DB Power Limited

CIN: U40109MP2006PLC019008

Business Office : Village – Badadarha, Post – Kanwali, Dist – Janjgir – Champa, Chhattisgarh, PIN – 495695

Tel. : +91-7389912699

No. DBPL/ENV/214 Date: 23.05.2022

To,

The Director
Ministry of Environment and Forests, Climate Change
Regional Office (WCZ), Ground Floor
East Wing, New Secretariat Building,
Civil Line, Nagpur-440001
eccompliance-cg@gov.in
apccfcentral-ngp-mef@gov.in

Subject: Six Monthly Compliance Report for the period of October 2021 – March 2022

Ref: Environment Clearance granted by MOEF vide letter no. J-13012/79/2008-IA. II (T) Dated 16/09/2010 to our 2X600 MW Thermal Power Plant located at village – Badadarha, Taluka- Dabhra, Dist – Janjgir Champa, Chhattisgarh, DB Power Limited.

Dear Sir,

We are pleased to enclose herewith six monthly Compliance Status Report for the conditions stipulated in subject EC granted to our Thermal power plant located at Village - Badadarha, Taluk - Dabhra, District-Janjgir Champa, Chhattisgarh. The report has following enclosures –

1.	CSR & Expenses Report	Annexure IA, IB
2.	FGD Progress Status Report	Annexure II
3.	Fly Ash Utilization Report	Annexure III
4.	Env. Monitoring Report	Annexure IV
5.	Hydro-geological study	Annexure V
6.	Social Audit Report	Annexure VI

Thanking you,
Yours Faithfully

Authorized Signatory

D.B. POWER LTD. ★ RAIGARH ★

Enclosures: as above

Copy to:

The Member Secretary, Chhattisgarh Environment Conservation Board,
Paryavas Bhavan, North Block Sector-19, Atal Nagar, Raipur (C.G.) 492002

Regional Officer, Chhattisgarh Environment Conservation Board
Vyapar Vihar, Near Pt. Dindayal Upadyay Garden, Dist: Bilaspur (C.G.)

Registered Office:
Block 1A, 5TH Floor, Corporate Block, DB City Park, DB City Arera Mills, Opposite M. P. Nagar Zone – I, Bhopal – 462016 (M. P.)
Tel. : +91-755-3988884 Fax: +91-755-267 5190

Status of compliance of conditions of Environment Clearance granted by MOEF vide letter no. J-13012/79/2008-IA.II (T) dated 16.09.2010 to M/S DB Power limited, 2X600 MW Thermal Power Plant located at Baradarha, Janjgir- Champa, Chhattisgarh

(Period : October 2021 – March 2022)

A. Specific Conditions

S. No.	Stipulation	Compliance Status
i.	Vision document specifying prospective plan for the site shall be formulated and submitted to the Ministry within six months.	Complied.
ii.	Sulphur and ash contents in the coal to be used in the project shall not exceed 0.5% and 34% respectively at any given time. In case of variation of coal quality at any point of time, fresh reference shall be made to MoEF for suitable amendments to environmental clearance condition wherever necessary.	Company is procuring coal from Coal India subsidiaries namely SECL & MCL. We are committed to comply MOEF&CC notification vide S.O. 1561(E) dated 21.05.2020.
iii.	A bi-flue stack of 275 m height shall be provided with continuous online monitoring equipments for SOx, NOx and Particulate Matter. Exit velocity of flue gases shall not be less than 22 m/sec. Mercury emissions from stack may also monitored on periodic basis.	A 275 meter tall twin flue stack has been constructed for effective dispersion of fumes aimed at proper dilution. We have installed continuous online monitoring system each attached to stack for SOx, NOx and Particulate Matter. The exit velocity of flue gas > 22 m/s.
iv.	Source sustainability study of water requirement shall be carried out by an institute of repute. The study shall also specify the source of water for meeting the requirement during lean season. The Report shall be submitted to the Regional Office of the Ministry within six months.	Complied. Source sustainability study, once again carried out by ISM Dhanbad and same had been submitted along with compliance report vide our Letter No. DBPL/ENV/41 Dated 28.05.2018.
v.	Hydro-geological study of the area shall be reviewed annually and report submitted to the Ministry.	Last Hydro-geological study in process this year.
vi.	No ground water shall be extracted for use in operation of the power plant even in Lean season. COC of 5.0 shall be adopted.	Ground water is not extracted for industrial & domestic use. COC of > 5.0 is maintained in water circulated through the cooling tower during operation. This is aimed at water conservation.
vii.	No water bodies including natural drainage system in the area shall be disturbed due to activities associated with the setting up /operation of the power plant. Minimum required environmental flow suggested by the competent Authority of the state govt. shall be maintained in the channel / Rivers (as applicable) even in lean season.	Being complied.
viii.	Local employable youth shall be trained in skills relevant to the project for eventual employment in the project itself. The action taken report and details thereof to this effect shall be submitted to the Regional Office of the Ministry and the State Govt. Dept concerned from time to time.	The local youths are being trained in skills such as Plumbing, Masonry, Hand pump repair etc by DB Power CSR team. CSR Report indicating such initiatives is attached as **Annexure I A.**

ix.	Additional soil for leveling of the proposed site shall be generated within the sites (to the extent possible) so that natural drainage system of the area is protected and improved.	Complied
x.	Provision for installation of FGD shall be provided for future use. High Efficiency Electrostatic Precipitators (ESPs) shall be installed to ensure that particulate emission does not exceed 50 mg/Nm3. Adequate dust extraction system such as cyclones / bag filters and water spray system in dusty areas such as in coal handling and ash handling points, transfer areas and other vulnerable dusty areas shall be provided.	1. Adequate space for installation for Flue Gas De-Sulphurisation (FGD) Plant has been provided for future use. DBPL has awarded EPC work to meet the MOEF emission norms. Contract awarded to Chinese EPC contractor M/s TUNA Corporation in Sep 2019. Project work started .Find the attached FGD progress status report as **Annexure-II** 2. High Efficiency (99.94%) Electro-static precipitator having 80 fields has been installed. This has kept particulate emission from stack < 50 mg/Nm3. 3. We have provided dust extraction system (DE) complete with filter bags, cage and hopper fitted to Crusher unit, transfer points (5, 6, 7 and 8) and bunkers. We have also provided dust suppression system (DS) at crusher house, TP-1,2,3 and 4 and also at MUH and ERH. The conveyors have been closed on all sides using color coated galvanized profile sheet (CCGP) to confine fugitive emissions. We have provided water cannons at strategic locations in coal handling. Water sprinkling using tankers is done for dust suppression on road. Ash transportation from generation point to silo and to ash pond is done using closed MS pipes. Above actions have immensely helped us contain fugitive emission and meet ambient air quality norms in the area.

xi.	Utilization of 100% Fly Ash generated shall be made from 4th year of operation of the plant. Status of implementation shall be reported to the Regional Office of the Ministry from time to time. Fly ash shall be collected in dry form and storage facility (silos) shall be provided. Unutilized fly ash shall be disposed off in the ash pond in the form of slurry form. Mercury and other heavy metals (As,Hg,Cr, Pb etc.) will be monitored in the bottom ash as also in the effluents emanating from the existing ash pond. No ash shall be disposed off in low lying area.	Fly ash generation & utilization report from October-2021 to March-2022 is attached as **Annexure III.** **Ash utilization for the FY 22 is 114%** Heavy metal monitoring is done periodically and analysis report is attached as **Annexure IV.**
xii.	Ash pond shall be lined with HDPE / LDPE lining or any other suitable impermeable media such that no leaching takes place at any point of time. Adequate safety measures shall also be implemented to protect the ash dyke from getting breached. For disposal of Bottom Ash in abandoned mines (if proposed to be undertaken) it shall be ensured that the bottom and sides of the mined out areas are adequately lined with clay before Bottom Ash is tilled up. The project proponent shall inform the State Pollution Control Board well in advance before undertaking the activity.	Complied. LDPE liners used for lining of Ash pond.
xiii.	Green Belt consisting of 3 tiers of plantations of native species around plant and at least 100 m width shall be raised. Wherever 100 m width is not feasible a 50 m width shall be raised and adequate justification shall be submitted to the Ministry. Tree density shall not less than 2500 per ha with survival rate not less than 75 %.	The total plantation done in the area of 211 acre is 2, 13,470 (33% of total area of 630 acres).
xiv.	Two nearest village shall be adopted and basic amenities like development of roads, drinking water supply, primary health centre, primary school etc shall be developed in coordination with the District administration. For the tribal families (if any) affected directly or indirectly by the proposed project, specific schemes for upliftment of their sustainable livelihood shall be prepared with time bound implementation and in built monitoring program me. The status of implementation shall be submitted to the Regional Office of the Ministry from time to time.	We have adopted 2 villages Tundri and Badadrha located near the plant as required. Basic amenities like development of roads, drinking water supply, health camps, infrastructure and other support in schools, etc are being done. **Annexure I A.**
xv.	An action plan for R&R (as applicable) with package for the project affected persons be submitted and implemented as per prevalent R&R policy within three months from the date of issue of this letter.	Complied.
xvi.	An amount of Rs 26.0 Corers shall be earmarked as one time capital cost for CSR program. Subsequently a recurring expenditure of Rs 5.2 Corers per annum shall be earmarked as recurring expenditure for CSR activities. Details of the activities to be undertaken shall be submitted within one month along with road map for implementation.	Expenses incurred towards implementation of CSR program from April-21 to March-22 is attached as **Annexure 1B.**

xvii.	While identifying CSR programme the company shall conduct need based assessment for the nearby villages to study economic measures with action plan which can help in upliftment of poor Section of society. Income generating projects consistent with the traditional skills of the people besides development of fodder farm, fruit bearing orchards, vocational training etc. can form a part of such program. Company shall provide separate budget for community development activities and income generating program. This will be in addition to vocational training for individuals imparted to take up self employment and jobs.	CSR activities have been undertaken by DB Power Ltd. CSR activity detail is attached as **Annexure I A.**
xviii.	It shall be ensured that in-built monitoring mechanism for the schemes identified is in place and annual social audit shall be got done from the nearest government institute of repute in the region. The project proponent shall also submit the status of implementation of the scheme from time to time.	Social Audit for the year **2020-21** is submitted. Find attached report as Annexure-VI

B. General Conditions

S. No.	Stipulation	Compliance Status
i.	The treated effluents conforming to the prescribed standards only shall be re-circulated and reused within the plant. There shall be no discharge outside the Plant boundary except during monsoon. Arrangements shall be made that effluents and storm water do not get mixed.	• Treated water of ETP is reused green belt irrigation besides in ash handling plant. • Ash Dyke decant water is treated and re-circulated to ash water sump for reuse. • The plant is designed for zero discharge. • Process and storm water is kept separate.
ii.	A sewage treatment plant shall be provided (as applicable) and the treated sewage shall be used for raising greenbelt / Plantation.	Sewage Treatment Plants (15 in number) have been installed and commissioned. These are working fine. The treated water from STPs is used for green belt nursing.
iii.	Rainwater harvesting should be adopted, Central Groundwater Authority / Board shall be consulted for finalization of appropriate rainwater harvesting technology within a period of three months from the date of issue of clearance and details shall be furnished to the Regional Office of the Ministry.	We have constructed 7 number of Rain water harvesting structures for the purpose. This is complete with a receiving pond, gravel/sand bed filter besides bore well. The collected water is subjected to ground water recharging.
iv.	Adequate safety measures shall be provided in the plant area to check / minimize spontaneous fires in coal yard, especially during summer season. Copy of these measures with full details along with plant layout shall be submitted to the Ministry as well as to the Regional Office of the Ministry.	Complied. We have provided a Fire Detection & Protection System (FDPS) including fire hydrants at all strategic points. The detail of same has already been submitted to your office.

v.	Storage facilities for auxiliary liquid fuel such as LDO and HFO /LSHS shall be made in the plant area in consultation with Department of Explosives, Nagpur Sulphur content in the liquid fuel will not exceed 0. 5%, Disaster Management Plan shall be prepared to meet any eventuality in case of an accident taking place due to storage of oil.	A storage facility for LDO is in place after obtaining license from PESO. We also own onsite Disaster/emergency plan duly approved by Factory inspectorate for meeting emergencies.
vi.	Regular monitoring of ground water level shall be carried out by establishing a network of existing wells and constructing new piezometers. Monitoring around the ash pond area shall be carried out particularly for heavy metals (Hg, Cr,As, Pb) and records maintained and submitted to the Regional Office of this Ministry. The data so obtained should be compared with the baseline data so as to ensure that the ground water quality is not adversely affected due to the project.	The ground water monitoring is done at regular intervals and records are maintained.
vii.	Monitoring surface water quantity and quality shall also be regularly conducted and records maintained. The monitored data shall be submitted to the Ministry regularly. Further, monitoring points shall be located between the plant and drainage in the direction of flow of ground water and records maintained. Monitoring for heavy metals in ground water shall be undertaken.	The monitoring is done at regular intervals and records maintained. **Annexure IV**
viii.	First Aid and sanitation arrangements shall be made for the drivers and other contract workers during construction phase.	Complied
ix.	Noise levels emanating from turbines shall be so controlled such that the noise in the work zone shall be limited to 75 dBA. For people working in the high noise areas, requisite personal protective equipment like earplugs / ear muffs etc. shall be provided, Workers engaged in noisy areas such as turbine area, air compressors etc shall be periodically examined to maintain audiometric record and for treatment for any hearing loss including shifting to non noisy / less noisy areas.	• Turbine is housed in a specially designed acoustic insulated box. • Compressors are kept in isolated closed chambers. • Boiler safety valves are fitted with silencers to contain noise. • In high noise areas PPE like Ear plugs / Ear Muffs are provided to keep impact minimum. • High noise area kept unmanned as far as practical. Above arrangements have helped keep noise level below 75 dB (A) and impact negligible.. The ambient noise monitoring is conducted regularly and records maintained. See **Annexure IV**
x.	Regular monitoring of ground level concentration of SO2, NOX, PM2.5 & PM10 and Hg shall be carried out in the impact zone and records maintained. If at any stage these levels are found to exceed the prescribed limits, necessary control measures shall be provided immediately. The location of the monitoring stations and frequency of monitoring shall be decided in consultation with SPCB. Periodic reports shall be submitted to the Regional Office of this Ministry. The data shall also be put on the website of the company.	Regular monitoring for AAQM is carried in the impact zone. Values are well within norms. The monitoring report is enclosed as **Annexure IV.** We have installed on line AAQMS for real time monitoring of ground level concentration. These are working fine.

xi.	Provision shall be made for the housing of construction labor (as applicable) within the site with all necessary infrastructure and facilities such as fuel for cooking, mobile toilets, mobile STP, safe drinking water, medical health care, crèche etc. The housing may be in the form of temporary structures to be removed after the completion of the Project.	Complied.
xii.	The project proponent shall advertise in at least two local newspapers widely circulated in the region around the project, one of which shall be in the vernacular language of the locality concerned within seven days from the date of this clearance letter, informs that the project has been accorded environmental clearance and copies of clearance letter are available with the State Pollution Control Board/Committee and may also be seen at Website of the Ministry of Environment and Forests.	Complied
xiii.	A copy of the clearance letter shall be sent by the proponent to concerned Panchayat, Zila Parisad / Municipal Corporation, urban local Body and the Local NGO, if any, from whom suggestions/representations, if any, received while processing the proposal. The clearance letter shall also be put on the website of the Company by the proponent.	Complied
xiv.	An Environmental Cell shall be created at the project site itself and shall be headed by an officer of appropriate seniority and qualification. It shall be ensured that the head of the Cell shall directly report to the head of the organization.	Environmental Cell is in place and is suitably staffed. It is headed by a senior officer. He reports directly to the head of the organization.
xv.	The proponent shall upload the status of compliance of the stipulated EC conditions, including results of monitored data on their website and shall update the same periodically, It shall simultaneously be sent to the Regional Office of MOEF, the respective Zonal Office of CPCB and the SPCB. The criteria pollutant levels namely; SPM, RSPM (PM2.5 & PM10), SO2, NOX (ambient levels as well as stack emissions) shall be displayed at a convenient location near the main gate of the company in the public domain.	Complied.
xvi.	The environment statement for each financial year ending 31st March in From –V as is mandated to be submitted by the project proponent to the concerned State pollution Control Board as prescribed under the Environment (Protection) Rules, 1986, as amended subsequently, shall also be put on the website of the company along with the status of compliance of environmental clearance conditions and shall also be sent to the respective Regional Offices of the Ministry by e-mail.	Complied. Environment Statement submitted for FY 2020-21 vide letter dated 17.09.2021.

<table>
<tr><td>xvii.</td><td>The project proponent shall submit six monthly reports on the status of the implementation of the stipulated environmental safeguards to the Ministry of Environment and Forests, its Regional Office, Central Pollution Control Board and State Pollution Control Board. The project proponent shall upload the status of compliance of the environment of the environmental clearance conditions on their website and update the same periodically and simultaneously send the same bye-mail to the Regional Office, Ministry of. Environment and Forests.</td><td>Complied. The last six monthly compliance reports to EC conditions were submitted via email to MOEF Regional office at Nagpur vides our Email dated 23.11.2021.</td></tr>
<tr><td>xviii.</td><td>Regional Office of the Ministry of Environment & Forests will monitor the implementation of the stipulated conditions.
A complete set of documents including Environmental Impact Assessment Report and Environment Management Plan along with the additional information submitted from time to time shall be forwarded to the Regional Office for their use during monitoring. Project proponent 'will upload the compliance status in their website and up-date the same from time to time at least six monthly basis. Criteria pollutants levels including NOX (Stack & ambient air) shall be displayed at the main gate of the power plant.</td><td>Being Complied as and when required.</td></tr>
<tr><td>xix.</td><td>Separate funds shall be allocated for implementation of environmental protection measures along with item-wise break-up, These cost shall be included as part of the project cost. The funds earmarked for the environment protection measures shall not be diverted for other purposes and year-wise expenditure should be reported to the Ministry.</td><td>The Expenditure incurred in environmental protection measures are – Capital Expenditure up to March 2018 = 1237.48 Crore
Recurring Expenditure :
<table><tr><th>Department</th><th>Expenses in FY 21-22 (in Crore)</th></tr><tr><td>Environment</td><td>9.40</td></tr><tr><td>Horticulture</td><td>1.02</td></tr><tr><td>Fly ash utilization</td><td>95.14</td></tr><tr><td>OHC</td><td>0.51</td></tr><tr><td>Total</td><td>106.07</td></tr></table></td></tr>
<tr><td>xx.</td><td>The project authorities shall inform the Regional Office as well as the Ministry regarding the date of financial closure and final approval of the project by the concerned authorities and the dates of start of land development work and commissioning of plant.</td><td>Complied.
Informed vide letter dated 06.06.2011.</td></tr>
<tr><td>xxi.</td><td>Full cooperation shall be extended to the Scientists / Officers from the Ministry / Regional Office of the Ministry at Bhopal / CPCB / SPCB who would be monitoring the compliance of environmental status.</td><td>Full cooperation will be extended to the Scientists / Officers from the Ministry / Regional Office of the Ministry at Bhopal / CPCB / SPCB as and when required.</td></tr>
</table>

D.B. POWER LTD. RAIGARH

DB POWER LIMITED

A Glimpses

on

CSR Activities

(October 2021 to March 2022)

DB Power Ltd., Badadarha

Corporate Social Responsibility

DB POWER LIMITED

* Constructed 300 meter CC road in village Badadarha.

* Constructed Cremation shed (2 nos.) Ghanatarai & Kalmidipa at Tundri

* Constructed Bathing step (4 nos.) Dadu pond, Patadi nala, Darri pond and Nimohi pond at Badadarha, Rampur & Baispali respectively

DB POWER LIMITED


* Drilling of bore well & Installation of Submersible pump & Hand pump at Labour colony, Badadarha, CHC and near weigh bridge at Basanpali respectively

* Fencing work of Govt. Hospital Tundri village

* Cleaning of Kachcha Canal at Badadarha.

Corporate Social Responsibility

DB POWER LIMITED

* Ambulance referral services have been provided to 137 cases.

* 641 Cases attended in CHC.

* Sprinkling of water on main road Tundri to Kanwali , Saraipali to Odekera & Tundri to By pass road Badadarha and ash dyke to L&T gate..

Corporate Social Responsibility

DB POWER LIMITED

* Repairing of 17 Hand pump have been done at Tundri & Badadarha * Repairing of 19 Motor pump have been done at Badadarha, Rampur & Tundri * Repairing of 15 Bio gas unit at Badadarha & Rampur. * Repairing of street lights of 86 times at Badadarha & Rampur have been done. * Repairing of 21 times Personal light connection of villagers at Badadarha.

*Provided sewing machine to Rajkumar Oron, Sonu Ram Oron , Arvind Rathiya, Tannusingh Rathiya, Jhanakram Rathiya, Nandlal Rathiya & Ramsharan Sahu,Tundri on the occasion of marriage of her daughter by president sir.

* A sum of Rs. 5000/- given to Govind Ram Sahu, Tundri as financial help for procurement of fridge on the occasion of marriage of her daughter by DBPL.

Corporate Social Responsibility

Annexure 1-B

DB Power Limited

CSR EXPENDITURE SORTED MONTH WISE FY 2021-22

Particulars	April'21	May'21	June'21	July'21	Aug'21	Sep'21	Oct'21	Nov'21	Dec'21	Jan '22	Feb '22	Mar'22	Total
Health & Sanitation	2120499	38711	1082615	367189	60237	54569	429382	224287	252289	698946	265502	1472222	7066449
Infrastructure	67401	7500	1853196	400938	871660	42200	28351	5379556	1161970	5910	1198635	2348085	13365403
Cultural & Social Events	1800	10900	735424	7125	65977	33536	244508	520800	755525	17000	88650	207516	2688761
Rehabilitation and Compensation	2431000	2102122	2127888	2083534	2042005	1621175	2969890	1890000	1875579	1869397	1868604	2046858	24928052
Women Empowerment & Skill	9400	6000	4839	6000	6000	6000	11800	0	12380	6000	6000	12000	86419
Education &Skill Development	0	12500	12500	12500	12500	12500	25000	91000	12500	12500	12500	25000	241000
Operating Expenses	72381	894	6926	26876	21960	14127	-31281	71364	42815	6899	35708	90951	359619
MONTHLY TOTAL	**4702482**	**2178627**	**5823388**	**2904162**	**3080340**	**1784107**	**3677650**	**8177008**	**4113058**	**2616653**	**3475599**	**6202631**	**48735703**

Annexure- II

FGD: Progress status note [May-22]

(A): Contract Award Status [Construction contracts]

1. Award of Civil Construction Package has been completed; agencies are given the job viz Package 1 for absorber area and Package 2 for Complex building & common facilities.
2. Both the agencies mobilized and work is progressing but with some delay from the original schedule.
3. Award of Mechanical Construction Package has been done and the agency mobilized their team on 10.10.2021
4. Award of Electrical and C&I Erection Packagenot yet awarded, scheduled for June 2022.

(B): Team Deployment status:

1. M/s Tuna's Project In charge and Commercial head from China reported at DBPL site on 07.11.2021.
2. M/s Tuna they mobilized their team members at site Mr.Tianyanzhao – GM (Site in charge) and other team members at various held with positiontotal 10 Nos.

(C): Design / Engineering approval status

1. All Civil engineering [foundations, buildingetc.] completed and drawings released for construction.
2. Mechanical erection engineering Completed; fabrication & erection drawing started released to site.
3. Single Line Diagram [SLD] of Electrical system has been approved. Electrical power hooking points from existing 11KV station switch gear have been identified.
4. Approved category: 102 Nos drawing has been approved out of 140 Nos drawings.
5. Information category: 125Nos drawing has been approved out of 220Nos drawings.
6. Balance drawing will be completion by mid of June'2022.

(D): Equipments supply status

1. Offshore equipments ordering completed except valves.
2. Drawing & ITP completed except valves.
3. Dampers, Expansion joints, Spray nozzles and Mist eliminators are reached to site.
4. As per schedule, Equipment supply completion by September 2022.
5. Enquiry for onshore equipment'sstarted, Some of the items are order placed like Steel, Elevator, CEMS and instruments.
6. Onshore items: Critical items like OVDT,HT& LT panel, UPS, DC Systems, DCS panel are offer received and technical clarification stage.
7. Balance items specification to be finalized for release of enquiry.
8. Onshore supply Completion by August'2022

(E): Construction status

1. Absorber #1 foundations Completed with all respect.
2. Absorber #1 Mechanical erection in progress (10.5 mtrs Shell erection completed)
3. Absorber #2foundations Completed with all respect.
4. Absorber #2 Mechanical erection in progress (5 mtrs Shell erection completed)
5. U#1 Bypass damper (in the existing flue gas duct) erection carried out in the month of October2021 during capital overhaul of Unit # I.
6. U #1 civil foundation for Booster fan suction and booster fan bypass dampers are ready.
7. Elevator foundation for each unit: 2 Nos completed, balance 2 nos in progress.
8. Duct Support foundation : 8 Nos completed out of 12 nos
9. Duct and duct support structure fabrication for these dampers are under progress.
10. Civil work for various tanks in complex building area has been completed.
11. Complex Building: Excavation 70% completed Raft foundation 40% completed. Balance work in progress completion up to zero level mid of June'2022. Overall completion by October'2022
12. Electrical control building civil work is started, plinth beam work in progress and scheduled completion by May 2023.
13. Keeping the current progress, we expect Trial operation & Commissioning of the FGD of Unit I by Sep 2024 and Unit II by Dec 2024, i.e within the timelines given for Category C projects with end date as December 2024.

Annexure-III

Ash Generation & Utilization Report
From Oct-21 to March-22

Sr.no	Month	Total Ash Generation (MT)	In making of Fly Ash based/ Bricks/ Blocks/ Tiles etc.	In manufacture of Portland Pozzolana Cement	In construction of Highways & Roads including Flyovers	Part replacement of cement in concrete	In Hydro Power Sector in RCC Dam Construction	In Ash dyke raising	In reclamation of low lying Area	In Mine filling	In Agriculture/ Waste land Devlopment	Others	Total Ash Utilization	Ash Utilization (%)
1	Oct-21	166410.78	1744.35	53395.92	0.00	0.00	0.00	0.00	28418.20	164101.09	0.00	0.00	247659.55	148.82
2	Nov-21	223810.50	1495.70	70716.42	0.00	0.00	0.00	0.00	31182.14	264150.23	0.00	0.00	367544.49	164.22
3	Dec-21	276290.11	1884.19	64721.76	0.00	0.00	0.00	0.00	21713.65	362041.09	0.00	0.00	450360.69	163.00
4	Jan-22	273213.53	1226.60	61864.81	0.00	0.00	0.00	0.00	2024.35	287588.43	0.00	0.00	352704.19	129.09
5	Feb-22	246091.56	2134.79	46721.17	0.00	0.00	0.00	0.00	35543.88	289919.61	0.00	0.00	374319.45	152.11
6	Mar-22	276367.10	2240.09	72110.44	0.00	0.00	0.00	0.00	38481.23	284695.49	0.00	0.00	397527.25	143.84
Total		**1462184**	**10726**	**369531**	**0**	**0**	**0**	**0**	**157363**	**1652496**	**0**	**0**	**2190116**	**149.78**

Annexure-IV

Environment Monitoring Report

Netel (India) Limited

TEST REPORT

REF	:	NIL/DBPL/AAQ/BZ/02-01		
Customer Name	:	M/s. DB Power Limited		
Customer Address	:	2 X 600MW, Village - Badadhara, District: Janjgir–Champa (C.G.) 495695		
Sample Type	:	**Ambient Air**	**Analysis Date** :03.03.2022 — 31.03.2022	
Sampling done by	:	Netel India Limited		
Date of Sampling	:	02.03.2022 - 30.03.2022		
Sample Received	:	03.03.2022 - 31.03.2022	**Date of Reporting:**	01.04.2022
Sampling Location	:	**BADADARHA VILLAGE**		

Test Method and NAAQM Standard for Ambient Air Quality Monitoring

Parameter	PM_{10}	$PM_{2.5}$	SO_2	NO_2	CO*	Hg
	µg/m³	µg/m³	µg/m³	µg/m³	mg/m³	ng/m³
Method Reference	IS 5182 (Part 23)	IS 5182 (Part 24)	IS 5182 (Part 02)	IS 5182 (Part 06)	IS 5182 (Part 10)	EPA Method IO-5
NAAQM Standard	100 µg/m³	60 µg/m³	80 µg/m³	80 µg/m³	2 mg/m³	---
Date of Sampling	**Report**					
02.03.2022	71.6	35.6	14.8	21.6	0.51	N.D.
07.03.2022	68.5	34.8	15.2	22.0	0.46	N.D.
09.03.2022	73.5	32.4	16.9	22.8	0.62	N.D.
14.03.2022	68.5	31.6	17.5	21.4	0.71	N.D.
16.03.2022	73.4	36.5	15.4	23.6	0.76	N.D.
21.03.2022	63.5	28.0	17.8	24.5	0.53	N.D.
23.03.2022	61.5	27.5	18.6	22.5	0.55	N.D.
28.03.2022	62.0	28.0	17.2	22.6	0.70	N.D.
30.03.2022	63.5	29.4	18.0	21.5	0.67	N.D

Parameter	Ammonia	Ozone	Benzene	Benzo(a)pyrene	Ni	Pb	As
	µg/m³	µg/m³	µg/m³	ng/m³	ng/m³	µg/m³	ng/m³
Method Reference	ISC Part-II (Method-401)	IS-5182 (Part-09)	IS-5182 (Part-11)	IS-5182 (Part-12)	EPA Method IO-5		
NAAQM Standard	400	100	5	1	20	1	6
Date of Sampling	**REPORT**						
02.03.2022	25.6	16.3	N.D.	N.D.	N.D.	N.D.	N.D.
07.03.2022	22.7	17.5	N.D.	N.D.	N.D.	N.D.	N.D.
09.03.2022	21.6	15.9	N.D.	N.D.	N.D.	N.D.	N.D.
14.03.2022	24.0	16.5	N.D.	N.D.	N.D.	N.D.	N.D.
16.03.2022	22.5	15.4	N.D.	N.D.	N.D.	N.D.	N.D.
21.03.2022	23.1	16.9	N.D.	N.D.	N.D.	N.D.	N.D.
23.03.2022	24.0	17.4	N.D.	N.D.	N.D.	N.D.	N.D.
28.03.2022	22.6	16.0	N.D.	N.D.	N.D.	N.D.	N.D.
30.03.2022	21.9	17.2	N.D.	N.D.	N.D.	N.D.	N.D.

