauna (insects) in and around RWPL Plant area

Crocothemis servilia (Drury)

Ictinogomphus rapax Rambur

Utetheisa pulchella (Linnaeus)

Anaphaeis aurota Fabricius

Junonia orithya Linnaeus

Junonia lemonias Linnaeus

Glimpses of fauna (birds) in and around RWPL Plant area

Indian Peafowl, *Pavo cristatus* (Linnaeus, 1758)

Common Myna, *Acridotheres tristis* (Linnaeus, 1766)

Grey Francolin, *Francolinus pondicerianus* (Gmelin, 1789)

Pigeon, *Columba livia*

White-eared Bulbul, *Pycnotus leucotis* (Gould, 1836)

Glimpses of fauna (birds) in and around RWPL Plant area

Grey Heron, *Ardea cinerea* Linnaeus, 1758

Black Winged Stilt, *Himantopua himantopus* (Linnaeus, 1758)

Mallard, *Anas platyrhynchos* Linnaeus, 1758

Little Cormorant, *Microcarbo niger* (Vieillot, 1817)

River Tern, *Sterna aurantia* (Gray, JE, 1831)

Birds in and around study area at RWPL, Barmer, Rajasthan

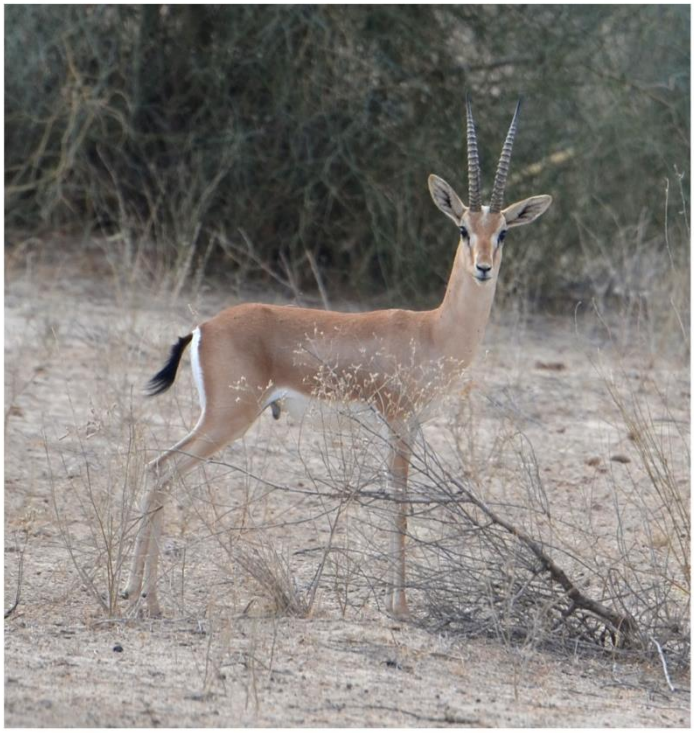
Indian Chestnut-Bellied Sandgrouse, *Pterocles exustus* (Temminck, 1825)

Green bee-eater, *Merops orientalis* Latham, 1801

Indian Robin, *Copsychus fulicatus* (Linnaeus, 1766)

Indian Peafowl, *Pavo cristatus* (Linnaeus, 1758) in and around study area at RWPL , Bhadresh, Barmer, Rajasthan

Indian Gazelle or Chinkara, *Gazella bennettii* (Sykes, 1831) in and around study area at RWPL , Bhadresh, Barmer, Rajasthan



Glimpses of fauna (mammals) in and around RWPL Plant area

Desert Hare, *Lepus capensis* Linnaeus, 1758

Desert Cat, *Felis silvestris ornata* Gray, 1830

Wild Boar, *Sus scrofa* Linnaeus, 1758

Indian Gazelle or Chinkara

Indian Gazelle or Chinkara, *Gazella bennettii* (Sykes, 1831)

ZOOLOGICAL SURVEY OF INDIA

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