For **Netel (India) Limited**

D.Srinivasa Rao

NETEL (INDIA) LIMITED Rabale Navi Mumbai 400 701

TEST REPORT

REF	:	NIL/DBPL/AAQ/BZ/02-02	
Customer Name	:	M/s. DB Power Limited	
Customer Address	:	2 X 600MW, Village - Badadhara, District: Janjgir–Champa (C.G.) 495695	
Sample Type	:	**Ambient Air**	**Analysis Date** :04.03.2022 — 31.03.2022
Sampling done by	:	Netel India Limited	
Date of Sampling	:	03.03.2022 - 30.03.2022	
Sample Received	:	04.03.2022 - 31.03.2022	**Date of Reporting:**01.04.2022
Sampling Location	:	**BAISPALI VILLAGE**	

Test Method and NAAQM Standard for Ambient Air Quality Monitoring

Parameter	PM_{10}	$PM_{2.5}$	SO_2	NO_2	CO*	Hg
	µg/m³	µg/m³	µg/m³	µg/m³	mg/m³	ng/m³
Method Reference	IS 5182 (Part 23)	IS 5182 (Part 24)	IS 5182 (Part 02)	IS 5182 (Part 06)	IS 5182 (Part 10)	EPA Method IO-5
NAAQM Standard	100 µg/m³	60 µg/m³	80 µg/m³	80 µg/m³	2 mg/m³	---
Date of Sampling	**REPORT**					
02.03.2022	54.6	21.6	16.6	20.3	0.51	N.D.
07.03.2022	61.2	22.5	15.5	21.6	0.50	N.D.
09.03.2022	56.5	22.8	17.5	23.5	0.62	N.D.
14.03.2022	53.4	22.9	16.9	24.5	0.54	N.D.
16.03.2022	50.5	21.5	17.1	26.5	0.67	N.D.
21.03.2022	53.9	21.8	17.5	20.5	0.62	N.D.
23.03.2022	61.5	27.9	16.9	22.7	0.50	N.D.
28.03.2022	60.5	24.6	18.0	23.0	0.56	N.D.
30.03.2022	63.7	25.8	17.2	22.8	0.53	N.D.

Parameter	Ammonia	Ozone	Benzene	Benzo(a)pyrene	Ni	Pb	As
	µg/m³	µg/m³	µg/m³	ng/m³	ng/m³	µg/m³	ng/m³
Method Reference	ISC Part-II (Method-401)	IS-5182 (Part-09)	IS-5182 (Part-11)	IS-5182 (Part-12)	EPA Method IO-5		
NAAQM Standard	400	100	5	1	20	1	6
Date of Sampling	**REPORT**						
02.03.2022	10.0	9.5	N.D.	N.D.	N.D.	N.D.	N.D.
07.03.2022	9.8	8.4	N.D.	N.D.	N.D.	N.D.	N.D.
09.03.2022	10.8	7.8	N.D.	N.D.	N.D.	N.D.	N.D.
14.03.2022	10.5	8.2	N.D.	N.D.	N.D.	N.D.	N.D.
16.03.2022	9.7	9.6	N.D.	N.D.	N.D.	N.D.	N.D.
21.03.2022	10.1	10.3	N.D.	N.D.	N.D.	N.D.	N.D.
23.03.2022	9.8	11.0	N.D.	N.D.	N.D.	N.D.	N.D.
28.03.2022	10.6	9.7	N.D.	N.D.	N.D.	N.D.	N.D.
30.03.2022	11.2	8.8	N.D.	N.D.	N.D.	N.D.	N.D.

For **Netel (India) Limited**

D.Srinivasa Rao

NETEL (INDIA) LIMITED Rabale Navi Mumbai 400 701

TEST REPORT

REF	:	NIL/DBPL/AAQ/BZ/02-03	
Customer Name	:	M/s. DB Power Limited	
Customer Address	:	2 X 600MW, Village - Badadhara, District: Janjgir–Champa (C.G.) 495695	
Sample Type	:	**Ambient Air**	**Analysis Date** :03.03.2022 — 31.03.2022
Sampling done by	:	Netel India Limited	
Date of Sampling	:	02.03.2022 - 30.03.2022	
Sample Received	:	03.03.2022 - 30.03.2022	**Date of Reporting:**01.04.2022
Sampling Location	:	**TUNDRI VILLAGE**	

Test Method and NAAQM Standard for Ambient Air Quality Monitoring

Parameter	PM_{10}	$PM_{2.5}$	SO_2	NO_2	CO*	Hg
	µg/m³	µg/m³	µg/m³	µg/m³	mg/m³	ng/m³
Method Reference	IS 5182 (Part 23)	IS 5182 (Part 24)	IS 5182 (Part 02)	IS 5182 (Part 06)	IS 5182 (Part 10)	EPA Method IO-5
NAAQM Standard	100 µg/m³	60 µg/m³	80 µg/m³	80 µg/m³	2 mg/m³	---
Date of Sampling	**REPORT**					
02.03.2022	59.6	27.8	17.5	21.5	0.52	N.D.
07.03.2022	53.8	26.5	16.9	22.5	0.49	N.D.
09.03.2022	56.5	28.2	17.0	20.8	0.54	N.D.
14.03.2022	53.9	26.9	18.5	22.4	0.51	N.D.
16.03.2022	54.5	23.7	17.5	23.7	0.47	N.D.
21.03.2022	53.8	27.8	16.9	20.4	0.50	N.D.
23.03.2022	60.5	28.5	17.4	22.7	0.56	N.D.
28.03.2022	59.8	29.0	17.0	24.6	0.52	N.D.
30.03.2022	53.2	27.5	18.2	22.0	0.54	N.D.

Parameter	Ammonia	Ozone	Benzene	Benzo(a)pyrene	Ni	Pb	As
	µg/m³	µg/m³	µg/m³	ng/m³	ng/m³	µg/m³	ng/m³
Method Reference	ISC Part-II (Method-401)	IS-5182 (Part-09)	IS-5182 (Part-11)	IS-5182 (Part-12)	EPA Method IO-5		
NAAQM Standard	400	100	5	1	20	1	6
Date of Sampling	**REPORT**						
02.03.2022	9.3	8.2	N.D.	N.D.	N.D.	N.D.	N.D.
07.03.2022	8.6	9.3	N.D.	N.D.	N.D.	N.D.	N.D.
09.03.2022	9.2	7.6	N.D.	N.D.	N.D.	N.D.	N.D.
14.03.2022	12.2	10.2	N.D.	N.D.	N.D.	N.D.	N.D.
16.03.2022	11.3	11.0	N.D.	N.D.	N.D.	N.D.	N.D.
21.03.2022	12.4	9.3	N.D.	N.D.	N.D.	N.D.	N.D.
23.03.2022	12.9	8.3	N.D.	N.D.	N.D.	N.D.	N.D.
28.03.2022	12.7	9.8	N.D.	N.D.	N.D.	N.D.	N.D.
30.03.2022	14.3	10.0	N.D.	N.D.	N.D.	N.D.	N.D.

For **Netel (India) Limited**

D.Srinivasa Rao

NETEL (INDIA) LIMITED Rabale New Mumbai 400 701

TEST REPORT

REF	:	NIL/DBPL/AAQ/BZ/02-04	
Customer Name	:	M/s. DB Power Limited	
Customer Address	:	2 X 600MW, Village - Badadhara, District: Janjgir–Champa (C.G.) 495695	
Sample Type	:	**Ambient Air**	**Analysis Date** :03.03.2022 — 31.03.2022
Sampling done by	:	Netel India Limited	
Date of Sampling	:	02.03.2022 – 30.03.2022	
Sample Received	:	03.03.2022 - 31.03.2022	**Date of Reporting:**01.04.2022
Sampling Location	:	**KANWALI VILLAGE**	

Test Method and NAAQM Standard for Ambient Air Quality Monitoring

Parameter	PM_{10}	$PM_{2.5}$	SO_2	NO_2	CO*	Hg
	µg/m³	µg/m³	µg/m³	µg/m³	mg/m³	ng/m³
Method Reference	IS 5182 (Part 23)	IS 5182 (Part 24)	IS 5182 (Part 02)	IS 5182 (Part 06)	IS 5182 (Part 10)	EPA Method IO-5
NAAQM Standard	100 µg/m³	60 µg/m³	80 µg/m³	80 µg/m³	2 mg/m³	---
Date of Sampling	**REPORT**					
02.03.2022	67.5	24.6	17.2	23.5	0.64	N.D.
07.03.2022	66.2	27.5	18.5	22.9	0.72	N.D.
09.03.2022	58.4	26.7	16.9	22.6	0.64	N.D.
14.03.2022	66.8	32.5	17.0	21.7	0.55	N.D.
16.03.2022	54.2	28.9	16.9	26.5	0.61	N.D.
21.03.2022	67.5	29.8	17.2	27.4	0.65	N.D.
23.03.2022	62.5	32.4	17.8	28.2	0.63	N.D.
28.03.2022	54.6	33.5	17.4	26.5	0.72	N.D.
30.03.2022	53.2	26.0	16.9	22.0	0.26	N.D.

Parameter	Ammonia	Ozone	Benzene	Benzo(a)pyrene	Ni	Pb	As
	µg/m³	µg/m³	µg/m³	ng/m³	ng/m³	µg/m³	ng/m³
Method Reference	ISC Part-II (Method-401)	IS-5182 (Part-09)	IS-5182 (Part-11)	IS-5182 (Part-12)	EPA Method IO-5		
NAAQM Standard	400	100	5	1	20	1	6
Date of Sampling	**REPORT**						
02.03.2022	11.4	8.3	N.D.	N.D.	N.D.	N.D.	N.D.
07.03.2022	14.0	9.0	N.D.	N.D.	N.D.	N.D.	N.D.
09.03.2022	10.8	7.5	N.D.	N.D.	N.D.	N.D.	N.D.
14.03.2022	12.9	6.5	N.D.	N.D.	N.D.	N.D.	N.D.
16.03.2022	11.3	8.2	N.D.	N.D.	N.D.	N.D.	N.D.
21.03.2022	12.4	6.3	N.D.	N.D.	N.D.	N.D.	N.D.
23.03.2022	11.4	8.7	N.D.	N.D.	N.D.	N.D.	N.D.
28.03.2022	9.8	9.6	N.D.	N.D.	N.D.	N.D.	N.D.
30.03.2022	10.2	8.8	N.D.	N.D.	N.D.	N.D.	N.D.

For **Netel (India) Limited**

D.Srinivasa Rao

NETEL (INDIA) LIMITED Rabale New Mumbai 400 701

TEST REPORT

REF	:	NIL/DBPL/AAQ/CZ/02-01	
Customer Name	:	M/s. DB Power Limited	
Customer Address	:	2 X 600MW, Village - Badadhara, District: Janjgir–Champa (C.G.) 495695	
Sample Type	:	**Ambient Air**	**Analysis Date** :04.03.2022 — 31.03.2022
Sampling done by	:	Netel India Limited	
Date of Sampling	:	03.03.2022 - 30.03.2022	
Sample Received	:	04.03.2022 - 31.03.2022	**Date of Reporting:** 01.04.2022
Sampling Location	:	**AAQM STATION NO. I**	

Test Method and NAAQM Standard for Ambient Air Quality Monitoring

Parameter	PM_{10}	$PM_{2.5}$	SO_2	NO_2	CO*	Hg
	µg/m³	µg/m³	µg/m³	µg/m³	mg/m³	ng/m³
Method Reference	IS 5182 (Part 23)	IS 5182 (Part 24)	IS 5182 (Part 02)	IS 5182 (Part 06)	IS 5182 (Part 10)	EPA Method IO-5
NAAQM Standard	100 µg/m³	60 µg/m³	80 µg/m³	80 µg/m³	2 mg/m³	---
Date of Sampling	**REPORT**					
03.03.2022	73.6	34.6	17.5	21.6	0.58	N.D.
08.03.2022	67.5	32.9	18.8	22.4	0.64	N.D.
10.03.2022	68.3	33.5	17.3	20.8	0.52	N.D.
15.03.2022	66.4	30.6	18.5	22.4	0.57	N.D.
17.03.2022	72.1	34.9	17.9	21.5	0.56	N.D.
22.03.2022	64.5	32.7	18.4	22.6	0.38	N.D.
24.03.2022	63.2	35.0	18.0	20.5	0.54	N.D.
29.03.2022	65.4	34.8	17.4	21.7	0.71	N.D.
30.03.2022	62.7	32.9	18.6	20.5	0.76	N.D.

Test Method and NAAQM Standard for Ambient Air Quality Monitoring

Parameter	Ammonia	Ozone	Benzene	Benzo(a)pyrene	Ni	Pb	As
	µg/m³	µg/m³	µg/m³	ng/m³	ng/m³	µg/m³	ng/m³
Method Reference	ISC Part-II (Method-401)	IS-5182 (Part-09)	IS-5182 (Part-11)	IS-5182 (Part-12)	EPA Method IO-5		
NAAQM Standard	400	100	5	1	20	1	6
Date of Sampling	**REPORT**						
03.03.2022	21.5	12.4	N.D.	N.D.	N.D.	N.D.	N.D.
08.03.2022	20.7	10.6	N.D.	N.D.	N.D.	N.D.	N.D.
10.03.2022	22.5	12.7	N.D.	N.D.	N.D.	N.D.	N.D.
15.03.2022	22.8	12.0	N.D.	N.D.	N.D.	N.D.	N.D.
17.03.2022	23.5	11.4	N.D.	N.D.	N.D.	N.D.	N.D.
22.03.2022	21.6	10.7	N.D.	N.D.	N.D.	N.D.	N.D.
24.03.2022	23.5	11.7	N.D.	N.D.	N.D.	N.D.	N.D.
29.03.2022	22.4	10.5	N.D.	N.D.	N.D.	N.D.	N.D.
30.03.2022	21.5	12.6	N.D.	N.D.	N.D.	N.D.	N.D.

For **Netel (India) Limited**

D.Srinivasa Rao

NETEL (INDIA) LIMITED Rabale New Mumbai 400 701

TEST REPORT

REF	:	NIL/DBPL/AAQ/CZ/02-02	
Customer Name	:	M/s. DB Power Limited	
Customer Address	:	2 X 600MW, Village - Badadhara, District: Janjgir–Champa (C.G.) 495695	
Sample Type	:	**Ambient Air**	**Analysis Date :**04.03.2022 — 31.03.2022
Sampling done by	:	Netel India Limited	
Date of Sampling	:	03.03.2022 - 30.03.2022	
Sample Received	:	04.03.2022 - 31.03.2022	**Date of Reporting:** 01.04.2022
Sampling Location	:	**URJA AAQM STATION NO.- II**	

Test Method and NAAQM Standard for Ambient Air Quality Monitoring

Parameter	PM_{10}	$PM_{2.5}$	SO_2	NO_2	CO*	Hg
	µg/m³	µg/m³	µg/m³	µg/m³	mg/m³	ng/m³
Method Reference	IS 5182 (Part 23)	IS 5182 (Part 24)	IS 5182 (Part 02)	IS 5182 (Part 06)	IS 5182 (Part 10)	EPA Method IO-5
NAAQM Standard	100 µg/m³	60 µg/m³	80 µg/m³	80 µg/m³	2 mg/m³	---
Date of Sampling	**REPORT**					
03.03.2022	65.4	30.5	17.5	25.4	0.54	N.D.
08.03.2022	63.5	31.5	18.6	25.9	0.61	N.D.
10.03.2022	70.4	35.3	17.3	24.3	0.68	N.D.
15.03.2022	69.5	37.2	16.5	20.8	0.72	N.D.
17.03.2022	67.8	32.6	17.0	21.5	0.55	N.D.
22.03.2022	70.2	28.9	16.4	22.6	0.49	N.D.
24.03.2022	70.6	28.7	17.8	21.3	0.78	N.D.
29.03.2022	71.6	27.9	16.9	20.9	0.73	N.D.
30.03.2022	72.5	32.4	19.0	21.5	0.70	N.D.

Test Method and NAAQM Standard for Ambient Air Quality Monitoring

Parameter	Ammonia	Ozone	Benzene	Benzo(a)pyrene	Ni	Pb	As
	µg/m³	µg/m³	µg/m³	ng/m³	ng/m³	µg/m³	ng/m³
Method Reference	ISC Part-II (Method-401)	IS-5182 (Part-09)	IS-5182 (Part-11)	IS-5182 (Part-12)	EPA Method IO-5		
NAAQM Standard	400	100	5	1	20	1	6
Date of Sampling	**REPORT**						
03.03.2022	27.8	11.5	N.D.	N.D.	N.D.	N.D.	N.D.
08.03.2022	25.9	13.2	N.D.	N.D.	N.D.	N.D.	N.D.
10.03.2022	24.3	11.8	N.D.	N.D.	N.D.	N.D.	N.D.
15.03.2022	20.2	13.5	N.D.	N.D.	N.D.	N.D.	N.D.
17.03.2022	24.6	12.6	N.D.	N.D.	N.D.	N.D.	N.D.
22.03.2022	21.3	13.8	N.D.	N.D.	N.D.	N.D.	N.D.
24.03.2022	29.5	12.4	N.D.	N.D.	N.D.	N.D.	N.D.
29.03.2022	30.5	13.0	N.D.	N.D.	N.D.	N.D.	N.D.
30.03.2022	28.6	12.4	N.D.	N.D.	N.D.	N.D.	N.D.

For **Netel (India) Limited**

D.Srinivasa Rao

NETEL (INDIA) LIMITED Rabale Navi Mumbai 400 701

TEST REPORT

REF	:	NIL/DBPL/AAQ/CZ/02-03	
Customer Name	:	M/s. DB Power Limited	
Customer Address	:	2 X 600MW, Village - Badadhara, District: Janjgir–Champa (C.G.) 495695	
Sample Type	:	**Ambient Air**	**Analysis Date :**04.03.2022 — 31.03.2022
Sampling done by	:	Netel India Limited	
Date of Sampling	:	03.03.2022 - 30.03.2022	
Sample Received	:	04.03.2022 - 31.03.2022	**Date of Reporting:** 01.04.2022
Sampling Location	:	**RAW WATER AREA AAQM STATION NO. III**	

Test Method and NAAQM Standard for Ambient Air Quality Monitoring

Parameter	PM_{10}	$PM_{2.5}$	SO_2	NO_2	CO*	Hg
	µg/m³	µg/m³	µg/m³	µg/m³	mg/m³	ng/m³
Method Reference	IS 5182 (Part 23)	IS 5182 (Part 24)	IS 5182 (Part 02)	IS 5182 (Part 06)	IS 5182 (Part 10)	EPA Method IO-5
NAAQM Standard	100 µg/m³	60 µg/m³	80 µg/m³	80 µg/m³	2 mg/m³	---
Date of Sampling	**REPORT**					
03.03.2022	68.5	28.6	17.5	23.5	0.57	N.D.
08.03.2022	67.4	33.5	19.7	22.5	0.65	N.D.
10.03.2022	66.6	32.5	16.5	23.4	0.73	N.D.
15.03.2022	67.2	30.4	17.5	24.5	0.57	N.D.
17.03.2022	68.4	31.2	18.2	23.6	0.55	N.D.
22.03.2022	69.2	32.5	18.5	22.9	0.57	N.D.
24.03.2022	67.8	36.5	17.6	20.4	0.52	N.D.
29.03.2022	68.7	30.2	18.5	22.7	0.60	N.D.
30.03.2022	68.9	31.6	18.3	22.4	0.61	N.D.

Test Method and NAAQM Standard for Ambient Air Quality Monitoring

Parameter	Ammonia	Ozone	Benzene	Benzo(a)pyrene	Ni	Pb	As
	µg/m³	µg/m³	µg/m³	ng/m³	ng/m³	µg/m³	ng/m³
Method Reference	ISC Part-II (Method-401)	IS-5182 (Part-09)	IS-5182 (Part-11)	IS-5182 (Part-12)	EPA Method IO-5		
NAAQM Standard	400	100	5	1	20	1	6
Date of Sampling	**REPORT**						
03.03.2022	23.5	13.5	N.D.	N.D.	N.D.	N.D.	N.D.
08.03.2022	22.6	12.4	N.D.	N.D.	N.D.	N.D.	N.D.
10.03.2022	21.5	12.0	N.D.	N.D.	N.D.	N.D.	N.D.
15.03.2022	22.2	12.9	N.D.	N.D.	N.D.	N.D.	N.D.
17.03.2022	25.4	12.4	N.D.	N.D.	N.D.	N.D.	N.D.
22.03.2022	20.7	11.5	N.D.	N.D.	N.D.	N.D.	N.D.
24.03.2022	20.8	12.7	N.D.	N.D.	N.D.	N.D.	N.D.
29.03.2022	21.3	13.2	N.D.	N.D.	N.D.	N.D.	N.D.
30.03.2022	21.8	12.8	N.D.	N.D.	N.D.	N.D.	N.D.

For **Netel (India) Limited**

D.Srinivasa Rao

NETEL (INDIA) LIMITED Rabale Navi Mumbai 400 701

TEST REPORT

REF	:	NIL/DBPL/AAQ/CZ/02-04		
Customer Name	:	M/s. DB Power Limited		
Customer Address	:	2 X 600MW, Village - Badadhara, District: Janjgir–Champa (C.G.) 495695		
Sample Type	:	**Ambient Air**	**Analysis Date :**04.03.2022 — 31.03.2022	
Sampling done by	:	Netel India Limited		
Date of Sampling	:	03.03.2022 - 30.03.2022		
Sample Received	:	04.03.2022 - 31.03.2022	**Date of Reporting:** 01.04.2022	
Sampling Location	:	**AAQM STATION NO. IV**		

Test Method and NAAQM Standard for Ambient Air Quality Monitoring

Parameter	PM_{10}	$PM_{2.5}$	SO_2	NO_2	CO*	Hg
	µg/m³	µg/m³	µg/m³	µg/m³	mg/m³	ng/m³
Method Reference	IS 5182 (Part 23)	IS 5182 (Part 24)	IS 5182 (Part 02)	IS 5182 (Part 06)	IS 5182 (Part 10)	EPA Method IO-5
NAAQM Standard	100 µg/m³	60 µg/m³	80 µg/m³	80 µg/m³	2 mg/m³	---
Date of Sampling	**REPORT**					
03.03.2022	67.5	27.0	16.8	22.5	0.53	N.D.
08.03.2022	65.6	25.2	18.2	23.4	0.64	N.D.
10.03.2022	69.2	28.6	17.5	22.6	0.62	N.D.
15.03.2022	63.4	27.5	16.9	23.2	0.53	N.D.
17.03.2022	63.5	27.5	18.2	22.8	0.64	N.D.
22.03.2022	66.2	26.7	16.9	24.8	0.62	N.D.
24.03.2022	64.5	28.5	18.5	25.2	0.67	N.D.
29.03.2022	63.2	30.2	17.3	22.6	0.65	N.D.
30.03.2022	61.5	29.6	16.5	21.9	0.63	N.D.

Test Method and NAAQM Standard for Ambient Air Quality Monitoring

Parameter	Ammonia	Ozone	Benzene	Benzo(a)pyrene	Ni	Pb	As
	µg/m³	µg/m³	µg/m³	ng/m³	ng/m³	µg/m³	ng/m³
Method Reference	ISC Part-II (Method-401)	IS-5182 (Part-09)	IS-5182 (Part-11)	IS-5182 (Part-12)	EPA Method IO-5		
NAAQM Standard	400	100	5	1	20	1	6
Date of Sampling	**REPORT**						
03.03.2022	22.6	13.5	N.D.	N.D.	N.D.	N.D.	N.D.
08.03.2022	21.7	12.4	N.D.	N.D.	N.D.	N.D.	N.D.
10.03.2022	23.4	12.6	N.D.	N.D.	N.D.	N.D.	N.D.
15.03.2022	24.6	12.2	N.D.	N.D.	N.D.	N.D.	N.D.
17.03.2022	25.3	11.5	N.D.	N.D.	N.D.	N.D.	N.D.
22.03.2022	25.6	12.8	N.D.	N.D.	N.D.	N.D.	N.D.
24.03.2022	22.4	12.6	N.D.	N.D.	N.D.	N.D.	N.D.
29.03.2022	23.8	13.1	N.D.	N.D.	N.D.	N.D.	N.D.
30.03.2022	21.5	12.4	N.D.	N.D.	N.D.	N.D.	N.D.

For **Netel (India) Limited**

D.Srinivasa Rao

NETEL (INDIA) LIMITED Rabale New Mumbai 400 701

STACK MONITORING REPORT			
Report No	NIL/DBPL/stack/02-1/2022	Date of Report	08-03-2022
Company Name	**M/s. DB Power Ltd.**	Sample Description	Stack Monitoring
Address	2X600MW, Village - Badadhara, District – Janjgir–Champa , (C.G.) 495695		
Sample Collected by	Netel (India) Limited	Date of Sampling/Monitoring :05-03-2022	

Page : 1 of 1

S. No	STACK DETAILS	Unit - 1
	Load(MW)	**600**
1	Height of the Stack (m)	275
2	Dia of Stack (m)	7.3
3	Flue gas Temperature (°C)	136
4	Exit Velocity of flue gases (m/sec)	24.5
5	Flue gas flow rate (Nm^3/hr)	2542358
6	Pollution control Equipment	ESP
7	Type of fuel	Coal

Pollutant Concentration (mg/Nm^3)

Parameter(s)	Result	PCB Stipulated limits
Particulate Matter (PM)	42.5	50
Sulphur Dioxide (SO_2)	1152	200
Oxide of Nitrogen (NO_X)	287	450
Mercury (Hg)	BDL	0.03
Carbon monoxide(CO)	<0.2	-
Test Method	**IS:11255& USEPA**	

For Netel (India) Limited

D.Srinivasa Rao

NETEL (INDIA) LIMITED Rabale New Mumbai 400 701

STACK MONITORING REPORT			
Report No	NIL/DBPL/stack/02-2/2022	Date of Report	08-03-2022
Company Name	**M/s. DB Power Ltd.**	Sample Description	Stack Monitoring
Address	2X600MW, Village - Badadhara, District – Janjgir–Champa , (C.G.) 495695		
Sample Collected by	Netel (India) Limited	Date of Sampling/Monitoring : 05-03-2022	

Page : 1 of 1

S. No	STACK DETAILS	Unit - 2
	Load(MW)	**590**
1	Height of the Stack (m)	275
2	Dia of Stack (m)	7.3
3	Flue gas Temperature (°C)	135
4	Exit Velocity of flue gases (m/sec)	23.8
5	Flue gas flow rate (Nm^3/hr)	2586854
6	Pollution control Equipment	ESP
7	Type of fuel	Coal

Pollutant Concentration (mg/Nm^3)

Parameter(s)	Result	PCB Stipulated limits
Particulate Matter (PM)	45.0	50
Sulphur Dioxide (SO_2)	1257	200
Oxide of Nitrogen (NO_X)	295	450
Mercury (Hg)	BDL	0.03
Carbon monoxide(CO)	<0.2	-
Test Method	**IS:11255& USEPA**	

For Netel (India) Limited

D.Srinivasa Rao

NETEL (INDIA) LIMITED Rabale New Mumbai 400 701

NOISE REPORT

Customer Name	:	M/s. DB Power Limited			
Customer Address	:	2 X 600MW, Village - Badadhara, District: Janjgir–Champa (C.G.) 495695			
Customer Reference	:	---			
Sample Type	:	**Noise Level Monitoring**	**Sampling done by**	:	Netel India Limited
Instrument Make	:	Lutron	**Instrument Model**	:	SL 4033SD
Date of Sampling	:	05-03-2022	**Date of Reporting**	:	01.04.2022

Workplace Noise Level

Sr. No.	Location	Unit	Noise Level	Limit
1	TG – I	dB(A)	82.6	**85 dB** (As per Factories Act 1948, maximum exposure for 8 hrs work shift.)
2	TG - II	dB(A)	82.0	
3	BFP-I	dB(A)	76.5	
4	BFP – II	dB(A)	74.3	
5	Compressor House	dB(A)	81.7	
6	TAC Building	dB(A)	75.4	
7	DM Plant	dB(A)	73.5	
8	MUH – CHP	dB(A)	72.7	
9	Crusher – CHP	dB(A)	82.1	
10	Near Silo	dB(A)	76.5	

Sr. No.	Location	Unit	Noise Level	Limit*		
			Day Time	Night Time	Day	Night
Inside Plant						
1	AAQM Station No.-I	dB(A)	65.6	62.0	75	70
2	Urja AAQMS – II	dB(A)	64.5	63.0		
3	Raw Water AAQMS- III	dB(A)	61.0	59.0		
4	Near Coal Yard (AAQMS-IV)	dB(A)	67.2	64.0		
Outside Plant						
1	Tundri Village	dB(A)	52.6	44.8	55	45
2	Kanwali Village	dB(A)	53.4	42.6		
3	Badadhara Village	dB(A)	52.8	43.5		
4	Baispali Village	dB(A)	53.6	40.2		

For **Netel (India) Limited**

D.Srinivasa Rao

NETEL (INDIA) LIMITED Rabale Navi Mumbai 400 701

Name & Address of the Customer : 2X600MW, Village - Badadhara, District: Janjgir–Champa, (C.G.) 495695 **Sample Particulars:** STP Inlet Effluent	**Test Report No. :NIL** /2022/EW/02-1 **Issue Date:21**.03.2022	
Qty : 1No. × 1Litre **Test Method :**IS:3025 & APHA 23rd Edition **Packing** : Sampling Bottle **Test Required** : As given below	**Date of Registration**	**15.03.2022**
	Date of commencement of testing	**15.03.2022**
	Date of completion of testing	**21.03.2022**
	Sample condition at receipt	Found ok
	Sample tested as received	
Sampling Method: Sample collected by our representative on 14**.03.2022**		**Page 1 of 1**

S. No.	Parameter	Unit	Result
1	pH	-	4.9
2	Total Suspended Solids	mg/L	135
3	Chemical Oxygen Demand (COD)	mg/L	149
4	Bio-chemical Oxygen Demand (3 days BOD at 27°C)	mg/L	52
5	Oil & Grease	mg/L	N.D.
6	Fecal Coliform	MPN	898

For Netel (India) Limited

D.Srinivasa Rao

NETEL (INDIA) LIMITED Rabale New Mumbai 400 701

Name & Address of the Customer : 2X600MW, Village - Badadhara, District: Janjgir–Champa, (C.G.) 495695 **Sample Particulars:** STP Out Let Effluent	**Test Report No. :NIL** /2022/EW/02-1 **Issue Date:21**.03.2022	
Qty : 1No. × 1Litre **Test Method :**IS:3025 & APHA 23rd Edition **Packing** : Sampling Bottle **Test Required** : As given below	**Date of Registration**	**15.03.2022**
	Date of commencement of testing	**15.03.2022**
	Date of completion of testing	**21.03.2022**
	Sample condition at receipt	Found ok
	Sample tested as received	
Sampling Method: Sample collected by our representative on 14**.03.2022**		**Page 1 of 2**

Test Results

S. No.	Parameter	Unit	Result								Limit
			STP-1	STP-2	STP-3	STP-4	STP-5	STP-6	STP-7	STP-8	
1	pH	-	7.18	7.35	7.28	7.31	7.20	7.21	7.18	7.20	5.5 – 9.0
2	Total Suspended Solids	mg/L	18	15	17	18	16	17	19	15	100.0
3	Chemical Oxygen Demand (COD)	mg/L	75	72	80	74	79	76	73	79	250.0
4	Bio-chemical Oxygen Demand (3 days BOD at 27°C)	mg/L	17	16	18	16	17	16	14	17	30.0
5	Oil & Grease	mg/L	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	10.0
6	Fecal Coliform	MPN	235	205	212	218	216	231	218	224	<1000

For Netel (India) Limited

D.Srinivasa Rao

NETEL (INDIA) LIMITED Rabale New Mumbai 400 701

S. No.	Parameter	Unit	Result							Limit
			STP-9	STP-10	STP-11	STP-12	STP-13	STP-14	STP-15	
1	pH	-	7.18	7.35	7.28	7.31	7.20	7.21	7.18	5.5 – 9.0
2	Total Suspended Solids	mg/L	18	15	17	18	16	17	19	100.0
3	Chemical Oxygen Demand (COD)	mg/L	75	72	80	74	79	76	73	250.0
4	Bio-chemical Oxygen Demand (3 days BOD at 27°C)	mg/L	17	16	18	16	17	16	14	30.0
5	Oil & Grease	mg/L	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	10.0
6	Fecal Coliform	MPN	235	205	212	218	216	231	218	<1000

For Netel (India) Limited

NETEL (INDIA) LIMITED Rabale Navi Mumbai 400 701

D.Srinivasa Rao

Name & Address of the Customer : 2X600MW, Village - Badadhara, District: Janjgir–Champa, (C.G.) 495695 **Sample Particulars:** Boiler Blow Down water (UNIT-II)	**Test Report No.:NIL** /2022/EW/02-2 **Issue Date:21**.03.2022	
Qty : 1No. × 1Litre each **Test Method :**IS:3025 & APHA 23rdEdition **Packing** : Sampling Bottle **Test Required** : As given below	**Date of Registration**	**15.03.2022**
	Date of commencement of testing	**15.03.2022**
	Date of completion of testing	**21.03.2022**
	Sample condition at receipt	Found ok
	Sample tested as received	
Sampling Method: Sample collected by our representative on 14**.03.2022**		

Test Results

S. No.	Parameter	Unit	Result	Limit
1	Suspended Solids	mg/L	6.5	100
2	Copper Total (as Cu)	mg/L	N.D.	1.0
3	Iron Total (as Fe)	mg/L	N.D.	1.0
4	Oil & Grease	mg/L	N.D.	20

For Netel (India) Limited

D.Srinivasa Rao

NETEL (INDIA) LIMITED Rabale New Mumbai 400 701

Name & Address of the Customer : 2X600MW, Village - Badadhara, District: Janjgir–Champa, (C.G.) 495695 **Sample Particulars:** Condenser cooling water(UNIT-II)	**Test Report No.:NIL** /2022/EW/02-3 **Issue Date:21**.03.2022 **Your Ref : NIL**	
Qty : 1No. × 1Litre **Test Method : IS:3025 & APHA 23rd Edition** **Packing : Sampling Bottle** **Test Required : As given below**	**Date of Registration**	**15.03.2022**
	Date of commencement of testing	**15.03.2022**
	Date of completion of testing	**21.03.2022**
	Sample condition at receipt	Found ok
	Sample tested as received	
Sampling Method: Sample collected by our representative on 14**.03.2022**		

Test Results

S. No.	Parameter	Unit	Result	Limit
1	pH	-	7.5	6.5 – 8.5
2	Temperature	°C	31.6	Not More than 5°C higher than the intake water temperature
3	Free Available Chlorine	mg/L	0.2	0.5

For Netel (India) Limited

D.Srinivasa Rao

NETEL (INDIA) LIMITED Rabale Navi Mumbai 400 701

Name & Address of the Customer : 2X600MW, Village - Badadhara, District: Janjgir–Champa, (C.G.) 495695 **Sample Particulars:** Treated water of AWRS	**Test Report No. :NIL** /2022/EW/02-4 **Issue Date:21**.03.2022 **Your Ref : NIL**	
Qty : 1No. × 1Litre **Test Method :IS:3025 & APHA 23rd Edition** **Packing : Sampling Bottle** **Test Required : As given below**	**Date of Registration**	**15.03.2022**
	Date of commencement of testing	**15.03.2022**
	Date of completion of testing	**21.03.2022**
	Sample condition at receipt	Found ok
	Sample tested as received	
Sampling Method: Sample collected by our representative on 14**.03.2022**		

Test Result

S. No.	Parameter	Unit	Result	Limit
1	Temperature	°C	26.8	Not More than 5°C higher than the intake water temperature
2	pH	-	7.35	5.5 To 9.0
3	Total Suspended Solid	mg/Lit	32.0	100
4	Chemical Oxygen Demand (COD)	mg/Lit	34.0	250
5	Biochemical Oxygen Demand (BOD 3 Days 27°C)	mg/Lit	8.5	30
6	Oil & Grease	mg/Lit	1.0	10
7	Phosphate (as PO_4)	mg/Lit	N.D.	5.0

For Netel (India) Limited

D.Srinivasa Rao

NETEL (INDIA) LIMITED Rabale Navi Mumbai 400 701

Name & Address of the Customer : 2X600MW, Village - Badadhara, District: Janjgir–Champa, (C.G.) 495695 **Sample Particulars: E**TP Inlet & Out Let Effluent	**Test Report No. :NIL** /2022/EW/02-5 **Issue Date:21**.03.2022	
Qty : 1No. × 1Litre **Test Method** :IS:3025 & APHA 23rd Edition **Packing** : Sampling Bottle **Test Required** : As given below	**Date of Registration**	**15.03.2022**
	Date of commencement of testing	**15.03.2022**
	Date of completion of testing	**21.03.2022**
	Sample condition at receipt	Found ok
	Sample tested as received	
Sampling Method: Sample collected by our representative on 14**.03.2022**		

S. No.	Parameter	Unit	Inlet	Outlet	Limit(Outlet)
1	pH	-	9.3	7.6	5.5 – 9.0
2	Temperature	°C	31.6	30.5	-/-
3	Total Suspended Solids	mg/L	154	35	100.0
4	Chemical Oxygen Demand (COD)	mg/L	168	52	250.0
5	Bio-chemical Oxygen Demand (3 days BOD at 27°C)	mg/L	45	16	30.0
6	Oil & Grease	mg/L	8.0	<1.0	10.0
7	Chloride	mg/L	45.5	38.5	-/-

For Netel (India) Limited

D.Srinivasa Rao

NETEL (INDIA) LIMITED Rabale Navi Mumbai 400 701

Name & Address of the Customer : 2X600MW, Village - Badadhara, District: Janjgir–Champa, (C.G.) 495695 **Sample Particulars: Ash Pond Recovery water**	**Test Report No. :NIL** /2022/EW/02-6 **Issue Date:21**.03.2022	
Qty : 1No. × 1Litre **Test Method** :IS:3025 & APHA 23rd Edition **Packing** : Sampling Bottle **Test Required** : As given below	**Date of Registration**	**15.03.2022**
	Date of commencement of testing	**15.03.2022**
	Date of completion of testing	**21.03.2022**
	Sample condition at receipt	Found ok
	Sample tested as received	
Sampling Method: Sample collected by our representative on 14**.03.2022**		

S. No.	Parameter	Unit	Result	Limit(Outlet)
1	pH	-	7.5	5.5 – 9.0
2	Temperature	°C	32.5	-/-
3	Total Suspended Solids	mg/L	36	100.0
4	Chemical Oxygen Demand (COD)	mg/L	43	250.0
5	Bio-chemical Oxygen Demand (3 days BOD at 27°C)	mg/L	15	30.0
6	Oil & Grease	mg/L	<1.0	10.0

For Netel (India) Limited

D.Srinivasa Rao

NETEL (INDIA) LIMITED Rabale Navi Mumbai 400 701

Name & Address of the Customer : 2X600MW, Village - Badadhara, District: Janjgir–Champa, (C.G.) 495695 **Sample Particulars: Coal settling Pond water**	**Test Report No. :NIL** /2022/EW/02-7 **Issue Date:21**.03.2022	
Qty : 1No. × 1Litre **Test Method** :IS:3025 & APHA 23rd Edition **Packing** : Sampling Bottle **Test Required** : As given below	**Date of Registration**	**15.03.2022**
	Date of commencement of testing	**15.03.2022**
	Date of completion of testing	**21.03.2022**
	Sample condition at receipt	Found ok
	Sample tested as received	
Sampling Method: Sample collected by our representative on 14**.03.2022**		

S. No.	Parameter	Unit	Result	Limit(Outlet)
1	pH	-	7.2	5.5 – 9.0
2	Temperature	°C	34.2	-/-
3	Total Suspended Solids	mg/L	72	100.0
4	Chemical Oxygen Demand (COD)	mg/L	45	250.0
5	Bio-chemical Oxygen Demand (3 days BOD at 27°C)	mg/L	16	30.0
6	Oil & Grease	mg/L	<1.0	10.0

For Netel (India) Limited

D.Srinivasa Rao

NETEL (INDIA) LIMITED Rabale New Mumbai 400 701

Name & Address of the Customer : 2X600MW, Village - Badadhara, District: Janjgir–Champa, (C.G.) 495695 **Sample Particulars: Cooling tower Blow down**	**Test Report No. :NIL** /2022/EW/02-8 **Issue Date:21**.03.2022	
Qty : 1No. × 1Litre **Test Method** :IS:3025 & APHA 23rd Edition **Packing** : Sampling Bottle **Test Required** : As given below	**Date of Registration**	**15.03.2022**
	Date of commencement of testing	**15.03.2022**
	Date of completion of testing	**21.03.2022**
	Sample condition at receipt	Found ok
	Sample tested as received	
Sampling Method: Sample collected by our representative on 14**.03.2022**		

S. No.	Parameter	Unit	Result	Limit(Outlet)
1	pH	-	7.5	5.5 – 9.0
2	Temperature	°C	21.6	-/-
3	Total Suspended Solids	mg/L	28	100.0
4	Chemical Oxygen Demand (COD)	mg/L	32	250.0
5	Bio-chemical Oxygen Demand (3 days BOD at 27°C)	mg/L	12	30.0
6	Oil & Grease	mg/L	<1.0	10.0

For Netel (India) Limited

D.Srinivasa Rao

NETEL (INDIA) LIMITED Rabale Navi Mumbai 400 701

Name & Address of the Customer : 2X600MW, Village - Badadhara, District: Janjgir–Champa, (C.G.) 495695 **Sample Particulars:** Drinking Water ***SAMPLE-1. HAND PUMP WATER TUNDRI VILLAGE*** ***SAMPLE-2. HAND PUMP WATER BADADARHA VILLAGE*** ***SAMPLE-3. BOREWELL WATER KANWALI VILLAGE*** ***SAMPLE-4. BOREWELL WATER BAISPALI VILLAGE***	**Test Report No.:NIL** /2022/DW-02/1 **Issue Date :** 24.03.2022 **Your Ref : NIL**
Qty : 1No. × 5Litre each **Test Method** :IS:3025 & APHA 23rd Edition **Packing** : Sampling Bottle **Test Required** : As given below	**Date of Registration** — **16.03.2022** **Date of commencement of testing** — **16.03.2022** **Date of completion of testing** — **24.03.2022** **Sample condition at receipt** — Found ok **Sample tested as received**
Sampling Method: Sample collected by our representative on 15.03.2022	Page :1 of 6

S. No.	PARAMETER	UNIT	Sample-1	Sample-2	Sample-3	Sample-4	Acceptable Limit as per IS:10500;2012
1	Colour	Hazen	<1	<1	<1	<1	5 (max)
2	Turbidity	NTU	<0.1	<0.1	<0.1	<0.1	1.0 (max)
3	pH	-	7.28	7.26	7.31	7.42	6.5 To 8.5
4	Residual Chlorine	mg/Lit	N.D.	N.D.	N.D.	N.D.	0.2 (max)
5	Total Dissolved Solids	mg/Lit	162	171	254	286	500 (max)
6	Alkalinity Total (As $CaCO_3$)	mg/Lit	53	65	102	123	200 (max)
7	Total Hardness (as $CaCO_3$)	mg/Lit	125	136	147	153	200 (max)
8	Calcium (as Ca)	mg/Lit	23.5	28.0	27.6	36.5	75 (max)
9	Magnesium (as Mg)	mg/Lit	5.8	7.6	7.5	8.5	30 (max)
10	Chloride (as Cl)	mg/Lit	32.5	34.5	33.5	37.5	250 (max)
11	Sulphate (as SO_4)	mg/Lit	15.6	17.2	20.6	24.5	200 (max)
12	Nitrate (NO_3)	mg/Lit	3.5	3.7	4.6	4.7	45 (max)
13	Boron (as B)	mg/Lit	N.D.	N.D.	N.D.	N.D.	0.5 (max)
14	Iron (as Fe)	mg/Lit	N.D.	N.D.	N.D.	N.D.	0.3 (max)
15	Fluoride (as F)	mg/Lit	0.10	0.12	0.15	0.13	1.0 (max)
16	Manganese (as Mn)	mg/Lit	N.D.	N.D.	N.D.	N.D.	0.1 (max)
17	Lead (as Pb)	mg/Lit	N.D.	N.D.	N.D.	N.D.	0.01 (max)
18	Zinc (as Zn)	mg/Lit	N.D.	N.D.	N.D.	N.D.	5.0 (max)
19	Copper (as Cu)	mg/Lit	N.D.	N.D.	N.D.	N.D.	0.05 (max)
20	Aluminium	mg/Lit	N.D.	N.D.	N.D.	N.D.	0.03 (max)

	(as Al)						
21	Mercury (as Hg)	mg/Lit	N.D.	N.D.	N.D.	N.D.	0.001 (max)
22	Arsenic (as As)	mg/Lit	N.D.	N.D.	N.D.	N.D.	0.01 (max)
23	Selenium (as Se)	mg/Lit	N.D.	N.D.	N.D.	N.D.	0.1 (max)
24	Chromium (as Cr)	mg/Lit	N.D.	N.D.	N.D.	N.D.	0.001 (max)
25	Sulphide (as S)	mg/Lit	N.D.	N.D.	N.D.	N.D.	0.01 (max)
26	Cyanide (as CN)	mg/Lit	N.D.	N.D.	N.D.	N.D.	0.05 (max)
27	Anionic Detergent (as MBAS)	mg/Lit	N.D.	N.D.	N.D.	N.D.	0.02 (max)
28	Phenolic Compound (as C_6H_5OH)	mg/Lit	N.D.	N.D.	N.D.	N.D.	0.001 (max)
29	Poly-nuclear Aromatic Hydrocarbon (PAH)	µg/Lit	N.D.	N.D.	N.D.	N.D.	0.0001 (max)
30	Mineral Oil	mg/Lit	N.D.	N.D.	N.D.	N.D.	0.05 (max)
31	Total Coliforms	MPN/ 100 ML	Absent	Absent	Absent	Absent	Shall not be detectable in any 100 ml sample
32	E – Coli	MPN/ 100 ML	Absent	Absent	Absent	Absent	Shall not be detectable in any 100 ml sample

Remarks: Above all water samples are meeting the drinking water requirements as per IS: 10500.

For Netel (India)Limited

D.Srinivasa Rao

NETEL (INDIA) LIMITED Rabale New Mumbai 400 701

Netel (India) Limited

Name & Address of the Customer : 2X600MW, Village - Badadhara, District: Janjgir–Champa, (C.G.) 495695 **Sample Particulars:** Drinking Water ***SAMPLE-5. POTABLE WATER TANK*** ***SAMPLE-6. ASH DUMP SIDE BORE WELL WATER GUDELI*** ***SAMPLE-7. AT DM PLANT*** ***SAMPLE-8. ADITYA CANTEEN WATER***	**Test Report No.:NIL** /2022/DW-02/2 **Issue Date:** 24.03.2022 **Your Ref : NIL**
Qty : 1No. × 5Litre each **Test Method :IS:3025 & APHA 23rd Edition** **Packing : Plastic Bottle** **Test Required : As given below**	**Date of Registration: 16.03.2022** **Date of commencement of testing: 16.03.2022** **Date of completion of testing: 24.03.2022** **Sample condition at receipt: Found ok** **Sample tested as received**

Sampling Method: Sample collected by our representative on 15.03.2022 **Page: 3** of 6

S. No.	PARAMETER	UNIT	Sample-5	Sample-6	Sample-7	Sample-8	Acceptable Limit as per IS:10500;2012
1	Colour	Hazen	<1	<1	<1	<1	5(max.)
2	Turbidity	NTU	<0.1	<0.1	<0.1	<0.1	1(max)
3	pH	-	7.21	7.34	7.20	7.41	6.5 – 8.5
4	Residual Chlorine	mg/Lit	N.D.	N.D.	N.D.	N.D.	0.2(min.)
5	Total Dissolved Solids	mg/Lit	125	157	121	110	500 (max.)
6	Alkalinity Total (As $CaCO_3$)	mg/Lit	53.4	62.7	45.6	42.5	200(max.)
7	Total Hardness (as $CaCO_3$)	mg/Lit	126	132	98	86	200(max.)
8	Calcium (as Ca)	mg/Lit	21.6	25.4	20.1	18.5	75(max.)
9	Magnesium (as Mg)	mg/Lit	6.5	6.8	4.8	5.0	30(max.)
10	Chloride (as Cl)	mg/Lit	30.4	34.5	25.0	20.5	250(max.)
11	Sulphate (as SO_4)	mg/Lit	13.2	14.9	11.5	10.0	200(max.)
12	Nitrate (NO_3)	mg/Lit	3.6	4.6	3.2	2.5	45(max.)
13	Boron (as B)	mg/Lit	N.D.	N.D.	N.D.	N.D.	0.5(max.)
14	Iron (as Fe)	mg/Lit	N.D.	N.D.	N.D.	N.D.	0.3(max.)
15	Fluoride (as F)	mg/Lit	0.11	0.14	0.11	0.10	1.0(max.)
16	Manganese (as Mn)	mg/Lit	N.D	N.D	N.D	N.D	0.1(max.)
17	Lead (as Pb)	mg/Lit	N.D.	N.D.	N.D.	N.D.	0.01(max.)
18	Zinc (as Zn)	mg/Lit	N.D.	N.D.	N.D.	N.D.	5.0(max.)
19	Copper (as Cu)	mg/Lit	N.D.	N.D.	N.D.	N.D.	0.05(max.)
20	Aluminium (as Al)	mg/Lit	N.D.	N.D.	N.D.	N.D.	0.03(max.)
21	Mercury (as Hg)	mg/Lit	N.D.	N.D.	N.D.	N.D.	0.001(max.)

22	Arsenic (as As)	mg/Lit	N.D.	N.D.	N.D.	N.D.	0.01(max.)
23	Selenium (as Se)	mg/Lit	N.D.	N.D.	N.D.	N.D.	0.01(max.)
24	Chromium (as Cr)	mg/Lit	N.D.	N.D.	N.D.	N.D.	0.05(max.)
25	Sulphide (as S)	mg/Lit	N.D.	N.D.	N.D.	N.D.	0.05(max.)
26	Cyanide (as CN)	mg/Lit	N.D.	N.D.	N.D.	N.D.	0.05(max.)
27	Anionic Detergent (as MBAS)	mg/Lit	N.D.	N.D.	N.D.	N.D.	0.2(max.)
28	Phenolic Compound (as C_6H_5OH)	mg/Lit	N.D.	N.D.	N.D.	N.D.	0.001(max.)
29	Poly-nuclear Aromatic Hydrocarbon (PAH)	µg/Lit	N.D.	N.D.	N.D.	N.D.	0.0001(max.)
30	Mineral Oil	mg/Lit	N.D.	N.D.	N.D.	N.D.	0.5(max.)
31	Total Coliforms	MPN/ 100 ML	Absent	Absent	Absent	Absent	Shall not be detectable
32	E – Coli	MPN/ 100 ML	Absent	Absent	Absent	Absent	Shall not be detectable

Remarks: Above water sample is meeting the drinking water requirements as per IS: 10500.

For Netel (India)Limited

NETEL (INDIA) LIMITED Rabale New Mumbai 400 701

D.Srinivasa Rao

Netel (India) Limited

Name & Address of the Customer : 2X600MW, Village - Badadhara, District: Janjgir–Champa, (C.G.) 495695 **Sample Particulars:** Drinking Water ***SAMPLE-9. SERVICE BUILDING WATER*** ***SAMPLE-10. CHP-WATER BOOTH***	**Test Report No.:NIL** /2022/DW-02/2 **Issue Date:** 24.03.2022 **Your Ref : NIL**
Qty : 1No. × 5Litre each **Test Method :IS:3025 & APHA 23rd Edition** **Packing : Plastic Bottle** **Test Required : As given below**	**Date of Registration: 16.03.2022** **Date of commencement of testing: 16.03.2022** **Date of completion of testing: 24.03.2022** **Sample condition at receipt: Found ok** **Sample tested as received**
Sampling Method: Sample collected by our representative on 15.03.2022	**Page: 5** of 6

S. No.	PARAMETER	UNIT	Sample-9	Sample-10	Acceptable Limit as per IS:10500;2012
1	Colour	Hazen	<1	<1	5(max.)
2	Turbidity	NTU	<0.1	<0.1	1(max)
3	pH	-	7.15	7.24	6.5 – 8.5
4	Free Residual Chlorine	mg/Lit	0.2	0.2	0.2(min.)
5	Total Dissolved Solids	mg/Lit	112	115	500 (max.)
6	Alkalinity Total (As $CaCO_3$)	mg/Lit	42.5	43.2	200(max.)
7	Total Hardness (as $CaCO_3$)	mg/Lit	98	97	200(max.)
8	Calcium (as Ca)	mg/Lit	18.5	18.9	75(max.)
9	Magnesium (as Mg)	mg/Lit	4.5	4.7	30(max.)
10	Chloride (as Cl)	mg/Lit	25.6	24.9	250(max.)
11	Sulphate (as SO_4)	mg/Lit	10.2	9.8	200(max.)
12	Nitrate (NO_3)	mg/Lit	2.5	2.3	45(max.)
13	Boron (as B)	mg/Lit	N.D.	N.D.	0.5(max.)
14	Iron (as Fe)	mg/Lit	N.D.	N.D.	0.3(max.)
15	Fluoride (as F)	mg/Lit	0.10	0.12	1.0(max.)
16	Manganese (as Mn)	mg/Lit	N.D	N.D	0.1(max.)
17	Lead (as Pb)	mg/Lit	N.D.	N.D.	0.01(max.)
18	Zinc (as Zn)	mg/Lit	N.D.	N.D.	5.0(max.)
19	Copper (as Cu)	mg/Lit	N.D.	N.D.	0.05(max.)
20	Aluminium (as Al)	mg/Lit	N.D.	N.D.	0.03(max.)
21	Mercury (as Hg)	mg/Lit	N.D.	N.D.	0.001(max.)

Netel (India) Limited

22	Arsenic (as As)	mg/Lit	N.D.	N.D.	0.01(max.)
23	Selenium (as Se)	mg/Lit	N.D.	N.D.	0.01(max.)
24	Chromium (as Cr)	mg/Lit	N.D.	N.D.	0.05(max.)
25	Sulphide (as S)	mg/Lit	N.D.	N.D.	0.05(max.)
26	Cyanide (as CN)	mg/Lit	N.D.	N.D.	0.05(max.)
27	Anionic Detergent (as MBAS)	mg/Lit	N.D.	N.D.	0.2(max.)
28	Phenolic Compound (as C_6H_5OH)	mg/Lit	N.D.	N.D.	0.001(max.)
29	Poly-nuclear Aromatic Hydrocarbon (PAH)	µg/Lit	N.D.	N.D.	0.0001(max.)
30	Mineral Oil	mg/Lit	N.D.	N.D.	0.5(max.)
31	Total Coliforms	MPN/ 100 ML	Absent	Absent	Shall not be detectable
32	E – Coli	MPN/ 100 ML	Absent	Absent	Shall not be detectable

Remarks: Above water sample is meeting the drinking water requirements as per IS: 10500.

For Netel (India)Limited

D.Srinivasa Rao

NETEL (INDIA) LIMITED Rabale Navi Mumbai 400 701

Netel (India) Limited

Name & Address of the Customer : 2X600MW, Village - Badadhara, District: Janjgir–Champa, (C.G.) 495695 **Sample Particulars:** Surface Water ***SAMPLE-1. POND WATER TUNDRI VILLAGE*** ***SAMPLE-2. POND WATER BADADARHA VILLAGE*** ***SAMPLE-3. POND WATER KANWALI VILLAGE*** ***SAMPLE-4. POND WATER BAISPALI VILLAGE***	**Test Report No.:NIL** /2022/SW-02/1 **Issue Date:** 24.03.2022 **Your Ref** : NIL
Qty : 1No. × 5Litre each **Test Method** :IS:3025 & APHA 23rd Edition **Packing** : Plastic Bottle **Test Required** : As given below	**Date of Registration** — **17.03.2022** **Date of commencement of testing** — **17.03.2022** **Date of completion of testing** — **24.03.2022** **Sample condition at receipt** — Found ok **Sample tested as received**
Sampling Method: Sample collected by our representative on 16.03.2022	

S. No.	Parameter	Unit	Sample-1	Sample-2	Sample-3	Sample-4	Tolerance Limit (As Per IS:2296,Class-C)
1	pH	-	7.2	7.4	7.3	7.4	6.5 to 8.5
2	Dissolved Oxygen	mg/L	6.5	6.4	6.7	6.5	4.0(min)
3	BOD (3 days at 27°C)	mg/L	2.0	2.4	2.5	2.0	3.0(max)
4	Total Coli forms	MPN/100ml	527	612	681	632	5000(max)
5	Colour	Hazen	1.0	1.4	1.5	1.0	300(max)
6	Fluoride as F	mg/L	0.12	0.14	0.08	0.06	1.5(max)
7	Cadmium as Cd	mg/L	<0.01	<0.01	<0.01	<0.01	0.01(max)
8	Chlorides as Cl	mg/L	48.2	44.5	47.5	47.2	600(max)
9	Chromium as	mg/L	<0.01	<0.01	<0.01	<0.01	0.05(max)
10	Cyanides as CN	mg/L	<0.02	<0.02	<0.02	<0.02	0.05(max)
11	TDS	mg/L	69	74	75	79	1500(max)
12	Selenium as Se	mg/L	<0.01	<0.01	<0.01	<0.01	0.05(max)
13	Sulphates as	mg/L	14.5	17.0	13.5	16.0	400(max)
14	Lead as Pb	mg/L	<0.01	<0.01	<0.01	<0.01	0.1(max)
15	Copper a Cu	mg/L	<0.01	<0.01	<0.01	<0.01	1.5(max)
16	Arsenic as As	mg/L	<0.01	<0.01	<0.01	<0.01	0.2(max)
17	Iron as Fe	mg/L	0.15	0.12	0.14	0.16	50(max)
18	Phenolic compounds	mg/L	<0.005	<0.005	<0.005	<0.005	0.005(max)
19	Zinc as Zn	mg/L	0.38	0.36	0.30	0.34	15(max)
20	Anionic	mg/L	<0.1	<0.1	<0.1	<0.1	1.0(max)
21	Oil & Grease	mg/L	<1.0	<1.0	<1.0	<1.0	0.1(max)
22	Nitrates as NO_3	mg/L	6.9	5.2	5.1	5.6	50(max)

For **Netel (India) Limited**

D.Srinivasa Rao

NETEL (INDIA) LIMITED Rabale New Mumbai 400 701

Netel (India) Limited

Name & Address of the Customer : DB Power Limited 2X600MW, Village - Badadhara, District: Janjgir–Champa, (C.G.) 495695 **Sample Particulars:** Fly Ash	**Test Report No. : NIL** /2022/FA/01 **Issue Date: 28**-02-2022 **Your Ref : NIL**	
Qty: 1 Kg. **Test Method :**IS:1727 **Packing :**Plastic Bag **Test Required:**As given below	**Date of Registration**	16-02-2022
	Date of commencement of testing	16-02-2022
	Date of completion of testing	28-02-2022
	Sample condition at receipt	Found ok
	Sample tested as received	
Sampling Method: Sample collected by our Representative on 15-02-2022		

Sl.No.	Test Parameters	UOM	Results (% by mass)
1	Aluminiumas Al_2O_3	% by mass	28.31
2	Iron as Fe_2O_3	% by mass	6.25
3	Silica as SiO_2	% by mass	59.60
4	Calcium as CaO	% by mass	2.28
5	Magnesium as MgO	% by mass	1.78
6	Sulphur as SO_3	% by mass	0.92
7	Sodium as Na_2O	% by mass	0.31
8	Potassium as K_2O	% by mass	0.26

For **Netel (India) Limited**

D.Srinivasa Rao

Netel (India) Limited

Name & Address of the Customer : DB Power Limited 2X600MW, Village - Badadhara, District: Janjgir–Champa, (C.G.) 495695 **Sample Particulars:** Soil	**Test Report No. : NIL** /2022/Soil/01 **Issue Date:** **28**-02-2022 **Your Ref** **:** NIL	
Qty: ~1 Kg. **Test Method :**Soil analysis by T.C.Baruah **Packing :**Plastic Bag **Test Required:**As given below	**Date of Registration**	16-02-2022
	Date of commencement of testing	16-02-2022
	Date of completion of testing	28-02-2022
	Sample condition at receipt	Found ok
	Sample tested as received	

Sampling Method: Sample collected by our Representative on 15-02-2022

S. No.	Parameter	Unit	Result
1.	Particle size distribution		
	Sand	%	67.65
	Slit	%	24.58
	Clay	%	7.77
2.	Texture	-	Loamy
3.	pH	-	7.3
4.	Permeability	cm/sec	0.012
5.	Porosity	%	23.48
6.	Bulk density	g/cm3	1.15
7.	Electrical Conductivity	mS/cm	0.04
8.	Nitrite	mg/kg	0.02
9.	Nitrate	mg/kg	0.30
10.	Phosphate	mg/kg	<0.2
11.	Sodium (Na)	mg/kg	428.0
12.	Potassium (K)	mg/kg	733.0
13.	Iron (Fe)	mg/kg	526.0
14.	Lead (Pb)	mg/kg	16.5
15.	Manganese (Mn)	mg/kg	422.5
16.	Nickle (Ni)	mg/kg	25.5
17.	Barium (Ba)	mg/kg	<0.01
18.	Zinc (Zn)	mg/kg	24.0
19.	Copper (Cu)	mg/kg	22.5
20.	Cadmium (Cd)	mg/kg	0.85
21.	Chromium (Cr)	mg/kg	6.75
22.	Arsenic (Ar)	mg/kg	<0.001
23.	Mercury (Hg)	mg/kg	<0.001

For **Netel (India) Limited**

D.Srinivasa Rao

HYDROGEOLOGICAL INVESTIGATION REPORT

OF M/S DB POWER LIMITED

BADADARHA VILLAGE, BLOCK- DABHRA

DISTRICT–JANJGIR-CHAMPA,CHHATTISGARH-495695

PREPARED BY

ENVIBA ENVIRONMENTAL SERVICES

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STUDY TEAM

Project Leader: Mr. Jagmohan kumar chandra (Director & Environmental Expert.)

Team members:

1. **Mr. Radha Raman Nayak (Regd. Hydrogeologist, Raipur)**
2. **Mr. Suresh Kumar Sinha (Regd. Hydrogeologist, Raipur)**

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INTRODUCTION

DB Power Limited is a coal-based thermal power plant located at Village: Badadarha, Block: Dabhra, Janjgir-Champa district in the state of Chhattisgarh. The plant has produced thermal power having capacity of 1200 MW (2*600 MW). Ministry of Coal, Govt. of India has allocated permanent Coal linkage of 2,497 MTPA from SECL Chaal, Baroud, Dipika, Gevra, kusmunda and Manikpur mines area and from MCL Vasundhara & Kuklda mines to fulfill the requirement for 1200 MW capacity. Water requirement for the project is getting fulfilled from river Mahanadi, which is flowing at a distance of 23 KM from the plant site. The power plant is operationg since 2014. The Project was awarded to BHEL for BTG and L & T for BOP and completed the project within time frame.

1.1 OBJECTIVE AND SCOPE OF WORK

1.1.1 Objective and Scope

The broad objective of the present study is to establish the hydrogeological environment of the project area and study the impact on ground water and suggest strategies for mitigation.

The scope of work includes following points

1. Conducting comprehensive hydrogeological studies, chemical analysis of ground and surface water samples from the buffer zone of 05 km radius and particularly downstream side of ash dyke and its impact on the water regime for DBPL, 2 X 600 MW, at Badadarha, Block- Dabhra, District-Janjgir-Champa, DB Power Limited.
2. Survey and hydrological data collection of key wells of 05 km radius are from the boundary of plant (buffer zone) of existing open wells/bore wells/piezometers and determine and record for each location including extermination of coordinates of the points by GPS and its plotting on map and water levels, pre & post monsoon levels. Yields, use, aquifer tapped etc.
3. Comprehensive hydrogeological assessment studies of the buffer zone discussing its geomorphology, digitized elevation model, geology, nature of water bearing formation sand depth to water table, long term ground water recharge, present ground water exploitation and present status of ground water development.
4. Collection of samples of ground water and few surface samples from the buffer zone for chemical analysis which parameters comprising pH, Color, EC, TDS, Chloride, Sulphate, Calcium, Magnesium, Fluoride, Nitrate, Bicarbonate, Carbonate, Total

Hardness, Total alkalinity and all the heavy and toxic elements including Hg.

5. Preparation of ground water quality report of 05 km radius area of buffer zone based the results of chemical analysis and its different maps showing the different contour maps on important constituents.
6. Hydrological and drainage studies of buffer zone, delineation of its catchment area, catchment yields, particularly of watershed covering the ash dyke.
7. Preparation of ground water contour map of 5 km radius area showing the Ground water flow direction and hydraulic gradient.
8. Submission of draft report covering the findings of the investigations, original data and recommendations for future monitoring.
9. Submission of final report after incorporation of user observations.

1.1.2 Approach and Methodology

To fulfill the above objectives, especially Hydrogeological study in the area, following approach has been adapted as given below:

A detailed Hydrogeological investigation was carried out in & around Plant within 05 km of radius for both Core & Buffer Zone for evaluating the impact of project activity on ground water storage in the area.

Collection and collation of supplementary data viz. soils, geology, geomorphology, drainage etc. for interpretation.

Establishment of observation stations for water level measurements in different seasons as well as water sample collection for determining the quality aspects.

Pumping test data & its interpretation for knowing the hydrogeological parameters, etc.

Evaluation of present ground water scenario as well as future course of action for protecting the natural environment.

2. GENERAL DESCRIPTION OF THE AREA

2.1 LOCATION

M/S DB Power Limited is a 1200 MW (2 X 600 MW) thermal power plant at Village: Badadarha, Taluka: Dabhra, Dist:.Janjgir-Champar, Chhattisgarh.

The co-ordinates of the Plant are 21°55'33.38"N - 21°54'14.08"N latitudes and 83°11'5214"E to 83°10'45.12"E longitudes. For the present study, an area of 05 km of radius has been demarcated which lies between 21°57'10.40"N - 21°57'47.54"N latitudes and 83°14'15.58"Eto83°08'26.19"E longitudes and falls under the Survey of India Toposheet No. 64 O/1 (1:50000 scale).The location map of the project site and toposheet of study area is given in **Fig. 2.1, 2.2** and the Satellite image map of the area is given in **Fig. 2.3**.

2.2 ACCESSIBILITY

The area is well connected by metaled and un-metaled road as well as Rail networks. Kharsia Railway station, on Mumbai- Howrah Broad Gauge main line of the South-Eastern-Central Railway is situated around 13 km North- Eastern direction from plant site. Jharsuguda is nearest Airport and is about 117 km from the study area which is also approachable by road and rail. The block head quarter is Dabhra.

2.3 DEMOGRAPHY

There are 21 villages within 5 km radius of plant area. The total population as per 2011 Census is 29024 (for 05 km radius buffer zone). Scheduled Caste population of the study area (05km) is 5352 and Scheduled Tribe is 6824, Percentage of literacy is 78.08%.The workers those actually engaged in occupation are 13927. A population detail is presented in table 2.1.

Table 2.1 Population details as per census 2011

Name	No_HH	TOT_P	TOT_M	TOT_F	P_SC	P_ST	P_LIT	TOT_WORK_P
Kharsia - Raigarh								
Adajhar	164	663	314	349	15	0	74.55 %	355
Karpipali	202	712	351	361	73	21	77.71%	264
Kuarmauha	162	666	330	336	152	175	76.32 %	267
Jaimura	404	1,398	691	707	207	275	77.42 %	358
Amapali	83	318	150	168	0	109	71.94 %	91

Basnajhar	361	1,549	790	759	198	518	76.02 %	634
Basanpali	149	582	293	289	107	145	82.08 %	201
Ful Bandhiya	218	797	394	403	431	222	90.65 %	338
Pandripani	211	823	420	403	139	181	77.50 %	320
Sondka	333	1,115	557	558	251	90	82.31 %	325
Tayang	194	730	365	365	68	253	79.85 %	323
Dabhra – Jangir Champa								
Badadarha	436	1,634	857	777	187	276	75.07 %	1,076
Dhurkot	546	2,378	1,200	1,178	1,107	137	67.80 %	1,090
Dumarpali	277	866	448	418	162	151	81.27 %	312
Kanwali	657	2,499	1,244	1,255	232	1,435	70.50 %	1,170
Khairmuda	204	916	469	447	136	95	69.11 %	423
Komi	281	1,118	572	546	137	378	70.89 %	566
Kenapali	323	1,283	664	619	595	84	78.09 %	702
Saraipali	158	456	217	239	69	157	78.16 %	176
Tundri	1,074	3,810	1,936	1,874	327	1,583	74.55 %	1,760
Jaijaipur – Jangir Champa								
Odekera	1,020	4,711	2,345	2,366	759	539	69.56 %	3,176
Total	**7457**	**29024**	**14607**	**14417**	**5352**	**6824**	**78.08%**	**13927**

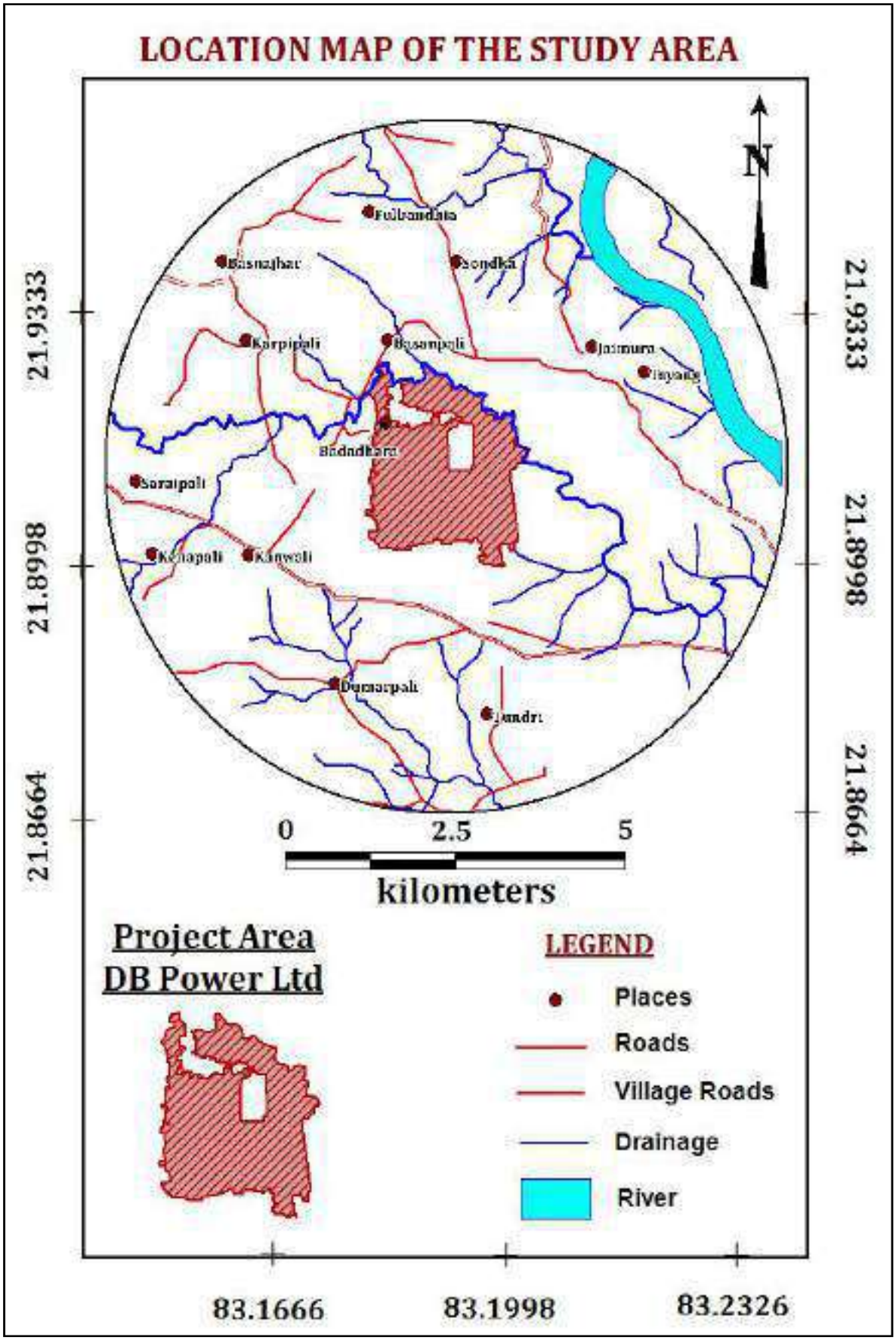


Fig 2.1: Location map the Study area

Fig 2.2: Top sheet (1:50000) of the Study area

Fig 2.3: Satellite of the Study area

Fig 2.4: Satellite Map of the Project area

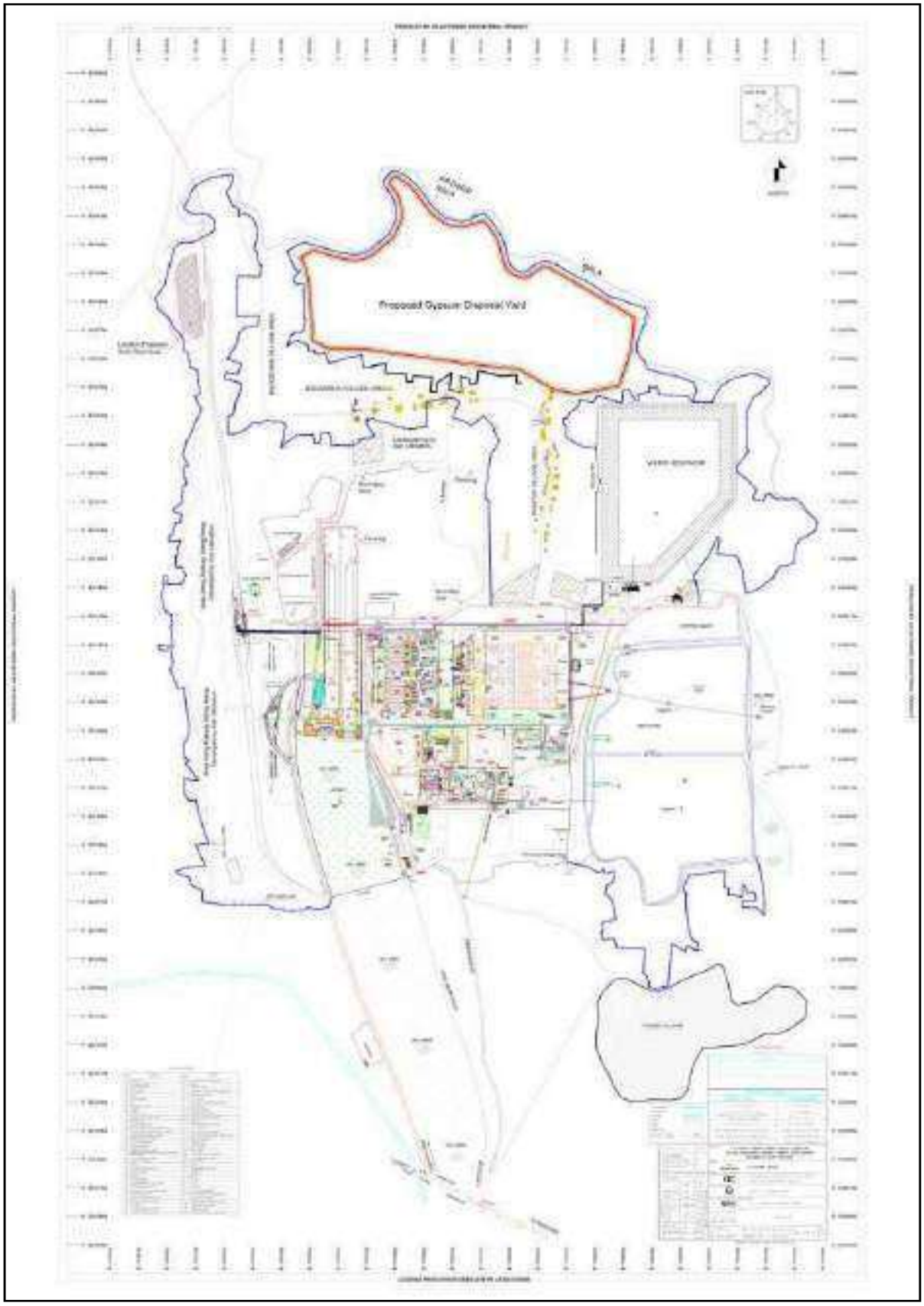


Fig 2.5: Plant Layout

2.4 LAND USE

The Land use / Land cover map for the project area has been prepared using satellite image, the current data will also enable assessing the impact on land use pattern in the study area due to the proposed project activity. Survey of India topo-sheet on 1:50000 scales has been used as a reference map for preparation of base layer data like road, rail network, village and project site and also for geo referencing of satellite image. Land use / Land cover map preparation.

Hybrid technique has been used i.e. visual interpretation and digital image processing for identification of different land use and vegetation cover classes based on spectral signature of geographic feature. Spectral signature represents various land use class. Image interpretation keys are developed based on image characteristics like color, tone, size, shape, texture, pattern, shadow, association etc, which enables interpretation of satellite images for ground feature. Training sites are then assigned based on their spectral signature and interpretation elements. Following classes have been used for the Land use. Land covers Map: Water Bodies, Plantation, Crop Land, Fallow Land, Industry, Human Settlement, Open Scrub, Vegetation, Open waste land, dense scrub & Mine Quarry. The land use/land cover details of the lease and study area are given below in **Table 2.2,** which has been presented in **Fig 2.6**.

Out of the total area taken for the study, nearly 538.79 ha is covered by forested area, only 992.91ha is covered by irrigated area, 9085.95 ha is covered by non-irrigated area. Culturable waste land area comes around 60.20 ha while 520 ha area is covered by area not available for cultivation. The details of land use pattern in the study area within 5 km radius are summarized as below in the **Table 2.2** & Fig **2.6.**

Table 2.2: Land use Pattern of the Study Area (05 km radius from the Project site)

SN	Land use	Area (in Sq KM)	Percentage
1	Agricultural Land-Crop Land-Kharif Crop	90.8595	73.06
2	Agricultural Land-Crop Land-Zaid Crop	3.80495	3.06
3	Agricultural Land-Crop Land-Two crop area	9.92907	7.98
4	Agricultural Land-Fallow-Current Fallow	0.60202	0.48
5	Forest-Deciduous (Dry/Moist/Thorn)-Dense/Closed	5.38796	4.33
6	Wastelands-Scrub land-Open scrub	5.20509	4.19
7	Wastelands-Sandy area-Riverine	1.53606	1.24
8	Build Up-Mining / Industrial area	1.69411	1.36

9	Build Up-Built Up (rural)-Built Up Area (Rural)	2.67511	2.15
10	Build Up-Built Up (Urban)-Transportation	0.140471	0.11
11	Waterbodies-Reservoir/Tanks- Perennial	2.52319	2.03
	Total	124.357531	100

Source: Satellite Imagery

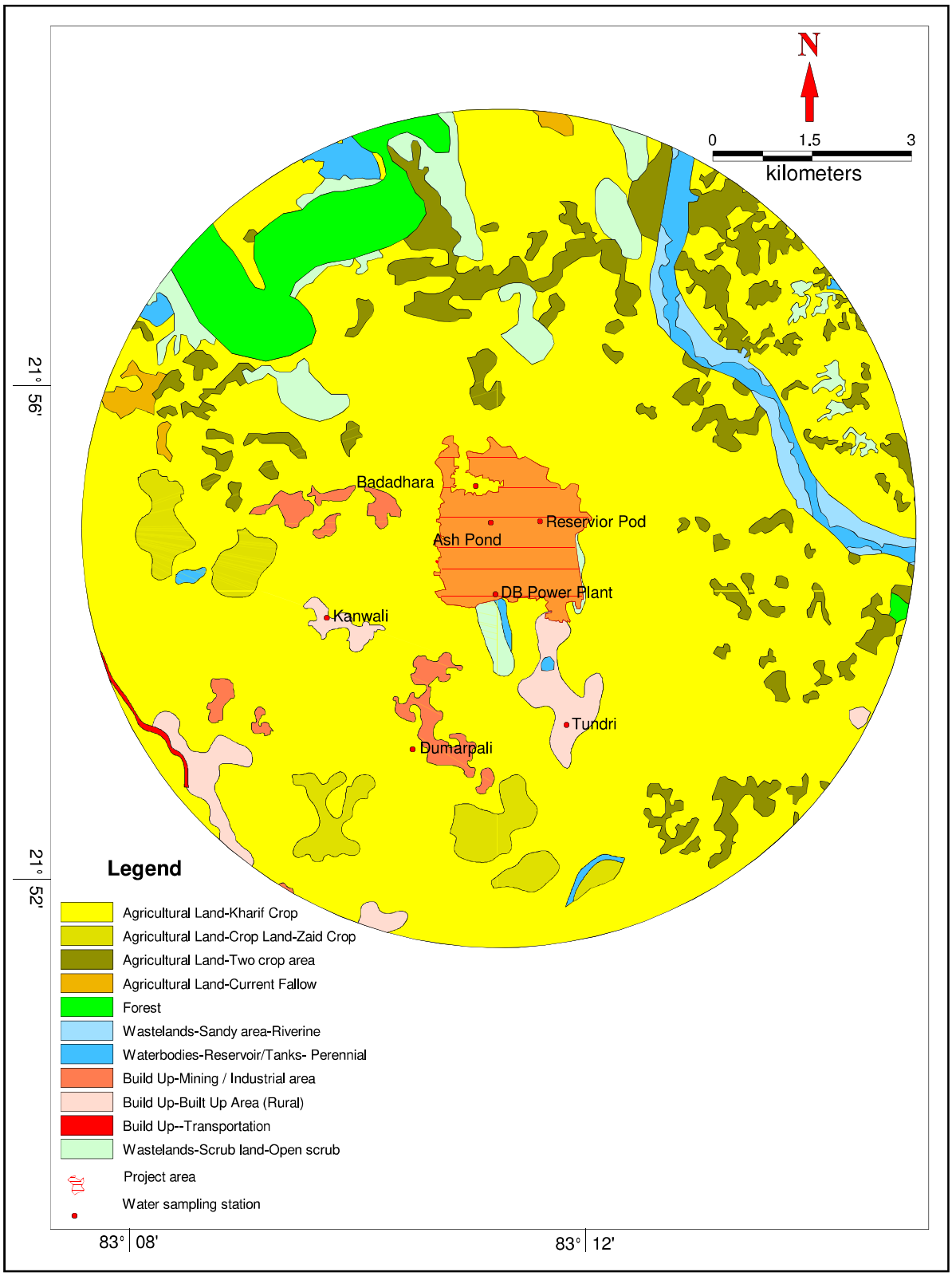


Fig 2.6: Land use map the Study area

2.5 CROPPING PATTERNOF THESTUDYAREA

The study area represents agricultural plain and Green fields and lot of agricultural activities in the surroundings of villages are noticed. Base line data collected from Agriculture Department, Raipur and observed that majority of the area around the 05 Km. radius from the project site is distributed with following crops:

Kharif Crops: - Peddy, Cotton, Wheat, Maize, Jowar, Moong, Sunflower, Soyabean, Groundnut.

Rabi Crops- Gram Wheat, Jow, Tarameera, Sarson, Bhindi, Channa, Pea, Tomato, Palak, Raddish.

Cropping pattern of the area depends upon the climatological conditions and need of the local population of the area. Sometimes cropping pattern may get changed during construction and operational phase because of particular requirement of specified anthropogenic activities.

The study area shows typical agro climatic conditions. In spite of the agriculture being depend mainly on monsoon and underground water, cultivation is the major occupation of this region. The land is mono culture in nature besides the above- mentioned crops, banana, papaya, bar, ginger, methi, tomato, carrots, soya beans etc. are also grown in the area. The growth season of major crops are as shown in table 2.3 given below:-

Table 2.3: Growth seasons of major crops

S.NO.	NAMEOFCROP	PLANTATION MONTH	HARVEST SEASON
1.	PEDDY	JUNE-JULY	OCTOBER
2.	WHEAT	JAN.	MAY
3.	JOWAR	JULY	OCT. -NOV.
4.	COTTON	APRIL	JULY-AUGUST

Most of the crops are grown on small farms (located near the village wells) where generally the work is done manually. A very little mechanized (with tractor) cultivation is also seen at times in certain areas.

2.6 CLIMATE AND SOILS

2.6.1 Climate:

The area enjoys tropical climate with hot summer followed by well-distributed rainfall through South-West monsoon season. The winter commences from December and last till the end of February. The period from March to the end of May is hot season. The monsoon season starts from the middle of June and last till the end of September. The average daily annual normal temperature for the area is 32° C. During the summer Season humidity is lowest i.e. about 32% and is highest during the South-West Monsoon period i.e. about 80%.. About 94 percent of the annual rainfall is received during the period June to October, July and August being the rainiest months. The variation in annual rain fall from year to year is very large on an average the reared 50- 60 rainy days in a year**.** There is only one observatory located in Raipur which is about 240 km away from the study area maintained by Indian Meteorology Department.

2.6.2 Rainfall

During the Year 2009 to 2019 the maximum rainfall recorded 1398.4 mm in the year 2016 and minimum rainfall 866.5 mm had been recorded in the year 2017. Details are as shown in **Table 2.4**. In this year very low rainfall recorder, although ground water of this area falls under safe zone as well as forest is very dense, but precipitation was comparably too less. The average rainfall for last eleven year is average 1106.34 mm. Out of the total annual rainfall about 90% of the takes place during the South West Monsoon i.e. among the months June to September. Only 8% of the rainfall takes place during the Winter Season from October to February while only 2% of the rainfall takes place during summer Season.

Table 2.4: Annual Rain Fall (2009-2019)

Sl No	Year	Rain fall (in MM)
1	**2009**	**963.7**
2	**2010**	**916.6**
3	**2011**	**884.5**
4	**2012**	**1348.1**
5	**2013**	**1146.7**
6	**2014**	**1423.9**
7	**2015**	**1027.7**
8	**2016**	**1398.4**
9	**2017**	**866.5**
10	**2018**	**1036.6**
11	**2019**	**1157.1**
12	**2020**	**1400.0**

2.7 SOILS

Only one soil categories are present in the study area namely Ultisols, (red & yellow Soils) Soil map of the study area is presented in **Fig 2.7**.

i. 2.7.1: Ultisols

The Indian equivalent of this soil found in study area is Lateritic and red yellow soil. It is exposed in all parts in the area. It is the ultimate product of continuous weathering of minerals in a humid climate. This is a highly weathered and leached acid soil with high levels of clay below top layer. They are characterized by a humus-rich surface horizon and by a layer of clay that has migrated below the surface horizon. This soil has variety of clay minerals but in many cases the dominant mineral is Kaolinite. This clay has good bearing capacity and no shrink-swell property. They are red to yellow in color and are quite acidic having pH less than 5. The red and yellow color results from the accumulation of iron oxide which is highly insoluble in water.

Alluvial Soils are found along the river course.

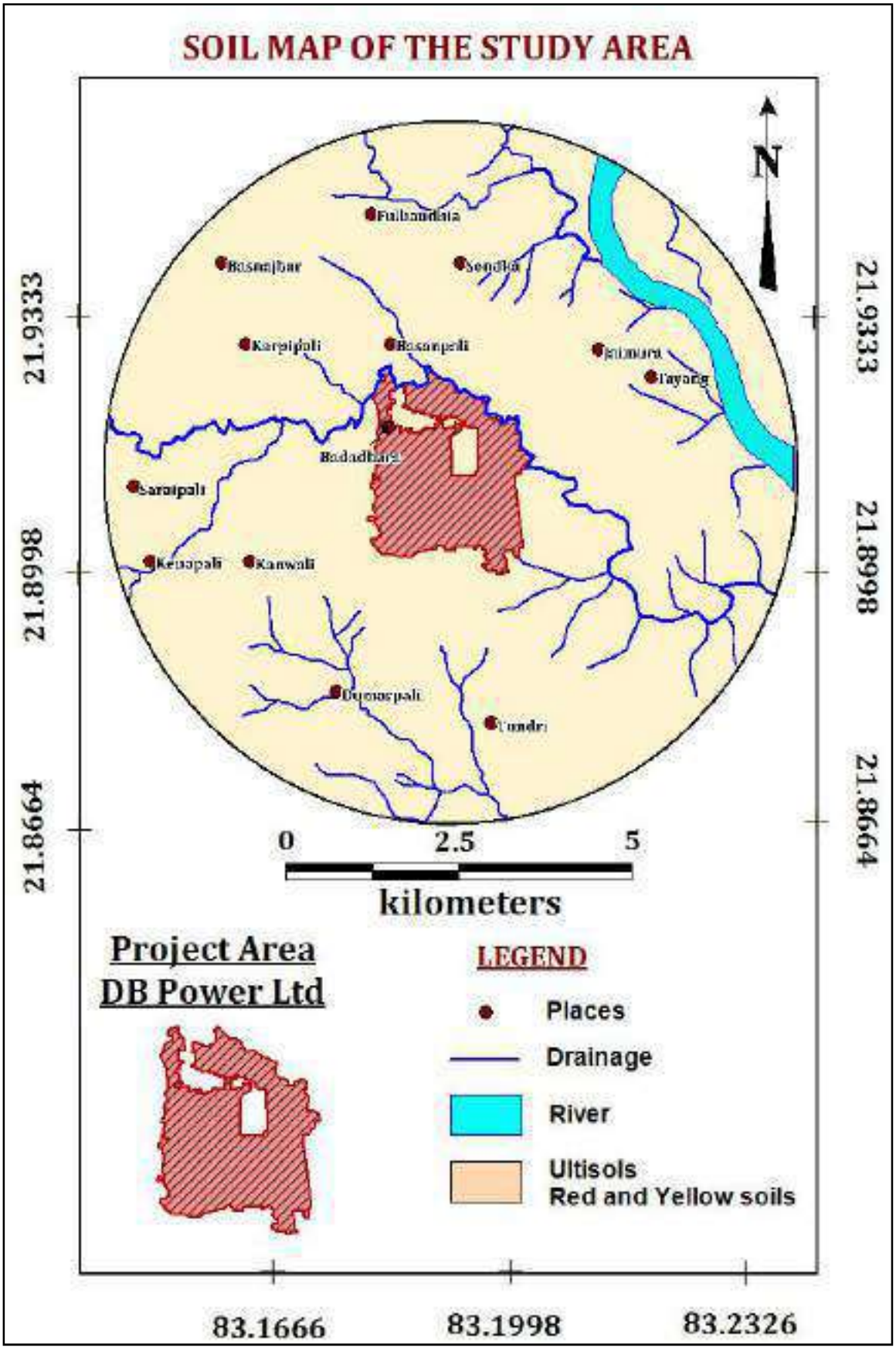


Fig 2.7: Soil map of the Study area

2.8 .DRAINAGE AND GEOMORPHOLOGY

2.8.1 Drainage

The area is drained by tributaries of Mand River. Mand River is flows from North to South-East Direction of project area. Thus the project area is in the interfluves zone of Dantar Nala, Pathari Nala & Mand River. The Mand River is a tributary of the Mahanadi in India. It joins the Mahanadi in Chandarpur, in Chhattisgarh, 28 km from the Odisha border and before the river reaches the Hirakud Dam. This tributary system comes under Mahanadi basin. The drainage pattern in the area is sub-parallel and dendritic in nature with medium drainage density indicating the formations in the area are moderately porous& permeable in nature and are having moderate surface run-off. The drainage density in the central part near to project area is low as compare to remaining area. The drainage map of the study area is presented in **Fig 2.8**.

The study area is characterized by flat undulating terrain with regional slope to the north-east. The average elevation in the southern portion is around 270 m while in the central parts is 310 m amsl. The average land slope of the area is works out about 4m per km from top sheets (1:50000 scale), Survey of India.

Drainage network are universal feature of landscape on the earth. Various environmental factors such as climate, relief, lithology, and vegetation play a considerable role in the development of drainage basin. Watershed geomorphology helps in understanding the physical and hydrological behavior of the river regime.

2.8.2 Geomorphology:

Geo-morphologically the study area comes under Pediplain, Denudation Hills & Floods Plan. The Physiography of the basin is controlled by geological formations namely Sandstone and shale.

The rocks were exposed to renewed post depositional activities and were subjected to intensive and extensive sedimentation, peneplanation and denudation during Pre-Quaternary and Quaternary time. In response to lithology of rocks, the alchemical composition, the irrelative deposition, tectonic setup, they were chiseled into various geomorphic and hydro-geomorphic surfaces; in this case Pediplain and Denudation hills. The feature Denudation Hills are formed in the north-western part of the study area. This unit is controlled by fractures, joints and lineaments. Flood Plain is also developed along the river courses. It is formed by extensive deposition of alluvium by major river system. This unit is normally flat/gently undulating land

surface and located along river courses. The elevation of the study area is 210-225 m amsl. Generally the slope is towards the eastern side of the study area.

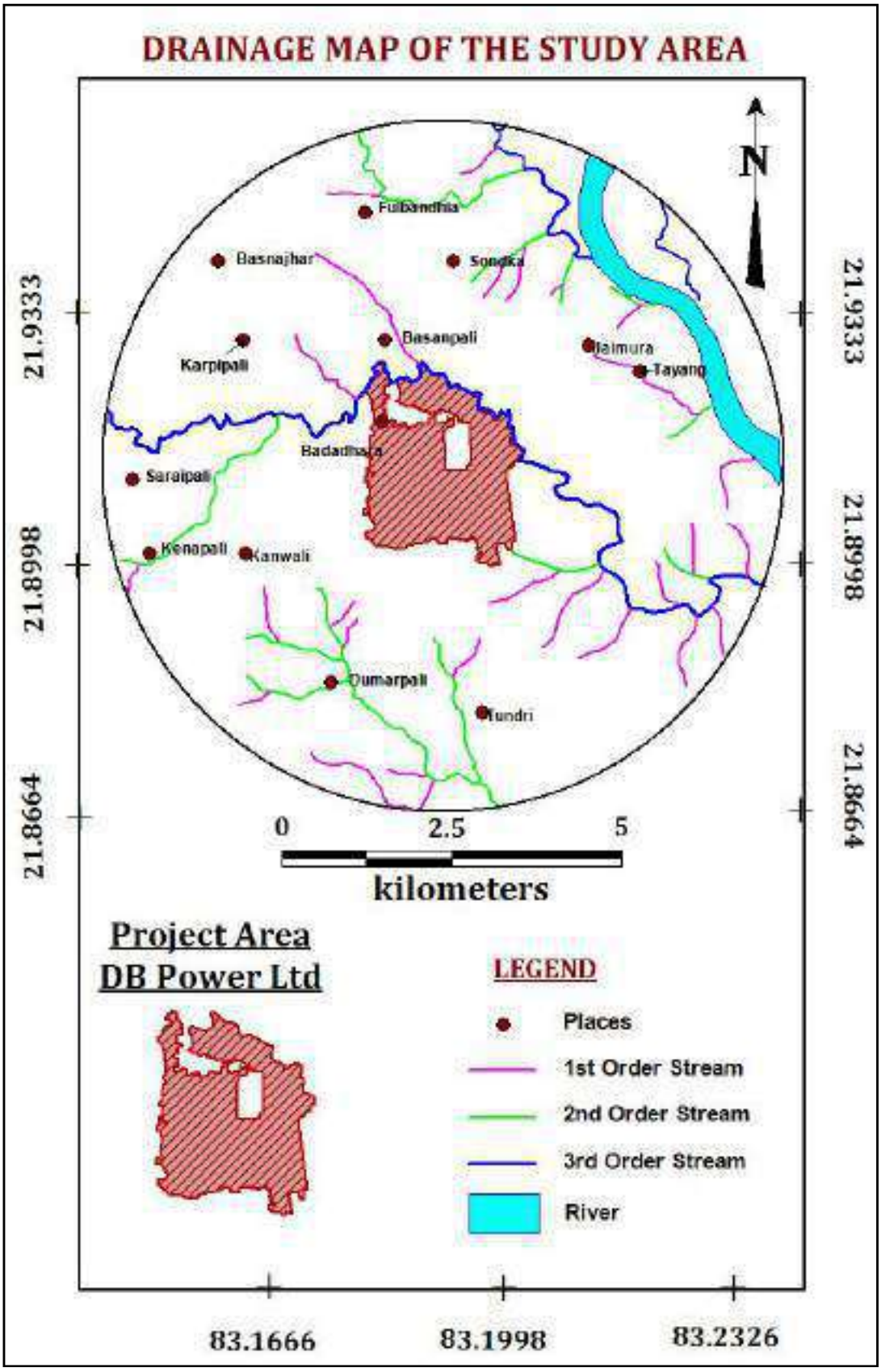


Fig 2.8: Drainage map of the Study area

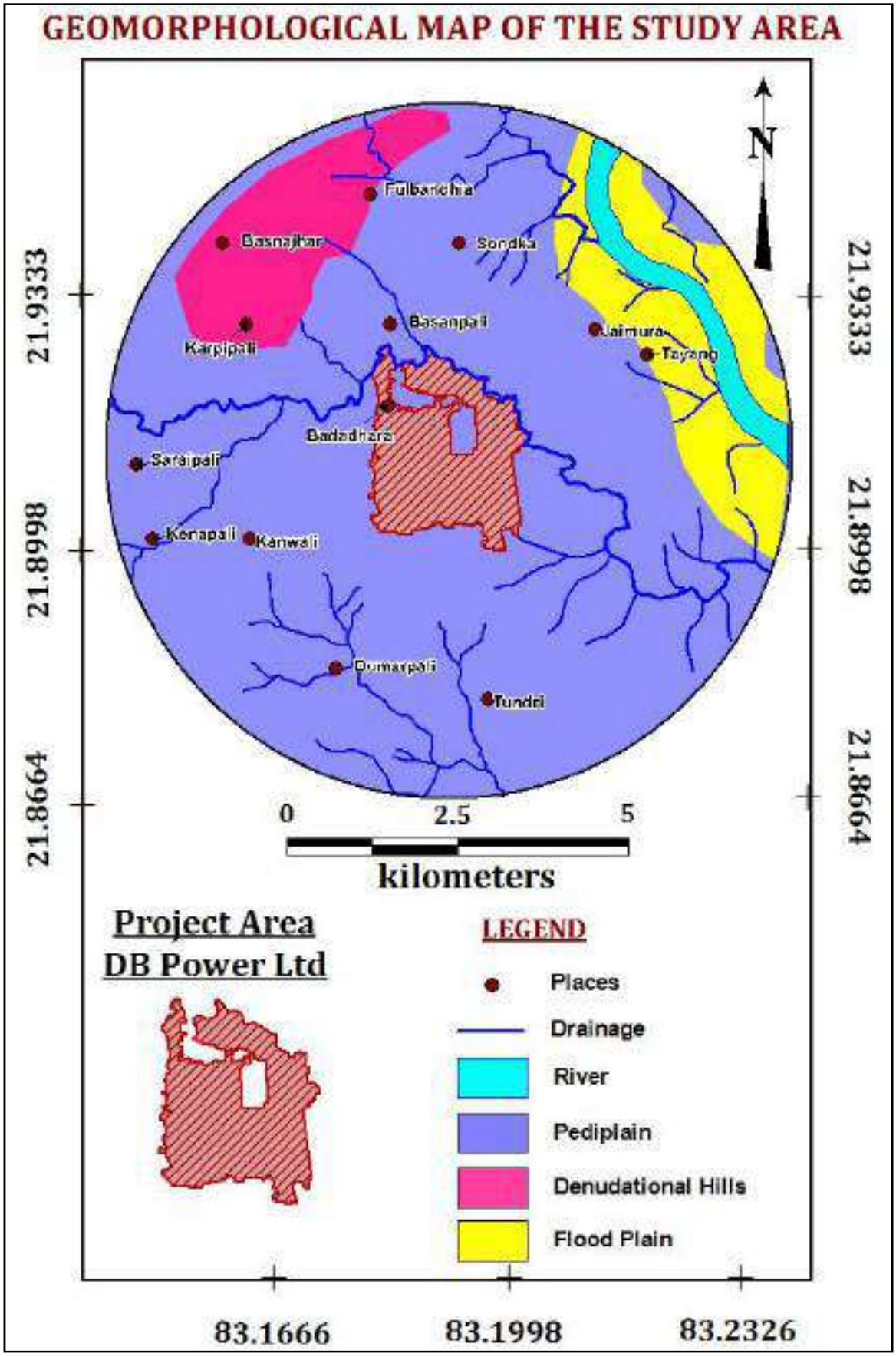


Fig 2.9: Geomorphological map the Study area

3. GEOLOGY

The rocks of the Chhattisgarh super group represented by limestone, Sandstone and shale. A thin layer of alluvium/ laterite belonging to Quaternary period is found on the top surface**.** The generalized stratigraphic sequence of formation in and around the area is given in **Table 3.1** below.

Table-3.1 Generalized stratigraphic sequence of Janjgir-Champa District

Age	Supergroup	Group	Formation	Lithology
QUATERNARY	Recent to sub-recent		Alluvium and Laterite	Sand, Silt, Clay and lateritic Soil
PROTEROZOIC	Chhattisgarh Supergroup	Raipur Group	Maniyarifm	Gypsiferous Shale
			Hirrifm	Dolomitic limestone
			Tarengafm	Shale & Dolomite
			Chandifm	Limestone & Shale
			Gunderdehifm	Shale
			Raigarh	**Shale,Limest.,Sandstone & Conglomerate**
			Charmuriafm	Limestone & Shale
		Chandrapur Group	Kanspatharfm	Sandstone, Siltstone Shale &Conglomerate
			Choparadihfm	
			Lohardifm	
		Bilari group Sonakhan gr Baya group	Intrusive, lakhadabri, Jonk&Chikhali	Quartz veins, basic dyke, Meta basalt Schist & Gneisses
ARCHAEAN	Basement crystallines- Granite, gneisses ,granulite and Amphibolite			

ii. 3.1.1 Basement Crystalline:

The basement crystallines belongs to Archaean age mainly consists of Granite, gneisses, granulite, phyllites and amphibolites. At places it is intruded by quartz veins. The overlying sedimentaries belongs to Chhattisgarh Super group of rocks. The contact between the Achaeans and the sedimentaries is faulted along the western margin of the basin.

iii. 3.1.2 Chhattisgarh Super group:

The crescent shaped Chhattisgarh basin within the Central Indian Craton can be subdivided into a small Baradwarproto-basin in the east and main Hirriproto -basin in the west. The entire succession of Chhattisgarh super group is divided into three groups. Lowermost Pairi group consists of sandstone, conglomerate, limestone and shale overlies unconformably on crystalline group and developed in the Baradwarproto-basin. The middle Chandrapur group un- conformably overlying the Singhora group or older basement and consists of arenite formations and third is Raipur group at the top, comprising argillite-carbonate suite of rock.

iv. 3.1.2.1 Chandrapur group:

The sequence of Chandrapur group shows a variable thickness ranging from 20 m to as much as 90 m. The maximum thickness is attained in SE part of the basin, thinning westward as well as NE side and directly overlying the crystalline basement.

v. 3.1.2.2 Raipur group:

The Raipur group comprising of predominantly argillite sequence conformably overlies the Chandrapur group with a gradational contact. The group has been subdivided into six sub-division representing three cycles of carbonate-argillite sediments as follows

Charmuria formation- dominantly carbonate sequence and is conformably overlain by Gunderdehi formation.

Gunderdehi formation- dominantly a calcareous argillite purple coloured shale with intercalated limestone is dominant member.

Chandi formation- comprise a major stromatolytic limestone sequence developed around southern side of Hirri sub-basin as arcuate outcrop pattern and is medium to course grained dolomitic limestone.

Tarenga formation- conformably overlies the Chandi formation and comprise cherty shale, calcareous shale and argillaceous dolomite, green and white clay.

Hirri formation- conformably overlies the Tarenga formation in south and Pandaria formation(coalesce of Charmuria, Gunderdehi, Chandi and tarenga formation) in the north. At places intra-formational conglomerate, dolomite and black shale contained gypsum as layer parallel to bedding.

Maniyari formation- named after the river along which the rock is best developed. It represents the closing phase of deposition in Chhattisgarh basin and consists of lower gypsiferous grey siltstone and shale followed by reddish brown calcareous and non-calcareous shale with limestone and dolomite.

vi. Recent to sub-recent:

3.1.3.1 Laterite:

Insitu and rolled laterite occurs at many places in isolated patches. These are blanket deposits and few centimeters to few meters in thickness. The ferruginous rock formations of Chhattisgarh Supergroup are responsible for the formation of thin capping of laterite due to leaching and concentration of iron oxide from sandstone of Chandrapur group and also of shale of Raipur group.

3.1.3.2 Alluvium:

The alluvium consists of sand, silt and clay. The sands are fine to coarse grained and poorly sorted. The alluvial soils are mostly of residual in nature and are the weathered products of shale and limestone. The thickness of soil varies from few centimeters to over 10m in places.

3.2 LOCAL GEOLOGY:

The area is underlain by thin layer alluvial/laterite belonging to Quaternary period. Thick pile of rocks belonging to Raipur group of Younger Proterozoic period consisting of shale, underlie the alluvial sediments **(Fig 3.1).** The formation have general strike in NE-SW direction with very low dips of 2°to 3° due NW. Two sets of vertical joints trending in N50°E- S50°W and NE-SW direction are prominent in the area. The gap between joint plain is large from few centimeters to 5meters and are mostly interconnected. The lithological characters of various formations present in the study area are described as follows:

3.2.1: Raigarh Formation: The formation is widely developed in Baradwar sub-basin, comprising dominantly friable calcareous purple shale with limestone intercalations. The formation can be classified into a lower shale flaggy carbonate-arenite member which is followed upward by a purple calcareous shale member. Unlike Hirri sub-basin, the bedded flaggy limestone gradually changes in its outcrop width and further east it pinches out occurring as pockets and lenses in the purple shale above the Chandarpur arenite. At places, arenite lenses and bands are also present in the member. The upper member is mainly purple calcareous shale with limestone as well as arenite lenses. Mud cracks and ripple marks are the common structures. One of the mappablearenite members is Dhurkotarenite occurring within the shale and comprises conglomerates and sandstone. Conglomerate consists of clasts of quartz, shale, jasper and chert embedded in siliceous matrix. This grades to a sandstone which is coarse to medium grained containing argillaceous and calcareous matrix. The dark grey dolomite in subsurface grades to light grey to cement limestone. A thin friable green sandstone unit occurs in SariaBorda area of Baramkela block. They also described presence of dolostone around Raigarh town. Some Stromatolitic limestones within this formation in Raigarh district indicate extension of Bamandih Formation upto Raigarh district. In the study area there are two types of rock formation are found.

1. Raigarh Sandstone

2. Raigarh Shale

Raigarh Sandstone is found in the central, Northern and North-Western part of the study area.

Raigarh Shale is found in Southern, Eastern and western part of the study area.

vii. 3.2.2: Soil/Alluvium:

Along The river course is underlain by alluvial residual soil covers which are loam and sandy loam. The thickness of overburden varies from 2 to 6 m. In order to understand the geological sequence fully well in the project site geological map of study area are present in **Fig 3.1.**

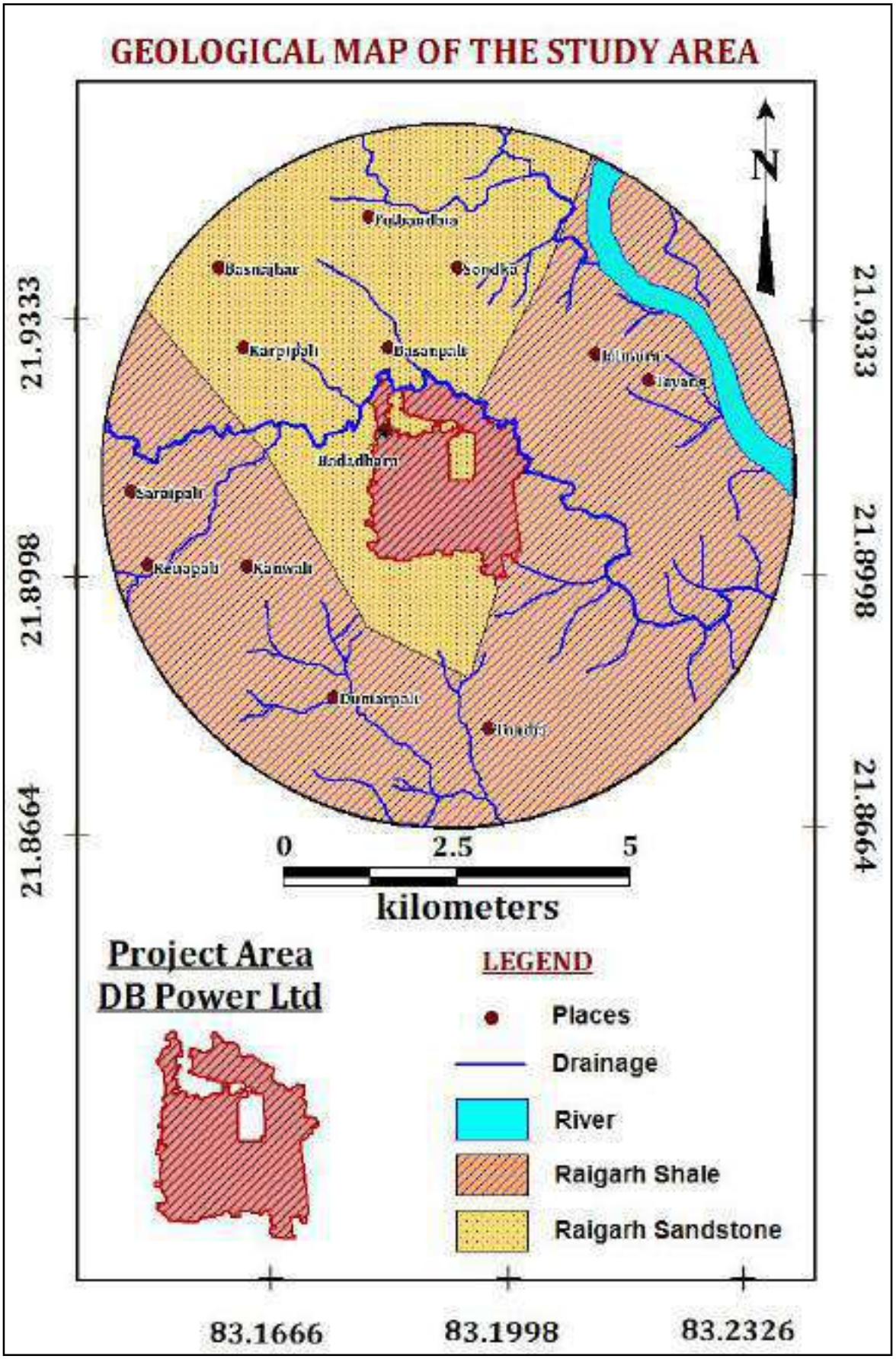


Fig 3.1: Geological map of the Study area

4. HYDROGEOLOGY

4.1 INTRODUCTION

Ground water occurrence is highly influenced by underlying geological formations and their hydro-geological characteristic. Weathered and fractured zones present in the rocks or formation provides scope of ground water occurrence, storage and its movement. Hydrogeology of the area broadly describes the disposition of aquifers, occurrence of ground water its movement, yield potential of water bearing formations, groundwater regime conditions in space and time etc. Detailed hydro-geological investigation has been carried out in and around the project area for elucidating the hydrogeology and establishing the interrelationships between various hydraulic parameters.

4.2 GROUND WATER OCCURRENCE AND AQUIFER SYSTEMS

In the study area, ground water occurs under phreatic or unconfined condition in weathered portion of rocks and semi-confined to confined conditions in fractures/cavernous part of rocks i.e. Sandstone and shale at depths. The shallow aquifers occur within an average depth of 25 m. The configuration of water table in the shallow aquifer follows the topography due to which the ground water movement is generally towards valleys or topographic low. The water bodies such as tanks, canals and streams also influence the occurrence and movement of ground water in shallow aquifers. The shallow aquifers of the area are mostly developed by way of dug wells in the area with depth ranges from 7 to 16 m. In general the yield of dug wells ranges from 25 to 40m^3/day. Deeper aquifer in the area mainly formed of Raipur group of rocks constituted of Raigarh formation comprising Sandstone and shale. The deeper aquifers of the area are mostly developed by way of bore wells with depth range from 50 to 80 m. In general, the yield of bore wells ranges from 1 to 5 lps.

4.3 WATER TABLE CONFIGURATION AND FLOW DIRECTION

The flow direction is of two directions i.e. in western, central and northern part of the study area it is towards East Direction and in southern part of the study area it is towards North-East direction indicating the surface water divide in the central portion of the study area near to project area.

The water table elevation in the study area ranges between 210 to 225 mamsl indicating more or less the plain terrain. North-Eastern part of the area is having low altitude of water table elevation i.e. 210 mamsl while water table elevation increases to western side & is maximum i.e. 225 mamsl. The gradient of water table is variable. In the area the yield ranges between1 to 5 lps in Central, Northern, North-Eastern & North-western indicating the area is covered by Sandstone while in major part of the area it is below 1 lps which is covered with shale. Contour map & Hydrogeological map is given at **Fig.4.1 and 4.2 r**espectively.

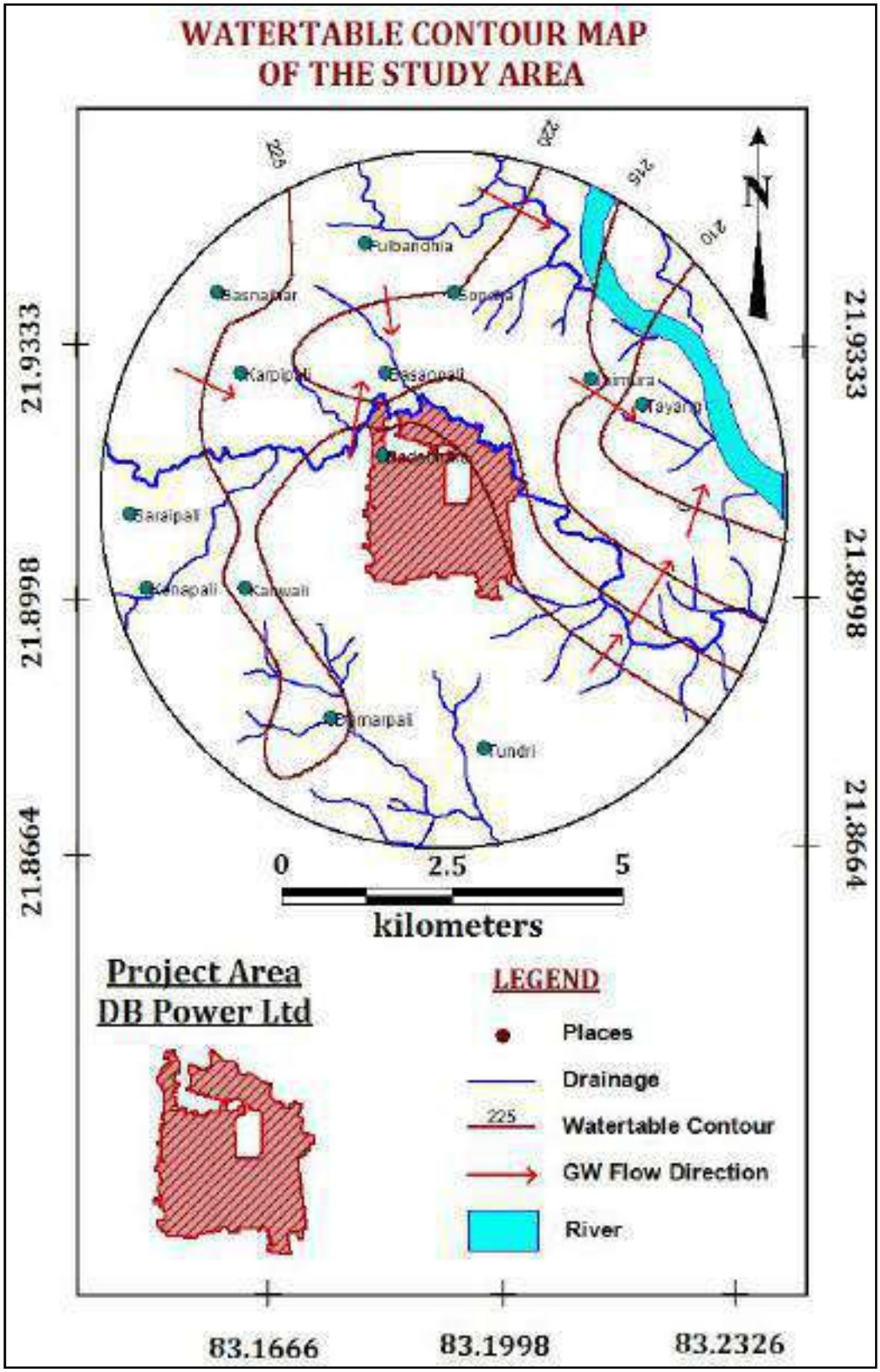


Fig 4.1 Water table contour and ground water flow direction

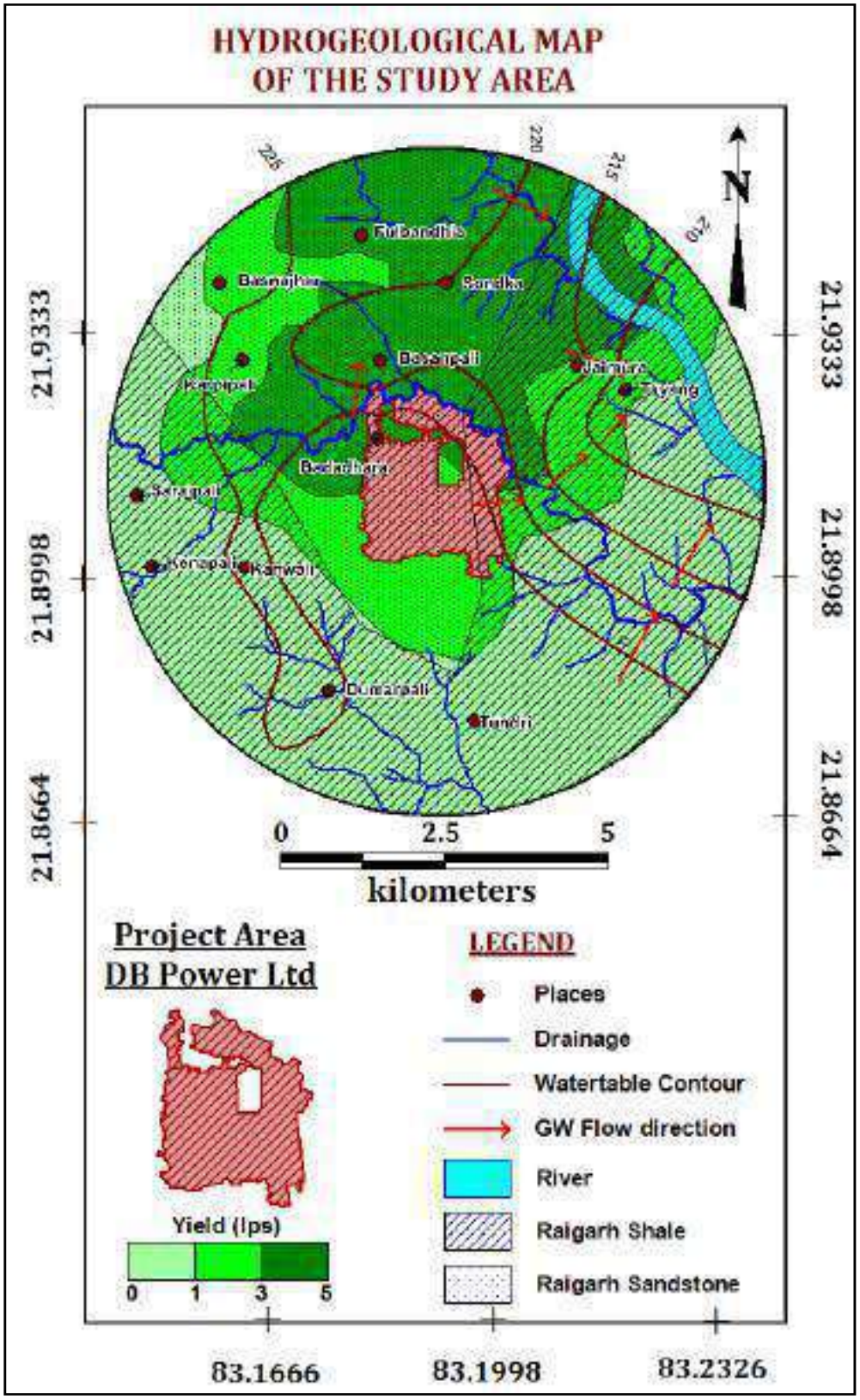
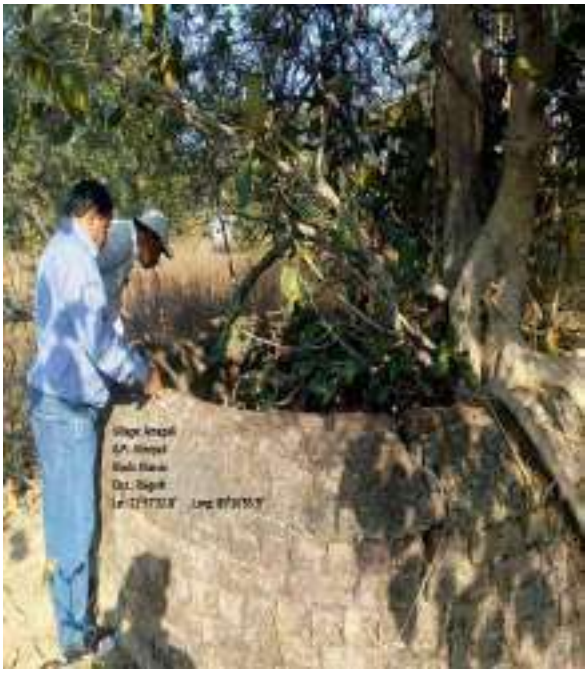


Fig 4.2: Hydrogeological Map of the Study area

4.4 GROUND WATER REGIME MONITORING

The monitoring of ground water regime is of immense help in management of the water resources as well as protecting the ground water storage. Such study envisages regular monitoring of water level at selected locations to observe the changes in ground water level and variation in ground water quality with respect to time and space. It is pertinent to say that any development of ground water resources in a particular area would bring changes in ground water regime if input to the ground water system is not balanced with output from the same system.

The study aims to observe the changes in ground water levels and quality with respect to the ground water development, which in turn would help in identifying the appropriate measures to be adopted for artificial recharge to ground water and neutralize the impact of the excessive ground water development. In the present report, the monitored data has been presented and the overall picture of ground water regime behavior due to continuous abstraction of ground water has been analyzed for the year 2019-20. Ground water regime monitoring was carried out two times in a year i.e. May, and November. The water level data of the month of May and November are taken as levels of pre-monsoon and post-monsoon respectively, Data presented and analysed for pre and postmonsoon water level data. The photographs of the some monitoring stations are indicated in **plate: I**, which was taken during the collection of water level of ground water in all four seasons.




Village: Fulbandhia
G.P.: Pendripani
Block: Kharsia
Dist.: Raigarh
Lat: 21°56'47.1" , Long: 83°19'48.1"


Village: Jaimura
G.P.: Jaimura
Block: Kharsia
Dist.: Raigarh
Lat: 21°55'49.4" , Long: 83°12'42.9"


Village: Karpipali
G.P.: Kanmura
Block: Kharsia
Dist.: Raigarh
Lat: 21°55'46.0" , Long: 83°09'45.1"


Village:Kenapali
G.P.: Kenapali
Block: Dabhra
Dist.: Janjgir-Champa
Lat: 21°54'04.7" , Long: 83°08'57.2"


Village: Tundri
G.P.: Tundri
Block: Dabhra
Dist.: Janjgir-Champa

4.4.1 Distribution of monitoring stations

To study the change in ground water regime in and around study area, total of 14 monitoring wells were established at different locations for regular monitoring of ground water level. The basic details of these monitoring wells are presented in **Table 4.1** and their distribution is presented in **Fig 4.3.**

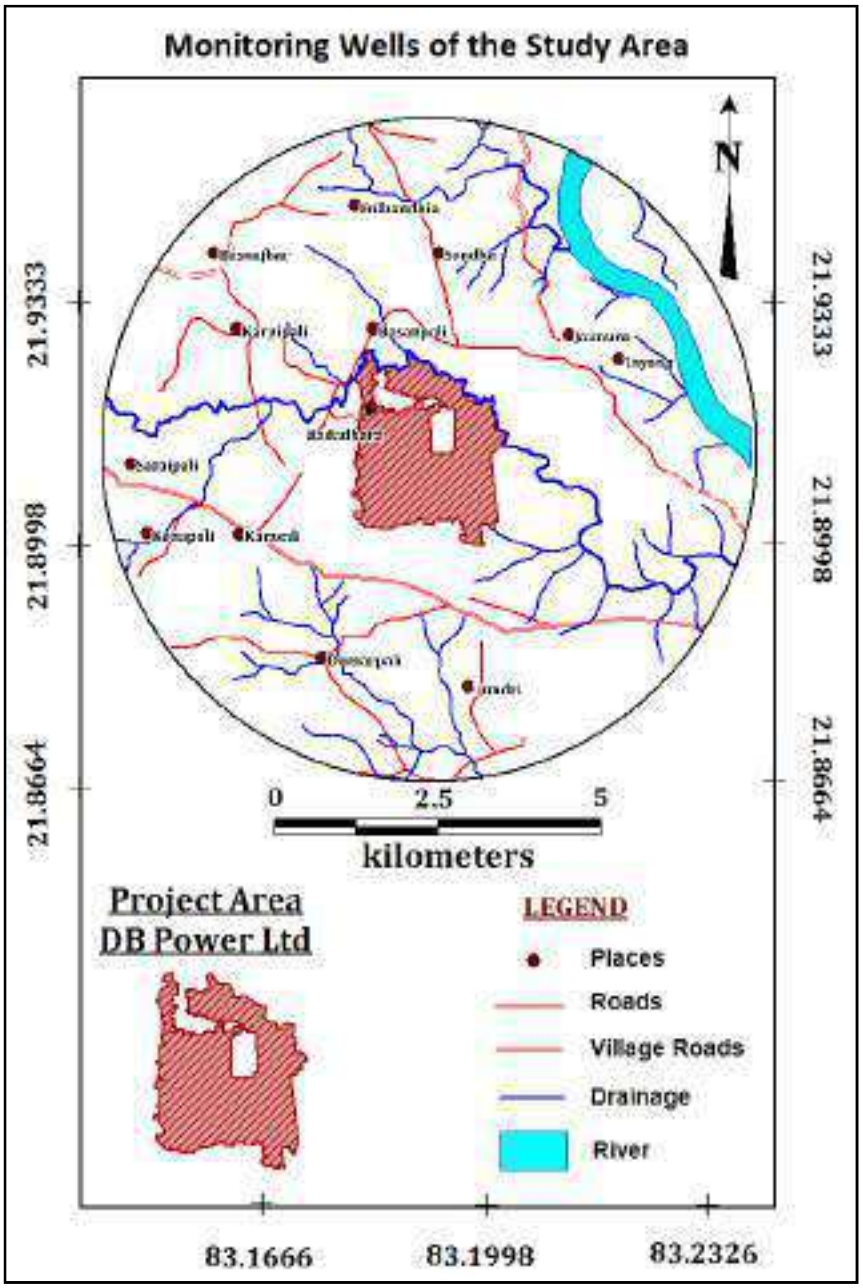


Fig 4.3: location of monitoring wells of the Study area

Table 4.1 : Basic details of established monitoring wells

Sl No.	Village	G.P.	Block	District	RL Of ground level (mamsl)	DIA (m)
1	Amapali	Kherpali	Kharsia	Raigarh	232	3.90
2	Sondka	Sondka	Kharsia	Raigarh	233	5inch
3	Badadhara	Badadhara	Dabhra	Jangir-Champa	231	4.8
4	Basnajhar	Basnajhar	Kharsia	Raigarh	241	6inch
5	Fulbandhia	Pandripani	Kharsia	Raigarh	232	2.2
6	Karpipali	Kanmuna	Kharsia	Raigarh	234	6inch
7	Tundri	Tundri	Dabhra	Jangir-Champa	236	5.5
8	Basanpali	Sondka	Kharsia	Raigarh	223	3.65
9	Kenapali	Kenapali	Dabhra	Jangir Champa	237	4.90
10	Saraipali	Saraipali	Dabhra	Jangir-Champa	239	3.13
11	Kanwali	Kanwali	Dabhra	Jangir-Champa	232	3.1
12	Dumarpali	Dumarpali	Dabhra	Jangir-Champa	232	2.6
13	Tayang	Jaimura	Kharsia	Raigarh	221	2
14	Jaimura	Jaimura	Kharsia	Raigarh	224	2.4

5. ANALYSIS OF WATER LEVELS

5.1 INTRODUCTION

Ground water levels or piezometric heads is resultant of all input and output to ground water system with defined boundaries. Ground water is a dynamic system. The parameters required to be monitored during ground water regime monitoring are ground water level or piezometric heads and chemical quality. These are subject to change due to natural and or anthropogenic causes with respect to dime and space. Rainfall, natural recharge to ground water, ground water draft and seepage from surface water bodies plays important roles in changes in ground water level fluctuations. The quality of water is being recharge, nature of host rock and dilution/concentration of ground water impacts the changes in ground water quality. Monitoring of ground water quality and temperature are one of the essential components for ground water regime monitoring. The monitored data is analyzed in time and space to assess the changes and a relationship is established to determine the impact of ground water development and recharge to the system.

5.2 GROUND WATER LEVELS:

The configuration of the water table depends upon by topography, geology, climate, water yielding and water bearing properties of rocks in the zones of aeration and saturation, which control ground water recharge. The upper surface of the zone of saturation is the water table. In case of wells penetrating confined aquifers, the water level represents the pressure or piezometric head at that point. Ground water monitoring network planning is basic step for ground water regime monitoring and further, for assessment of groundwater resources and planning for development and management programs. The groundwater, being hidden resource can only be analyzed through its signatures in the form of water level fluctuations. The systematic and regular monitoring of groundwater levels can bring out the changes taking place in the regime. The data so generated are of immense help for regional groundwater flow modeling for planning and management of ground water resources and its sustainability. Modeling provides necessary information to the user agencies to frame contingency plans in case of unfavorable groundwater recharge situation.

The data have also immense utility in implementing the legal provisions of groundwater regulation, and to substantiate expert advice in legal issues arising out of conflicting interests of ground water

users. Ground water regime data of different seasons have been collected for the year 2020, analyzed for every set of measurements and discussed with maps in following sections.

viii. 5.2.1 Analysis of water levels (2020)

The water level data collected two times during the year 2020 from the observation wells in core zone as well as buffer zone is presented in **Table 5.1.**

Table 5.1: Depth to water levels monitored in the study area (during 2020)

Sl No.	Village	Latitudes	Longitudes	Post monsoon depth to water 2020 level (mbgl)	Pre monsoon depth to water level 2020 (mbgl)	Fluctuation May 2020 Vs Nov 2020 (m)	RL of pre monsoon water level (mamsl)
1	Amapali	N 21º57’32.8”	83º10’55.9”	3.60	8.68	5.08	223.32
2	Sondka	N 21º56’23.8”	83º11’33.4”	8	13	5	220
3	Badadhara	21º55’07.28”	83º10’57.1”	1.6	3.40	1.8	227.6
4	Basnajhar	21º56’23.8”	83º09’32.9”	9.10	13.18	4.08	227.82
5	Fulbandhia	21º56’47.1”	83º10’48.1”	6.1	9.144	3.044	222.856
6	Karpipali	21º55’46.0”	83º09’45.1”	8.90	13.16	4.26	220.84
7	Tundri	21º52’48.7”	83º11’48.6”	1.6	4.30	2.7	231.7
8	Basanpali	21º55’46.1”	83º10’58.4”	3.8	6.11	2.31	216.89
9	Kenapali	21º54’04.7”	83º08’57.2”	4.40	8.31	3.91	228.69
10	Saraipali	21º54’39.4”	83º08’48.8”	4.90	7.41	2.51	231.59
11	Kanwali	21º54’04.3”	83º09’46.9”	4.99	7.30	2.31	224.7

Sl No.	Village	Latitudes	Longitudes	Post monsoon depth to water 2020 level (mbgl)	Pre monsoon depth to water level 2020 (mbgl)	Fluctuation May 2020 Vs Nov 2020 (m)	RL of pre monsoon water level (mamsl)
12	Dumarpali	21º53'03.1"	83º10'30.8"	3.91	7.33	3.42	224.67
13	Tayang	21º55'31.1"	83º13'09.4"	8.1	13.11	5.01	207.89
14	Jaimura	21º55'43.4"	83º12'42.9"	4.3	7.2	2.9	216.8

5.2.1.1 Post-monsoon Depth to Water level (November' 2020)

The depth to water level map has been prepared based on ground water monitoring data of Nov 2020. On perusal of the data and map given at Fig.5.1, it is observed that the overall depth to water level remains between 1.6 and 9.10 meters below ground level. The post-monsoon depths to water level range of 4 to 6 mbgl are observed at Kenapali, Saraipali, Jaimura & Kanwali villages. Ground water levels more than 6 mbgl are observed in the villages Tayang, Karpipali, Fulbandhia & Basnajhar Villages. Water level less than 4 mbgl are observed in the remaining parts of the study area.

5.2.1.2 Pre-monsoon Depth to Water level (May' 2020)

The depth to water level map has been prepared based on ground water monitoring data of May 2020. From the perusal of Table 5.1, it is observed that the overall depth to water level remains between 3.40 to 13.18 meters below ground level. The pre-monsoon depth to water levels ranges Below 5 mbgl is observed in Badadhara & tundri villages. Water levels is between 5 - 10 mbgl are observed in the villages namely Amapali, Basanpali, Saraipali, Kanwali, Dumerpali & Jaimura villages. Water level greater than 9 mbgl is observed in the remaining parts of the study area as shown in Fig 5.2.

5.2.1.3 Seasonal water level fluctuation (Nov.' 2020 VsMay' 2020).

Based on the pre-monsoon & post-monsoon data water level fluctuation in the study area is calculated & respective map (as shown in Fig 5.3) has also been prepared. It is observed that in the study area water level fluctuation varies from 1.8 to 5.08 meters.

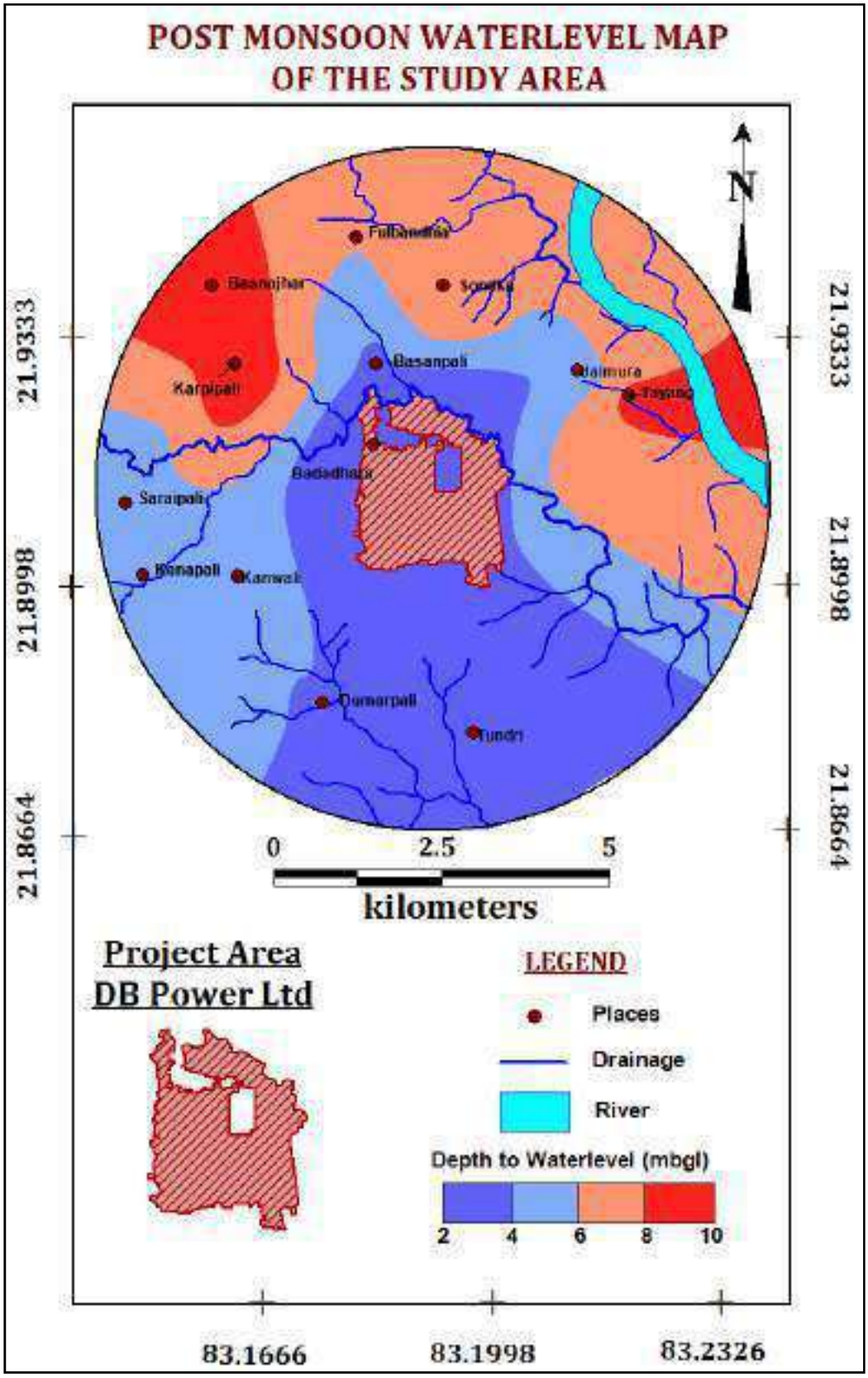


Fig.5.1: Post-monsoon Depth to Water level map (Nov'2020)

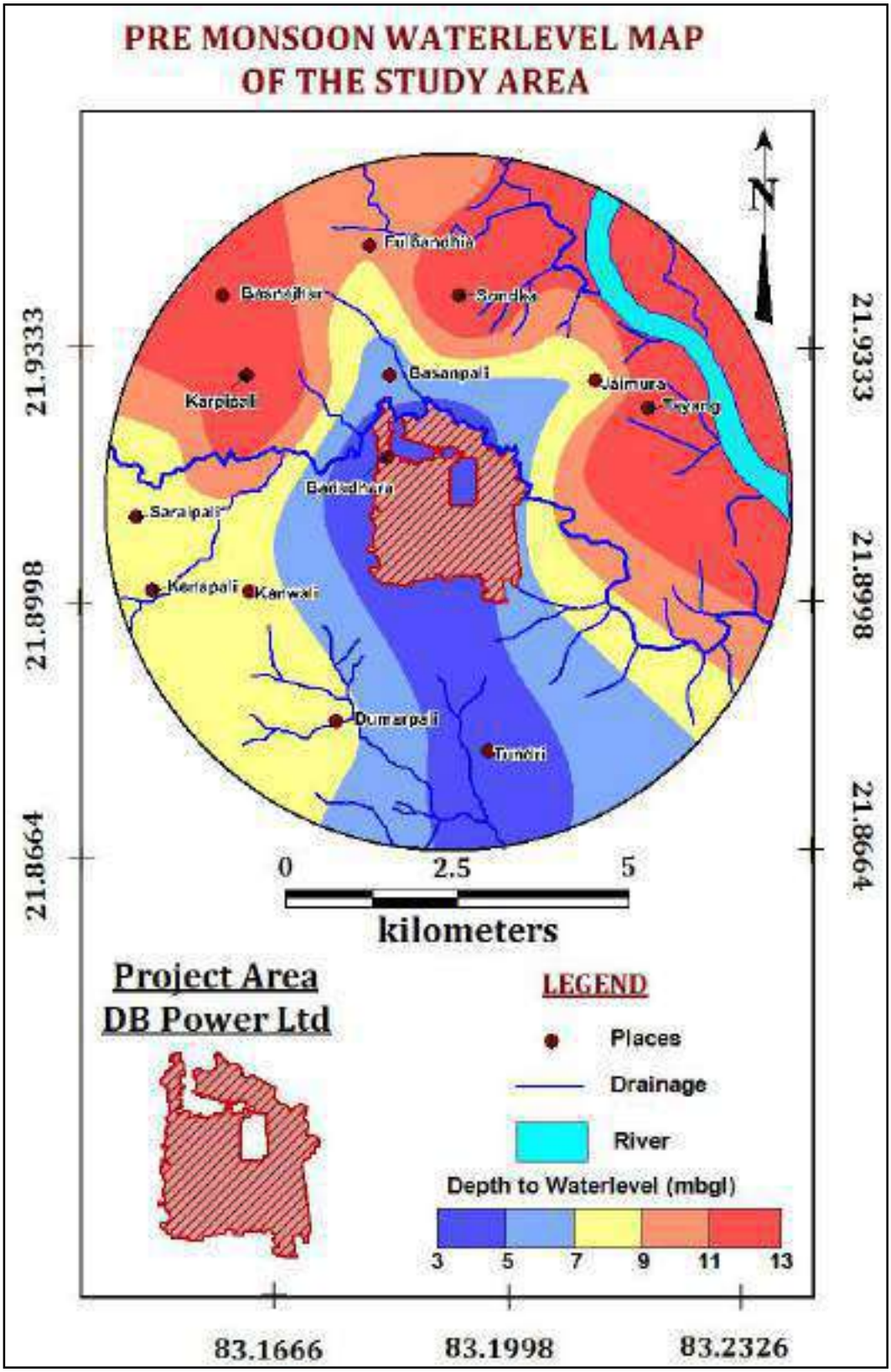


Fig.5.2: Pre-monsoon Depth to Water level map (May'2020)

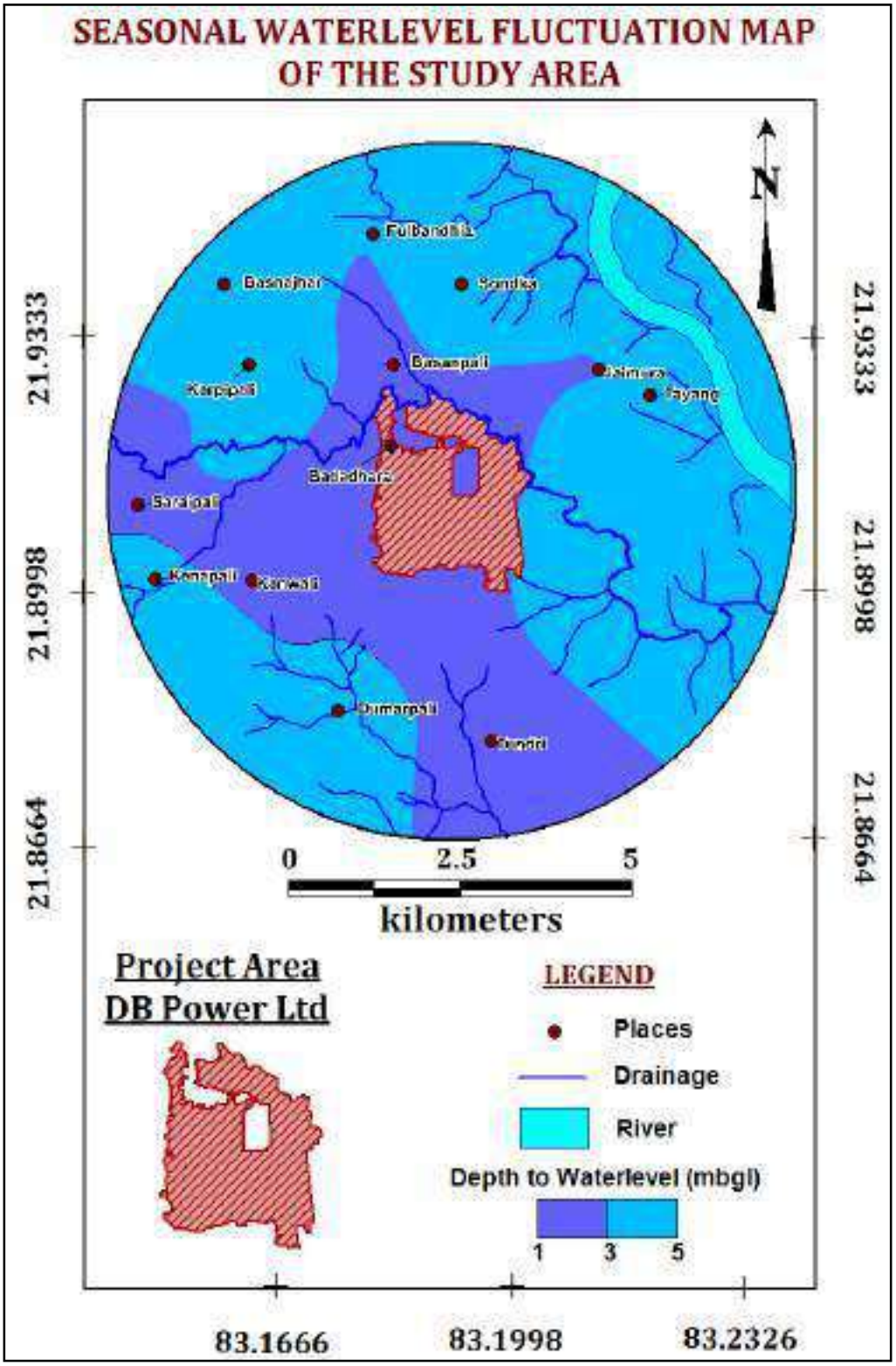


Fig 5.3: Seasonal Water Level Fluctuation map (Nov.' 2020 Vs May' 2020)

5.3 AQUIFER PARAMETERS:

Pumping test has been carried out for determination of aquifer parameters accurately. The aquifer parameters of study area covered by Sandstone are described below.

The transmissivity values of phreatic aquifer tapped in open well in general varies from 4 to 8.5 m^2/day while specific capacity ranges from 15 to 40 lpm/m/day. However for deep aquifer the transmissivity ranges from 15-32 m^2/day and at places it ranges up to 40m^2/day.

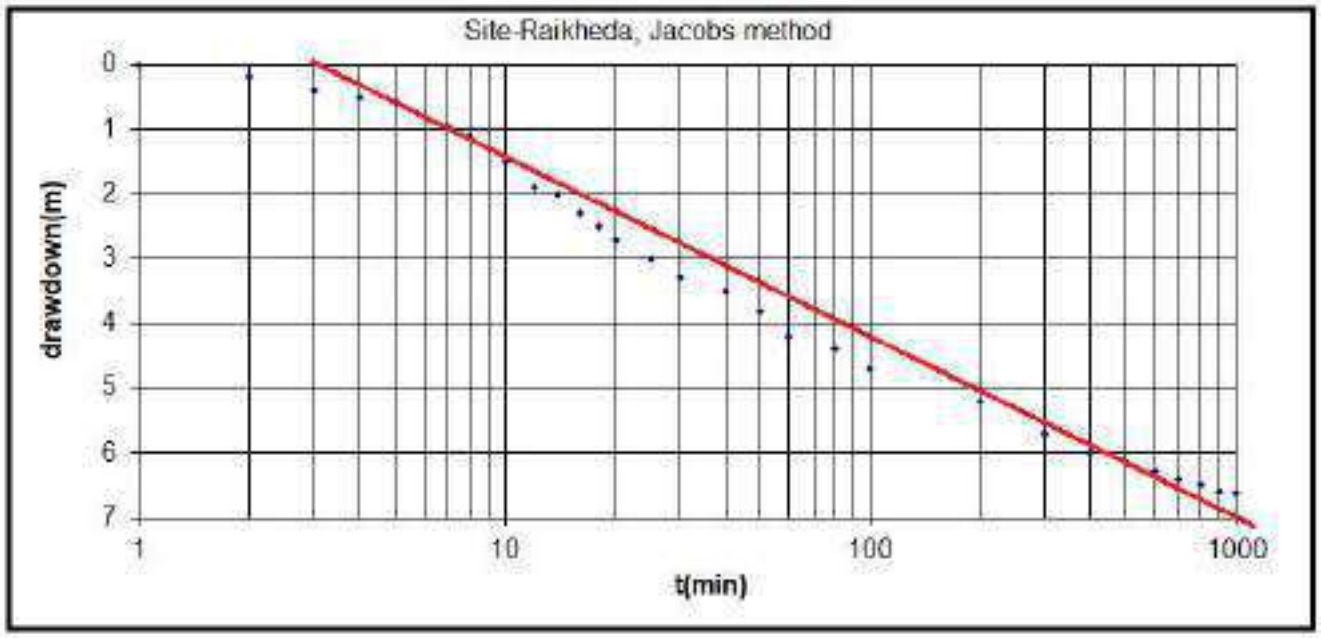
To verify the aquifer parameters of the aquifer present in the area pumping test has been carried out on a private /public bore well at Badadharha village (close to Project). The results and data interpretation is discussed below

Village	Badadharha
Block	Dabhra
District	Janjgir-Champa
State	Chattisgarh
Duration of test	1000 minutes
Capacity of pump	5 hp
Distance of OW from pump well	45 m.
Thickness of the aquifer	10
MP(magl)	0.8
SWL(mbmp)	6.5
Discharge(lps)	5

Table 5.2: Pumping Data observation well

Sl.no.	Time since pumping started (min)	Tape Reading (m)		DTW (mbmp)	Draw Down (m)	Remarks
		Hold	Cut			
1	1	20	13.50	6.50	0.00	
2	2	20	13.30	6.70	0.20	
3	3	20	13.10	6.90	0.40	
4	4	20	13.00	7.00	0.50	
5	5	20	12.95	7.05	0.55	
6	6	20	12.70	7.30	0.80	
7	7	20	12.55	7.45	0.95	
8	8	20	12.40	7.60	1.10	
9	9	20	12.20	7.80	1.30	
10	10	20	12.00	8.00	1.50	
11	12	20	11.60	8.40	1.90	
12	14	20	11.50	8.50	2.00	
13	16	20	11.20	8.80	2.30	
14	18	20	11.01	8.99	2.49	
15	20	20	10.80	9.20	2.70	
16	25	20	10.50	9.50	3.00	
17	30	20	10.20	9.80	3.30	
18	40	20	10.00	10.00	3.50	
19	50	20	9.68	10.32	3.82	
20	60	20	9.30	10.70	4.20	
21	80	20	9.10	10.90	4.40	
22	100	20	8.80	11.20	4.70	
23	200	20	8.30	11.70	5.20	
24	300	20	7.80	12.20	5.70	
25	400	20	7.50	12.50	6.00	
26	500	20	7.35	12.65	6.15	
27	600	20	7.22	12.78	6.28	

28	700	20	7.09	12.91	6.41	
29	800	20	7.00	13.00	6.50	
30	900	20	6.90	13.10	6.60	
31	1000	20	6.88	13.12	6.62	



The pumping test data has been analyzed by Jacob's straight line method of the pumping data of the observation well. The calculation is given below.

Formulae: $T = 2.3Q/4\pi\Delta s$

$K = T/b$ &

$S = 2.25\ T\ t_o/r^2$

Where,

T =kD = Transmissivity, m^2/day

K =Permeability

B= Thickness of aquifer

Q = Discharge m^3/day

r = Distance (m) between PW & OW

Δs = Slope of straight line per log cycle of time

S = Storage coefficient

t_o= time in days at zero drawdown

On the basis of above formulae, the calculated parameters are as follows.

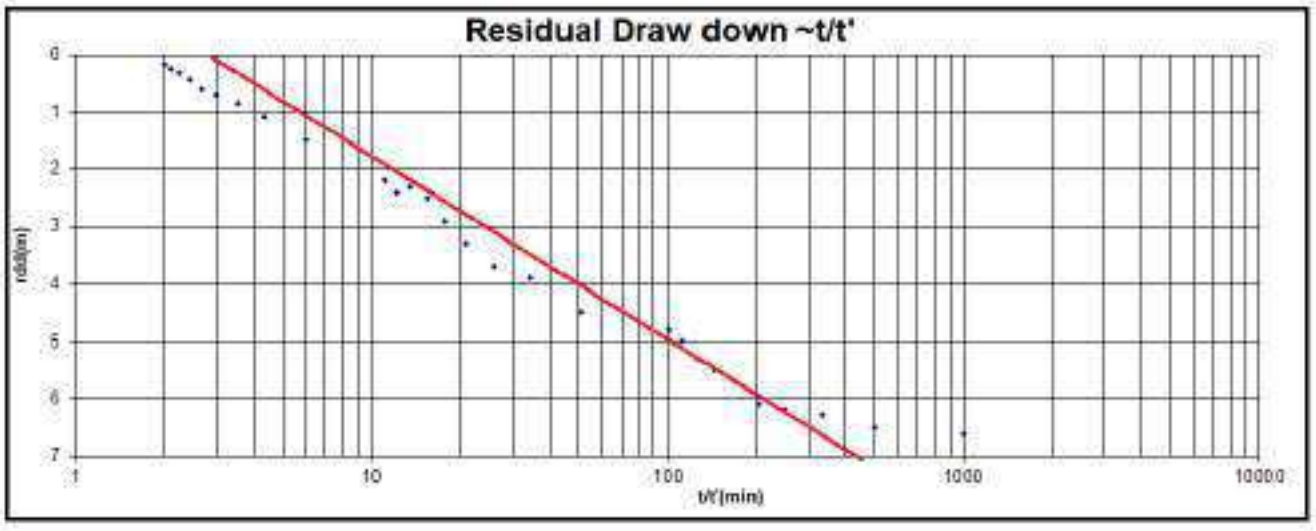
T= 30.42 m^2/day, K=2.3765 m/day&

S= 7.041 $X10^{-5}$

Table 5.3: Recuperation Data

Time since pumping started in min(t)	Time since pumping stopped in min (t')	t/t'	Tape reading (m)		DTW (mbmp)	RDD (m)	Remarks
			Hold	Cut			
1001	1	1001.00	20	6.88	13.12	6.62	
1002	2	501.00	20	7	13	6.5	
1003	3	334.33	20	7.1	12.9	6.4	
1004	4	251.00	20	7.29	12.71	6.21	
1005	5	201.00	20	7.4	12.6	6.1	
1006	6	167.67	20	7.5	12.5	6	
1007	7	143.86	20	7.66	12.34	5.84	
1008	8	126.00	20	7.89	12.11	5.61	
1009	9	112.11	16	4.1	11.9	5.4	
1010	10	101.00	16	4.5	11.5	5	
1020	20	51.00	16	5	11	4.5	
1030	30	34.33	16	5.6	10.4	3.9	
1040	40	26.00	16	5.8	10.2	3.7	
1050	50	21.00	16	6.2	9.8	3.3	
1060	60	17.67	16	6.6	9.4	2.9	

1070	70	15.29	16	6.99	9.01	2.51	
1080	80	13.50	16	7.18	8.82	2.32	
1090	90	12.11	16	7.1	8.9	2.4	
1100	100	11.00	16	7.3	8.7	2.2	
1200	200	6.00	16	8	8	1.5	
1300	300	4.33	16	8.4	7.6	1.1	
1400	400	3.50	16	8.64	7.36	0.86	
1500	500	3.00	16	8.8	7.2	0.7	
1600	600	2.67	16	8.9	7.1	0.6	
1700	700	2.43	16	9.05	6.95	0.45	
1800	800	2.25	16	9.18	6.82	0.32	
1900	900	2.11	16	9.26	6.74	0.24	
2000	1000	2.00	16	9.32	6.68	0.18	



Formulae:

$T = 2.3Q/4\pi\Delta s$, $K = T/b$&

$S = 2.25\ T\ t_o/r^2$

On the basis of above formulae, the calculated parameters are as follows.

$T = 30.42\ m^2/day$, $K = 2.3765\ m/day$& $S = 7.041 \times 10^{-5}$

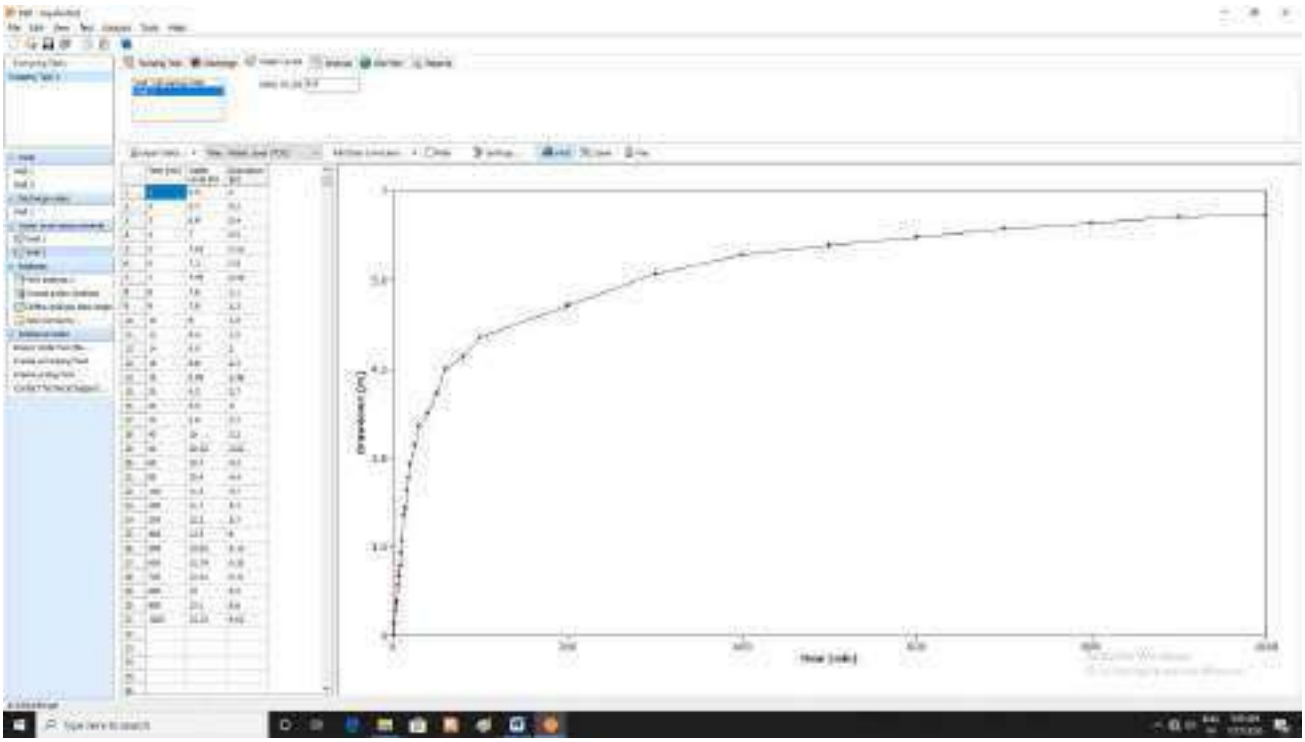


Fig 5.4: Pumping water level data plot in Aquifer test soft ware

6. SURFACE GEOPHYSICAL SURVEY

Surface geophysical survey comprised of one Vertical Electrical Sounding (VES) has been conducted at the premises of M/S DB Power Ltd, Village-Badadhara, Block-Dabhra, District-Jangir-Champa , Chhattisgarh on 10.10.2020 to know the subsurface condition in the area. The VES location is given in the location map. The VES location is given in Fig No: 6.1.

Fig6.1: Location Map of Geophysical Survey

6.1 Resistivity Survey:

Using Ohm's law electrical resistivity of sub-surface geologic formation is determined through artificially energizing the subsurface and carrying measurements on the ground surface. Contrast in resistivity value of an individual layer with the surrounding or effective presence (dependent of its relative resistivity and thickness) makes it detectable.

In the electrical resistivity method, a known amount of electrical current (I) is sent into the ground through a pair of electrode (called current electrodes) and the potential (δV) developed because of the resistance offered by the subsurface due to the passage of this current is measured across another pair

of electrodes (potential electrodes) planted into the ground. The ratio between the potential measured and the corresponding current sent into the ground yields the resistance 'R' of the ground to a depth depending upon the spacing between the two current electrodes. Through the multiplication of this value of `R' by a geometric factor a parameter called the apparent resistivity "ρ_a" is computed. Both the parameters, apparent resistivity 'ρ_a' and the resistance 'R' contain the information on the geo-electric characteristics of the subsurface. In practice, there exist several configurations but most commonly used are the Wenner and Schlumberger configurations.

In this survey microprocessor based resistivity meter CRM-500 was used. For the present study Vertical Electrical Sounding (VES) have been carried out using Schlumberger configuration.Maximum spreads were 200m (AB) for sounding.

6.2 Vertical Electrical Sounding (VES)

VES is a process by which the depth investigation is made. In this, the centre is fixed and the measurements are made by successively increasing the electrode spacing. The apparent resistivity values obtained with increasing values of electrode separations are used to estimate the thickness and resistivity's of the subsurface formations. In Schlumberger sounding arrangement (Figure-6), all the four electrodes are kept in a line symmetrically over a point '0', with inner (Potential) electrodes kept closer. For increasing the depth of investigation the current electrodes C_1 and C_2 are moved apart symmetrically from the centre point `0' keeping the potential electrodes fixed. The separation between the potential electrodes is changed only when the potential between them drops to allow value during the course of sounding. The apparent resistivity for each electrode separation is calculated by multiplying the resistance `R' with Schlumberger configuration factor 'K' (which is called as geometrical factor).

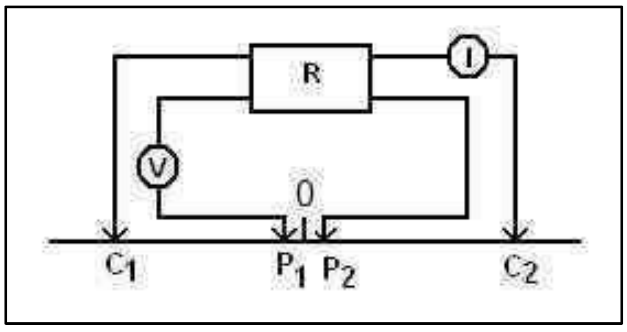


Fig 6.2 (A): Schlumberger electrode configuration

The formula is: $\rho_a = \pi R \{(C_1C_2/2)^2 - (P_1P_2/2)^2\} / P_1P_2$ or $\rho_a = KR$

Where 'K' is the geometric factor for Schlumberger configuration,

C_1C_2 is current electrode spacing

P_1P_2 is potential electrode spacing

Equipment

The geophysical methods are useful in constructing a picture of the subsurface hydrogeological conditions in totally virgin areas. It is based upon measurement of earth electrical properties. In the present study the resistivity surveys have been carried out by using Aquameter CRM 500 an indigenous microprocessor based Resistivity Meter (Fig.-6.2 B).

Aquameter CRM 500 is a high power version (40 Watt) which is useful for any type of soil specially preferred for low resistivity soil of the coastal region. It can penetrate current down to 500 meters. It is a popular instrument, because of its single button operation deep penetration, accurate and reliable result, even in adverse field conditions. The instrument has a facility to measure self-potential (SP) which is useful in mineral prospecting and environmental studies.

Fig 6.2 (B): Aquameter CRM 500

6.3 Data Analysis and Interpretation

Surface geophysical survey comprised of two Vertical Electrical Sounding (VES) has been conducted at the premises of M/S DB Power Ltd, , Village-Badadhara, Block-Dabhra, District-Jangir-Champa on

10.10.2020 to know the subsurface condition in the area. The observed resistance values from the instrument have been multiplied with geometric factor (K) to get the apparent resistivity values for each electrode spacing. The apparent resistivity values for different potential dipole were brought to single common potential dipole. The field apparent resistivity data were plotted on log-log graph paper against the half current electrode separation to get the VES curves (X axis-C1C2/2 value and Y axis apparent resistivity value).

These data of $C_1C_2/2$ and apparent resistivity were interpreted with the help of two layer master curve by curve matching technique and further checked with the help of IPI2WIN software. The final results were corroborated with the known hydrogeological conditions existing in the area. The geoelectric layer parameters (layer resistivity and layer thickness) were obtained for each VES. The field data of VES and field curves of VES are given in Table 6.1 and Fig-6.3, 6.4 & 6.5.

6.4 Discussion of result

The VES has been carried out at the premises of M/S D B Power Ltd, , Village-Badadhara, Block-Dabhra, District-Jangir-Champa, Chhattisgarh on 10.10.2020 (See fig.1). DDR-3 Resistivity Meter has been used for conducting the VES. Schlumberger configurations have been used for conducting the VES survey. The maximum current electrode spread for conducting VES was 200m (AB).

The data is plotted on double logarithmic graph paper and matched with standard curves to know the true resistivity and thickness of various layers. The data is also interpreted by Computer using IPI2WIN software to verify the results of partial curve matching. From interpreted results of VES is discussed below.

VES-1:

It is an HA type curve and it has four layer. The topmost soil layer having resistivity value of 125 Ω-m is top whereas the second layer may be weathered Sandstone with resistivity of 90 Ω-m. The third layer is hard and compact sandstone with resistivity of 410 Ω-m. The last layer may be shale having resistivity of 70 Ω-m. The thickness of topmost layer is 2.2m, second layer is 9.8m and the third layer thickness is 25m.

VES-2: It is also an HA type curve and it has four layer. The topmost soil layer having resistivity value of 105 Ω-m is top whereas the second layer may be weathered Sandstone with resistivity of 72 Ω-m. The third layer is hard and compact sandstone with resistivity of 285 Ω-m. The last layer may be shale

having resistivity of 80 Ω-m. The thickness of topmost layer is 1.4, second layer is 6.2m and the third layer thickness is 28.4m.

VES-3:

It is also an HA type curve and it has four layer. The topmost soil layer having resistivity value of 96 Ω-m is top whereas the second layer may be weathered Sandstone with resistivity of 73Ω-m. The third layer is hard and compact sandstone with resistivity of 411 Ω-m. The last layer may be shale having resistivity of 79 Ω-m. The thickness of topmost layer is 2.05, second layer is 9.2m and the third layer thickness is 26.3m.

Conclusions & Recommendations

From the interpretation of resistivity survey data we got the following outcome.

The thickness of topsoil varies from 1.4 to 2.2m with resistivity range of 96 to 125 Ω-m.

The thickness of weathered sandstone from 6.2 to 9.8m with resistivity range of 72 to 90Ω-m.

The thickness of hard sandstone from 25 to 28.4m with resistivity range of 285 to 411Ω-m.

The last layer is shale resistivity range of 70 to 80Ω-m.

At point VES-1 probable fracture zones are there in between 18 to 20m and 45 to 55m.

At point VES-2 probable fracture zones are there in between 16 to 18m and 35 to 45m.

At point VES-2 probable fracture zones are there in between 20 to 25m and 42-47m.

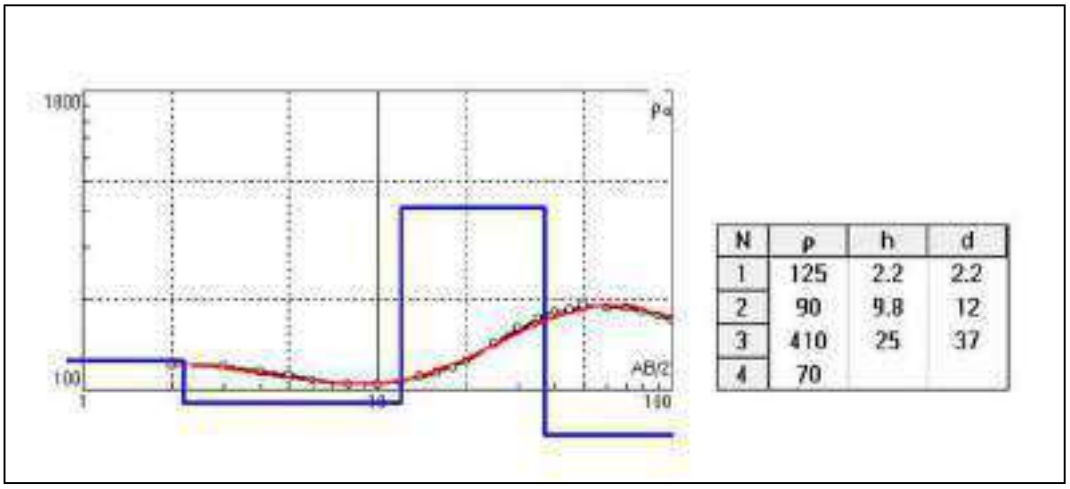
Bore hole may be drilled down to 100m to get a good amount of ground water.

Table-6.1: Interpreted Results of VES

VES No	Layer Resistivity (in Ohm-m)				Layer Thickness (in m)			Probable Fracture Zones
	ρ_1	ρ_2	ρ_3	ρ_4	h_1	h_2	h_3	
VES-1	125	90	410	70	2.2	9.8	25	18 to 20m and 45-50m
VES-2	105	72	285	80	1.4	6.2	28.4	16 to 18m and 35-45m
VES-3	96	73	411	79	2.05	9.2	26.3	20 to 25m and 42-47m

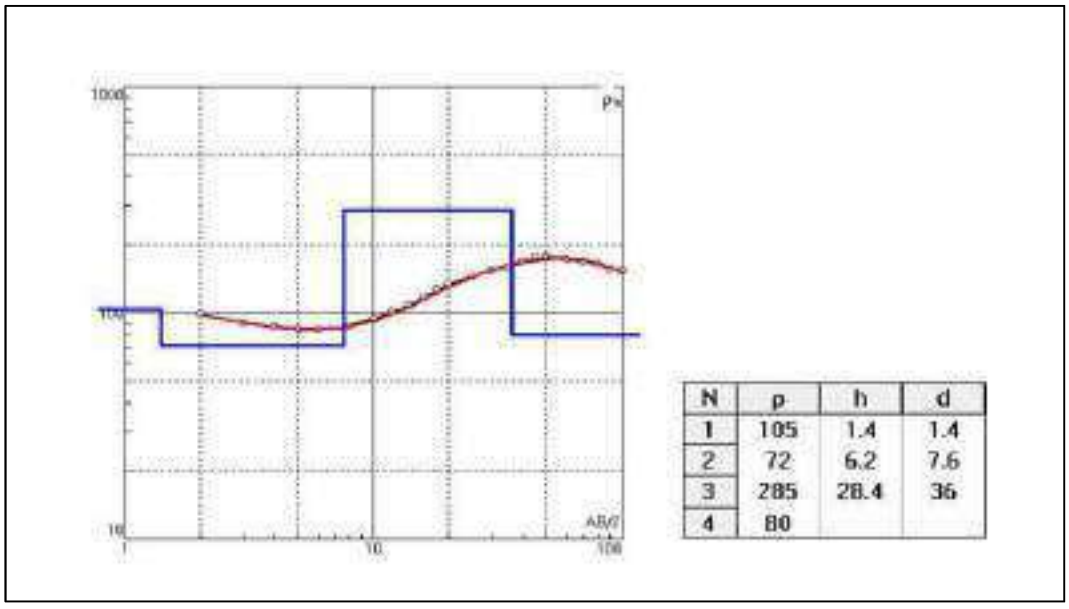
Table-6.2: VES Data					
VES1		**VES2**		**VES 3**	
Location: Badadhara (Near Urja Road, Inside plant area)		**Location:** Badadhara (Near Resevior, Inside Plant Area)		**Location:** Badadhara (Near Coal Yard, Outside of plant area)	
Latitude: N 21°54'18.6"		**Latitude:** N 21°54'54.4"		**Latitude:** N 21°54' 44.7"	
Longitude: E 83°11'22.3"		**Longitude:** E 83°11'36.0"		**Longitude:** E 83°10' 56.4"	
Date: 10.10.2020		**Date:** 10.10.2020		**Date:** 10.10.2020	
Altitude: 234m		**Altitude:** 235m		**Altitude:** 239 m	
AB/2	**App. R**	**AB/2**	**App. R**	**AB/2**	**App. R**
2	120.00	2	98.65	2	96.23
3	120.00	3	90.90	3	88.54
4	115.00	4	87.26	4	85.34
5	112.20	5	84.92	5	81.67
6	108.00	6	84.92	6	83.23
8	104.00	8	87.26	8	85.28
10	104.00	10	93.42	10	91.45
12	105.60	12	102.76	12	99.46
14	111.00	14	108.52	14	104.78
16	114.00	16	115.00	16	113.24
18	118.00	18	126.00	18	123.54
20	124.30	20	133.00	20	130.67
25	142.40	25	144.50	25	140.56
30	161.00	30	154.00	30	151.56
35	174.00	35	158.00	35	155.98
40	183.00	40	168.00	40	166.89
45	186.00	45	176.00	45	172.34
50	192.00	50	177.23	50	174.34
60	189.00	60	172.50	60	170.23
70	188.10	70	169.00	70	167.45
80	183.00	80	164.00	80	162.34

90	176.90	90	156.00	90	154.29
100	171.00	100	154.00	100	152.39



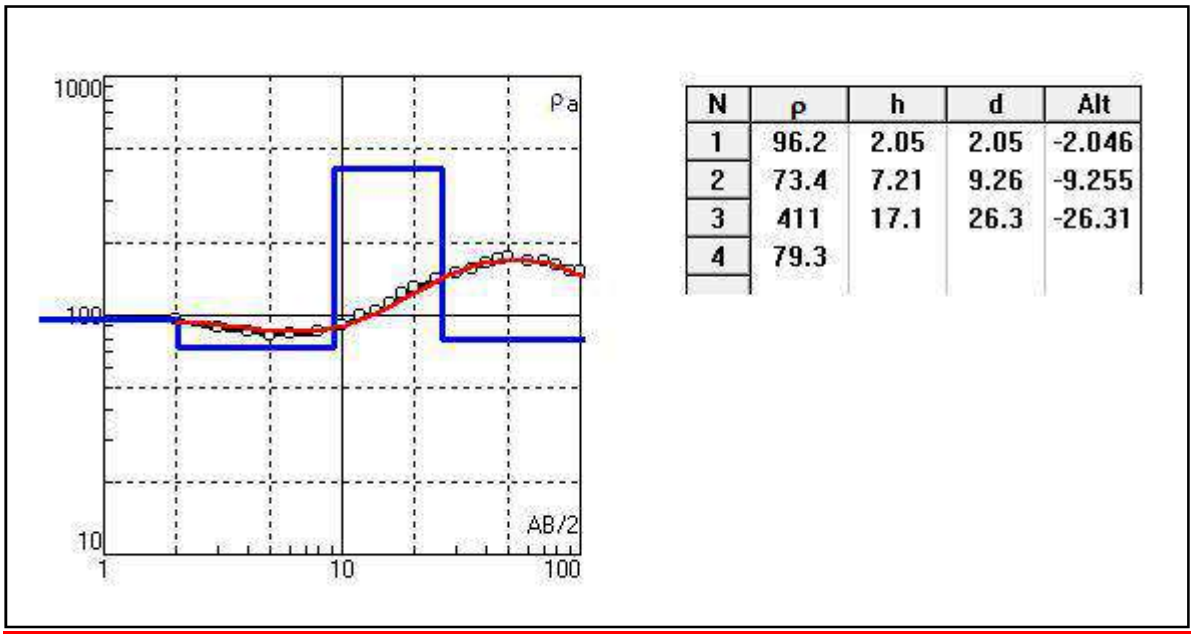
N	ρ	h	d
1	125	2.2	2.2
2	90	9.8	12
3	410	25	37
4	70		

Fig-6.3: VES Curve and interpreted results at Badadhara (Near Urja Road, Inside plant area) (VES 1)



N	ρ	h	d
1	105	1.4	1.4
2	72	6.2	7.6
3	285	28.4	36
4	80		

Fig-6.4:VES Curve and interpreted results at Badadhara (Near Resevior, Inside Plant Area) (VES 2)



N	ρ	h	d	Alt
1	96.2	2.05	2.05	-2.046
2	73.4	7.21	9.26	-9.255
3	411	17.1	26.3	-26.31
4	79.3			

Fig-6.5:VES Curve and interpreted results at Badadhara (Near Coal Yard, Outside of plant area)(VES3)

FIG 6.6: PHOTOGRAPHS OF GEOPHYSICAL SURVEY IN DIFFERENT LOCATION IN STUDY AREA

7. ARTIFICIAL RECHARGE AND RAIN WATER HARVESTING

Artificial recharge to ground water through scientifically designed structures has been proven as a viable option for augmentation of ground water resources. It also provides an opportunity to utilize the surplus monsoon run-off which otherwise lost to sea unutilized.

Artificial recharge aims at augmenting the natural replenishment of ground water storage by some method of construction, spreading of water, or by artificially changing natural conditions. It is useful for reducing overdraft, conserving surface run-off, and increasing available ground water supplies. Recharge may be incidental or deliberate, depending on whether or not it is a by-product of normal water utilization. Artificial recharge is becoming increasingly necessary to ensure sustainable ground water supplies to satisfy the needs of a multi-pronged demand. The benefits of artificial recharge can be both tangible and intangible.

The concept of rainwater harvesting involves 'tapping the rainwater where it falls'. A major portion of rainwater that falls on the earth's surface runs off into streams and rivers and finally into the sea. The technique of rainwater harvesting involves collecting the rain from localized catchment surfaces such as roofs, plain/sloping surfaces etc., either for direct use or to augment the ground water resources depending on local conditions. Construction of small barriers across small streams to check and store the running water also can be considered as water harvesting.

During monsoon season, whatever rainwater is collected in the premises of project area, i.e. through, Building/roof area, Road/Paved area, Green belt area and Open land will be utilized to recharge the ground water. It is proposed to implement rain water harvesting structures at feasible, viable and sustainable location, catchment wise by diverting the runoff that is generated from the roof area, paved area, roads and green belt area for recharging into the specified recharge structure for putting into ground water system. The runoff generated from the two catchments needs to be suitably diverted through storm water drains to the recharge structures in order to augment the ground water. Overflow water from recharge structures is to be stored into two proposed ponds to be constructed at the western fringe of the plant area as a water conservation measures. Special care needs to be taken for locating the recharge structures and water conservation storage ponds so that the ground water augmentation as well as conservation is optimal. Implementation of water conservation structures and recharge mechanism shall ensure the balance between the discharge vis-à-vis recharge relationships of the aquifer system and provide the sustainable ground water supply. Based on the site plan and the land

use pattern of the project area, the computation of runoff for each unit has been worked out and the details are tabulated below.

Total Area available for recharge **– 2549521.8 sq.m.**

Rainfall – 1100 mm. (60-65 rainy days)

Formations –Shale & Sandstone.

7.1. Runoff Available for Recharge:

7.1.1: Surrounding area of 5 K.m. from Plant Boundary:

S. N.	Land use type	Area (m^2)	Rainfall (m)	Amount of water that received Through Rain (Cub meter)	Co-efficient of runoff	Quantity of Rainwater (m^3)
1.	Build - up Area	4509691	1.10	4960660.1	0.85	4216561.08
2.	Green belt area Approx.	5387960	1.10	5926756	0.15	889013.4
3.	Open land area	6741150	1.10	7415265	0.20	1483053
4.	Water Bodies	2523190	1.10	2775509	0.60	1665305.4
5.	Agriculture Land	105195540	1.10	115715094	0.30	34714528.2
6.	Total Area	**124357531**	……	……	…….	42968461.08
6.	Assuming 10% is not Suitable for recharge, hence available quantum of Rain water for Recharge is about **38671614.97 m^3** [90% **42968461.08 m^3**]					

From the above, it is observed that a total potential of **38671614.97** cum of rainfall runoff can be collected from the surrounding of 5 k.m. radius from plant boundary.

7.1.2: Recharge from Plant Complex Area:

S. N.	Land use type	Area (m^2)	Rainfall (m)	Amount of water that received Through Rain (Cub meter)	Co-efficient of runoff	Quantity of Rainwater (m^3)
1.	Construction area	1003621.28	1.10	1103983.40	0.85	938385.89
2.	Green belt area Approx.	837700.02	1.10	921470.02	0.15	138220.50
3.	Open land area	465388.1	1.10	511926.91	0.20	102385.38
4.	Raw Water Reservoir	242811.6	1.10	267092.76	0.60	160255.65
5.	Total Area	**2549521**	……	……	…….	1339247.42
6.	Assuming 10% is not Suitable for recharge, hence available quantum of Rain water for Recharge is about **1205322.67 m^3** [90% **1339247.42 m^3**]					

From the above, it is observed that a total potential of **1205322.67** cum of rainfall runoff can be harvested at feasible, viable and sustainable location annually.

Plant Complex area:

The main interest in rainwater harvesting methods is the collecting and conserving rainwater at an

early stage in the water cycle to ensure the best use of rainfall before it runs away into rivers and groundwater, or disappears as evaporation. The appropriate choice of rainwater harvesting and artificial recharge techniques depends on the amount of rainfall and its distribution, land topography, soil type, vadose zone thickness and its hydraulic characteristics, depth and type of aquifers, hydraulic parameters of aquifer systems, source and quality of recharge water, and socio-economic factors, among others; these factors tend to be location specific.

Thus, the selection of water harvesting structures and artificial recharge methods strongly depends on local conditions, which calls for proper scientific investigations prior to the design and execution of artificial recharge and/or rainwater harvesting schemes. Water harvesting methods include such widely differing practices as 'roof top water harvesting', 'land surface water harvesting' and 'groundwater harvesting'. On the other hand, a variety of methods have been developed to artificially recharge groundwater and mostly of combinations of direct surface, direct subsurface or indirect recharge techniques. Commonly used artificial recharge techniques, however, are through drainage canals, from surface water bodies like ponds and lakes, recharge through pits/shafts and tube wells/ bore wells etc.

The increasing stress on ground water needs, preventive measures like rain water harvesting structures and recharge measures are to be taken. It has been found that the plant areas of M/S DB Power Limited offers enough scope and options for rain water harvesting and recharge measures. In view of this, detailed topographical, hydro-geological and hydrological study has been undertaken in the area, so as to formulate a comprehensive recharge plan outlining measures with recommended site specific designs for rain water conservation and recharge measures along with the implementing modalities.

Since, the selection and design of artificial recharge and water harvesting structures are highly dependent on the local feasible and suitable conditions and the availability of local materials for their construction. A successful design of artificial recharge and rain water harvesting structures necessitates proper understanding of hydrology and hydro-geology of the project area.

Total recharge potential of **1205322.67** cum of rainfall runoff can be harvested at feasible, viable and sustainable location annually, based on hydrogeological condition trench and recharge pits use for ground water artificial recharge.

The plant is already constructed recharge trench & recharge reservoir to recharge the ground water of the study area.

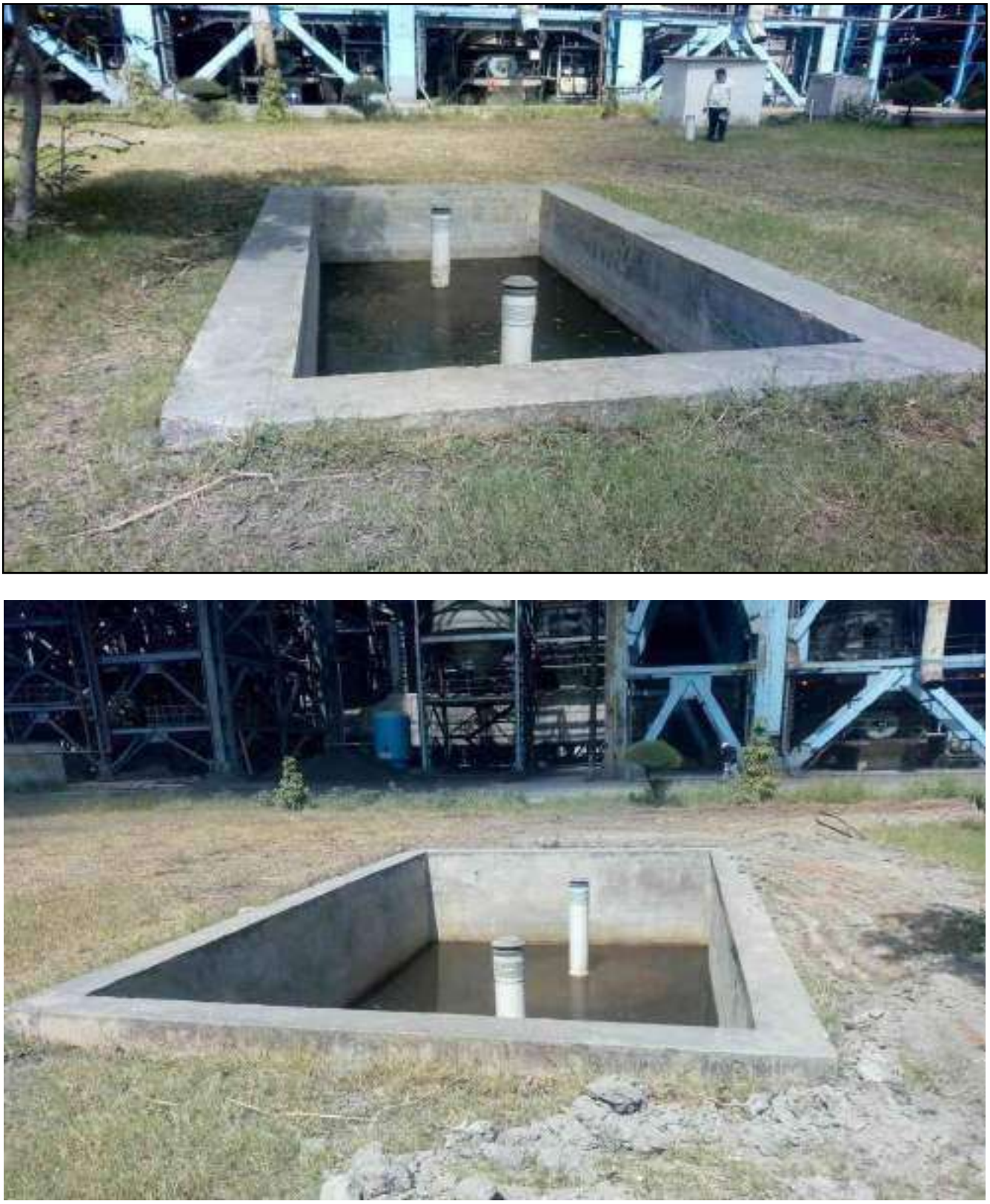


Fig 7.1: Rain water Harvesting in the plant premises

Fig 7.2: Piezometric Point for Ground water level Monitoring in the plant area

7.3: Stages of Ground water Development:

The Total Ground water Storage, net annual ground water availability (ham), ground water draft (ham), ground water for future use (ham) and stage of ground water development (%) is given in table 7.2. The net ground water available is 3599.1 ham. Existing gross ground water draft for all purpose is 1927.76 ham out of which 1598.32 ham is for irrigation and 329.44 ham is for domestic and industrial water supply. The stage of ground water development in the Dabhra tehsil is 53.56%. the non command area has the highest stage of ground water development (61.83%) followed by command area (45.21%) in the Dabhra block.

As per ground water resources data the Block Dabhra is categorized as **safe zone**.

Table: 7.2: Ground Water Resource of Dabhra Tehsil

Assessment Unit	Total Annual Recharge in Ham	Net Ground Water Availability in Ham	Existing Gross Ground Water Draft for Irrigation in Ham	Existing Gross Ground Water Draft for Domestic & Industrial Water Supply in Ham	Existing Gross Ground Water Draft for All Uses in Ham	Allocation For Domestic & Industrial Water Supply in Ham	Net Ground Water Availability for Future Irrigation Development in Ham	Stage of Ground Water Development in %
In ham								
Command	1884.52	1790.29	671.53	137.84	809.37	187.59	931.17	45.21
Non Command	1904.01	1808.81	926.79	191.6	1118.39	260.75	621.27	61.83
Total	3788.53	3599.1	1598.32	329.44	1927.76	448.34	1552.44	53.26

Ground water recharge by rainfall infiltration Method

Rrf= NAR x A x rfi, Where Rrf= Recharge from Rain fall, NAR= Normal Annual Rainfall, A= Area of unit in ha

RIF = Rain fall infiltration Factor

Total Annual water availability= Rain fall recharge + seepage from irrigation + Recharge from tanks/Ponds

Net ground water availability = total recharge – Base Flow

Total Annual Demand in Ham = Population X Average Per Capita Consumption (60) X 365/1000 X 10000

Ground Water Draft for Irrigation = Number of Ground Water Structure X Unit Draft in Ham

Ground Water Balance = Annual Utilizable GW Resource – Gross Ground Water Draft

Stage of Ground Water Development = Gross Ground Water Draft X 100/ Annual Utilizable GW Resource

8. GROUND WATER QUALITY

The suitability of ground water for drinking/irrigation/industrial purposes is determined keeping in view the effects of various chemical constituents present in water on the growth of human being, animals, and various plants and also on industrial requirement. However, many ions are very essential for the growth of plants and human body but when present in excess, have an adverse effect on health and growth. For estimation of the quality of ground water, 7 ground water samples have been collected in study area. The ground water samples were analysed for major as well as heavy chemical constituents. The ranges of different chemical constituents present in ground water are given in **Table 8.1 and location of sampling is given in fig 8.1**.

Table 8.1: Village wise chemical constituents

Village	**Desirable limit**	**Permissible limit**	Badadhar	Tundri	Kanwali	Dumarpali	Ash Pond, inside Plant Area	Pond near main gate of DB Power Plant	Reservoir Pod, inside plant area
G.P.			Badadhara	Tundri	Kanwali	Dumarpali	Ash Pond	main gate of DB Power Plant	Reservior Pond
Block			Dabhra	Dabhra	Dabhra	Dabhra	Dabhra	Dabhra	Dabhra
Dist			Janjgir-Champa	Janjgir-Champa	Janjgir-Champa	Janjgir-Champa	Janjgir-Champa	Janjgir-Champa	Janjgir-Champa
Latitude			21°55'09"	21°53'15"	21°54'07"	21°53'03"	21°54'42"	21°54'07"	21°54'54"
Longitude			83°11'05"	83°11'50"	83°09'44"	83°10'29"	83°11'36"	83°11'15"	83°11'36"
Sample taken from			Ground water	Ground water	Ground water	Ground water	Surface Water	Surface Water	Surface Water
PH Value	6.5-8.5	No relaxation	6.53	6.23	6.9	6.94	6.75	6.85	6.83
Turbidity (NTU)	1	5	1.32	0.21	0.79	0.53	0.15	0.14	0.21
Conductivity	>1	3200	1040	800	1220	1000	1360	180	300

	000								
Total Disolved Solid (mg/l)	500	2000	550	400	630	536	700	100	170
Total Hardness (as Caco3) (mg/l)	200	600	272	240	512	336	360	64	64
Calcium (Ca) (mg/l)	75	200	60.92	51.3	112.22	80.16	83.36	14.42	16.03
Calcium Hardness in (mg/l)	-	-	151.99	127.99	279.98	199.99	207.99	35.97	39.99
magnesium (As mg) (mg/l)	30	100	29.16	27.21	56.38	33.04	36.93	6.8	5.83
Magnesium Hardness(As mg) (mg/l)	-	-	120.01	112.01	232.02	136.01	152.01	28.03	24.01
Carbonates As c03	-	-	162.36	115.52	218.94	218.94	39.36	22.14	19.68
Bi-carbonates as Hco3	-	-	241.56	505.08	325.74	325.74	58.56	32.94	29.28
chloride (As Cl) (mg/l)	250	1000	23.77	16.46	32.92	20.12	16.46	5.48	3.65
Total Alkalinity (as Caco3) (mg/l)	200	600	198	141	267	267	48	27	24
Fluride (as F) (mg/l)	1	1.5	<0.1	<0.1	0.21	0.18	<0.1	<0.1	<0.1
Sulphate (As So4) (mg/l)	200	400	6.98	5.89	36.35	28.6	8.96	5.2	1.36
iron (as Fe) (mg/l)	1	No relaxation	<0.1	<0.1	0.16	0.13	<0.1	<0.1	<0.1
Nitrate (As No3) (mg/l)	45	No relaxation	<1	<1	8.56	3.31	2.36	<1	<1
Sodium (Na) (mg/l)	-	-	10	8	46.6	18	12	4	3
Potasium (K) (mg/l)			4	2	8	3	2	<1	<1

According to above table, majority of chemical constituent of all samples are within permissible limit and suitable for drinking, irrigation and industrial use,

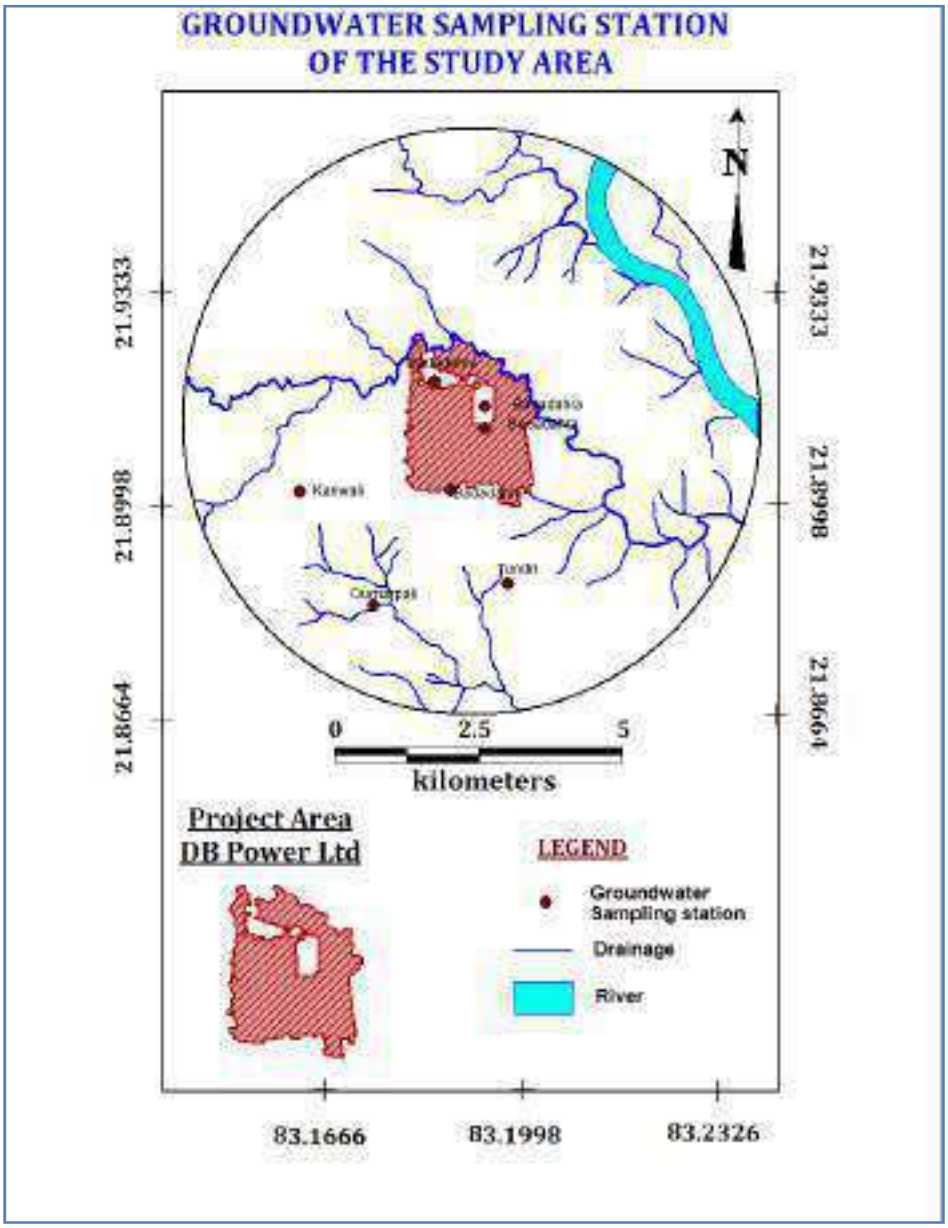


Fig 8.1 location of water sampling stations

Geochemical Classification of Ground Water

The geochemical classification of ground water, of study area has been carried out by using Piper Diagrams the ground water is of Ca/Mg-CO3/HCO_3 type. The analysis of ground water samples collected from the area suggests that type of water in the major part is bicarbonate dominating type, The type of ground water found in each ground water sample collected is given in the **Table 8.2**.

Table 8.2. The type of ground water

Station ID	Location	X coordinate	Y coordinate	Water Type	pH (lab)	El. Cond .uS/cm	TDS mg/l
MW1	Badadhara	83.185	21.919	Ca-SO4-CO3-HCO3	6.53	1040	550
MW2	Tundri	83.197	21.888	Ca-Mg-HCO3-CO3	6.23	800	400
MW3	Kanwali	83.162	21.902	Ca-Mg-CO3-HCO3	6.9	1220	630
MW4	Dumarpali	83.175	21.884	Ca-Mg-CO3-HCO3	6.94	1000	536
MW5	Ash Pond	83.185	21.919	Ca-Mg-CO3	6.75	1360	700
MW6	DB Power Plant	83.188	21.902	Ca-Mg-CO3-HCO3	6.85	180	100
MW7	Reservior Pod	83.193	21.915	Ca-Mg-CO3-HCO3	6.83	300	170

SUITABILITY OF GROUND WATER FOR DRINKING AND IRRIGATION PURPOSES

The suitability of ground water for drinking purpose

The suitability of ground water for drinking purpose is determined keeping in view the effects of various chemical constituents present in water on the biological system of human being. The standards proposed by the Bureau of Indian Standards (BIS) for drinking water (BIS-2012, revised) were used to decide the suitability of ground water that occur in study area for drinking purpose. The classification of ground water samples falling below desirable limit (DL), between desirable & maximum permissible limit (DL-MPL) and above maximum permissible limit (MPL) for drinking water purpose limit is shown in the following **Table 8.3.**

Table 8.3: Classification of Ground Water Samples for Drinking Purposes.

Parameters	Drinking water Standards (IS-10500-91, Revised 2012)		Total No. of GW Samples	Samples (< DL)		Samples (DL-MPL)		Samples (>MPL)	
	Desirable Limit (DL)	Maximum Permissible Limit (MPL)		No.	%	No.	%	No.	%

PH	6.5-8.5	No relaxation	7	1	14	6	86	0	0
TDS (mg/L)	500	2000	7	3	43	4	57	0	0
TH (mg/L)	300	600	7	4	57	3	43	0	0
Ca (mg/L)	75	200	7	4	57	3	43	0	0
Mg (mg/L)	30	100	7	4	57	3	43	0	0
Cl (mg/L)	250	1000	7	7	100	0	0	0	0
SO_4 (mg/L)	200	400	7	7	100	0	0	0	0
NO_3 (mg/L)	45	-	7	7	100	0	0	0	0

It is observed from the above **table 8.3**, that than 100 % of samples are suitable for drinking purposes. Therefore, it is concluded that the portability of ground water in study area.

The suitability of ground water for Irrigation purpose:

Water is one of the most important constituents, which is required for plant growth, which not only provides the liquid for food processing of the plants but also provides important nutrients for the growth of the plants. But when concentration of ions, are found in excess in the water, it affects the plant growth and reduces the plant yield. Therefore, it is necessary to know the quality of the water before applying in the field, so that the maximum crop yield can be obtained.

Sodium Adsorption Ratio (SAR)

SAR is an expression pertaining to cation makes up of water and soil solution and is used for characterizing the sodium hazard of irrigation water. The main problem with high sodium concentration is its effect on soil permeability & water irrigation. Sodium also contributes directly to the total salinity of the water and may be toxic to sensitive crops such as fruit trees. SAR is calculated from the following equation-

$$SAR = \frac{Na^{+}}{\sqrt{(Ca^{2+} + Mg^{2+})/2}}$$

Where the concentration of cations are expressed in meq/L.

Residual Sodium Carbonate (RSC)

Water containing carbon dioxide on way gets saturated with carbon dioxide and forms bicarbonates. The excess bicarbonates of Mg and Ca are precipitated out as carbonates. This produces impermeability to the top soil. Bicarbonate concentration of water has been suggested as additional criteria of suitability of irrigation water. Residual sodium carbonate is determined by using the following formula.

RSC = (CO3+ HCO3) - (Ca+Mg)

The suitability of ground water of study area for irrigation purpose was considered on the basis of U. S Salinity diagram in which electrical conductivity value in μS/cm at 25°C upto 2250 μS/cm at 25°C is plotted on one axis and the SAR values upto 10 on the other. The electrical conductivity and the corresponding SAR & RSC values of each ground water sample collected from the study area is given in the **Table 8.4**, and the EC and SAR values are plotted in **Wilcox Diagram (Fig 8.2)** and **Piper (Fig 8.3).**

The number of ground water samples based on Sodium Absorption Ratio (SAR) characteristics falling under Good, Good to Permissible, Doubtful & Bad (Unsuitable) categories is shown in the following **Table 8.4.**

From the Table 8.4, it is observed that 100% of samples show SAR values below 10 and falling in the Low Sodium (alkali) Hazard Zone (S1). Such type of water can be used for irrigation on almost all soils with little danger of development of sodium exchangeable problem. Out of 7 samples collected from study area all samples having EC above > 2250 μS/cm at 25° .

The High Salinity Water (C3) cannot be used on soils with poor drainage. Even with adequate drainage, special management for salinity control may be required and plants with good salt tolerance should be selected.

Table 9.4: Classification of ground water for irrigation based on SAR values

EC microsiemens/cm at 25°C		SAR Value			
		<10 (S1)	10-18 (S2)	18-26 (S3)	>26 (S4)
	Quality	Good	Good to Permissible	Doubtful	Bad (Unsuitable)
	Total No. of GW Samples	No. of samples	No. of samples	No. of samples	No. of samples

< 100	-	-	-	-	-
100-250 (C1)	1	1	-	-	-
250-750 (C2)	1	1	-	-	-
750-2250 (C3)	5	5	-	-	-
2250-5000 (C4)	-	-	-	-	-
> 5000	-	-	-	-	-
Total	7	7			
Overall Percentage		100%			

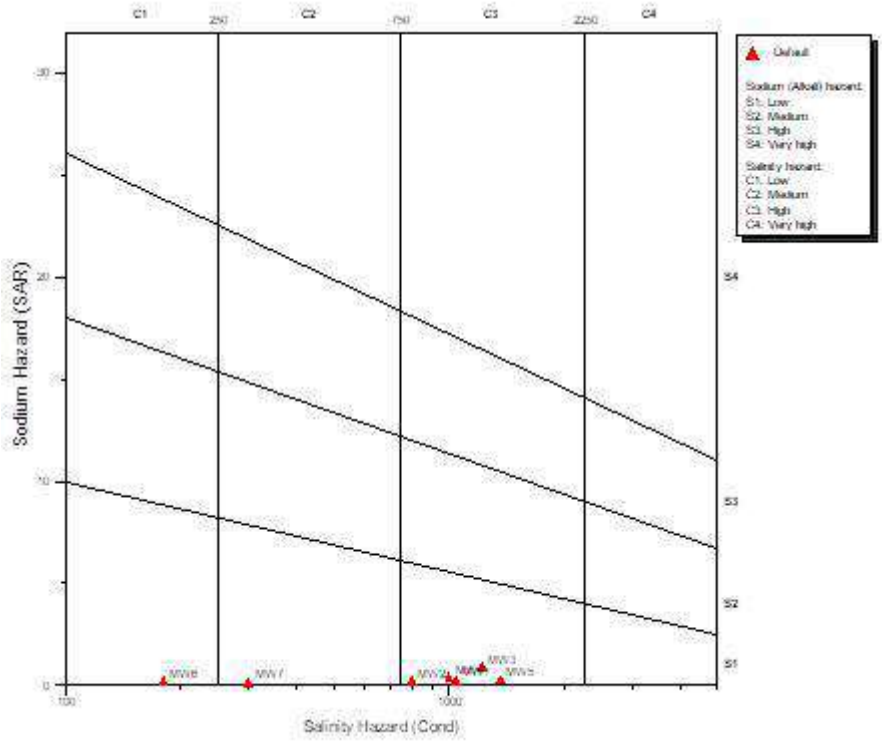


Fig 8.2 Wilcox Diagram

The Very High Salinity Water (C4) is not at all suitable for irrigation under ordinary conditions, but may be used occasionally if the soil is permeable by providing adequate drainage and irrigation water must be applied in excess to provide considerable leaching and very salt tolerant crops should be selected.

Based on above **table 8.4**, ground water samples are classified with respect to salinity and sodium hazard and are presented in **Table 8.5.**

Table 8.5: Classification of ground water samples with respect to salinity and sodium hazards

Type of Classification	Characteristics	No. of samples falling	%
C1S1		1	14
C1S2			
C2S1	Medium salinity and low sodium water	1	14
C3S1	High salinity and low sodium water	5	72
C4S1	Very high salinity and low sodium water		
Total		**7**	**100**

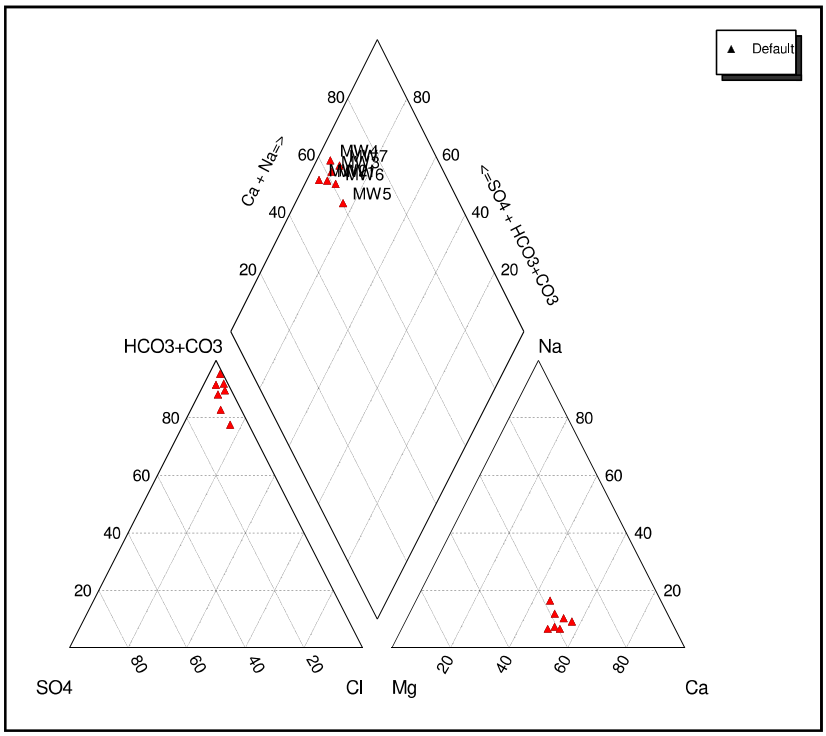


Fig 8.3: Trainer piper diagram

The iso-conductivity map of ground water has been prepared and presented as **Fig 8.4**. On perusal of the iso-conductivity, it is observed that the electrical conductivity for shallow Aquifer in study area ranges from 180 μMhos/cm (Pond near main gate DB power plant) to 1360μMhos/cm (Ash pond), the electrical conductivity for shallow aquifer is within Permissible Limit (750-2250 μMhos/cm @ 25°C) Fig 8.4.

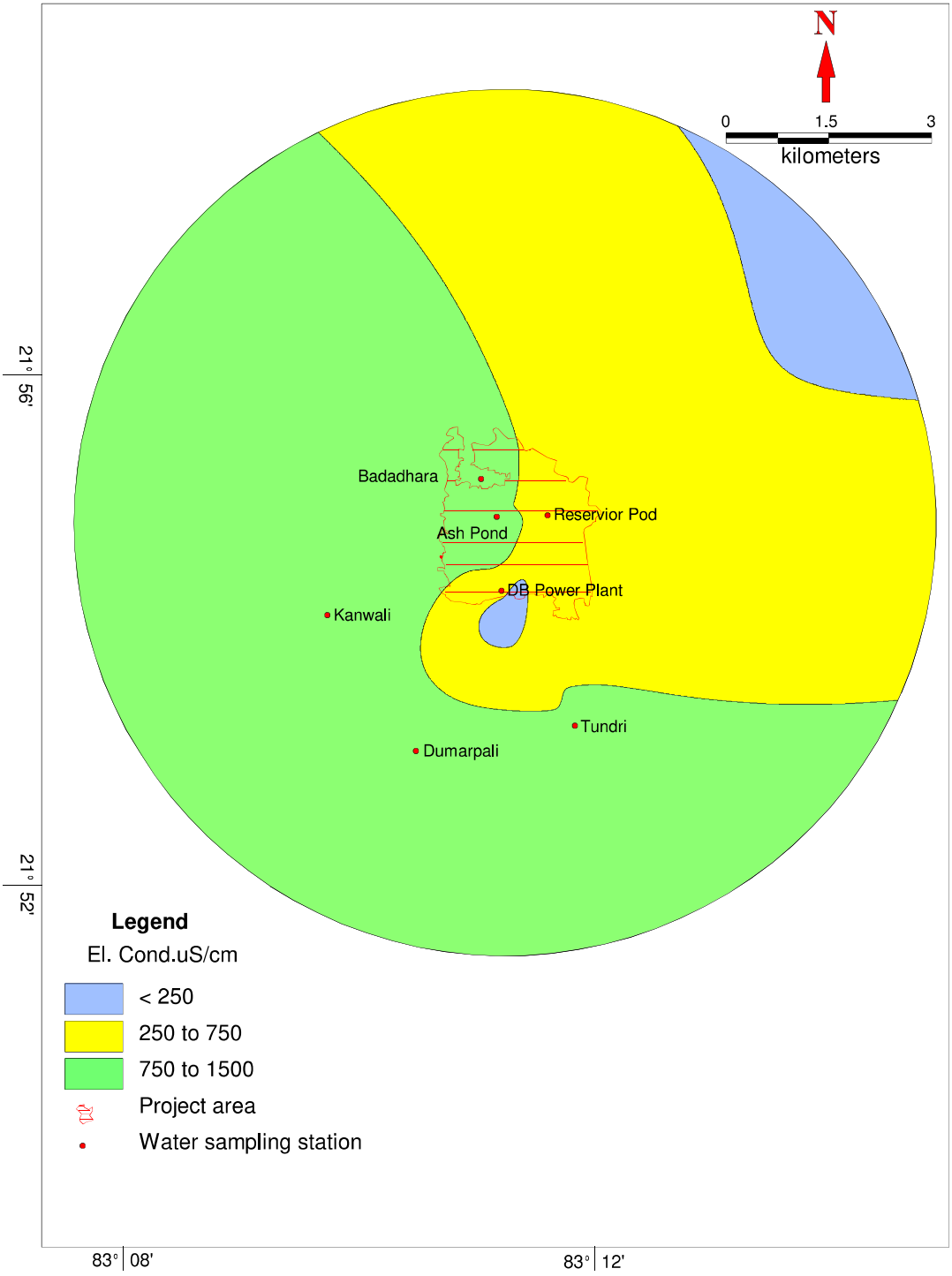


Fig 8.4: Iso-conductivity map of ground water

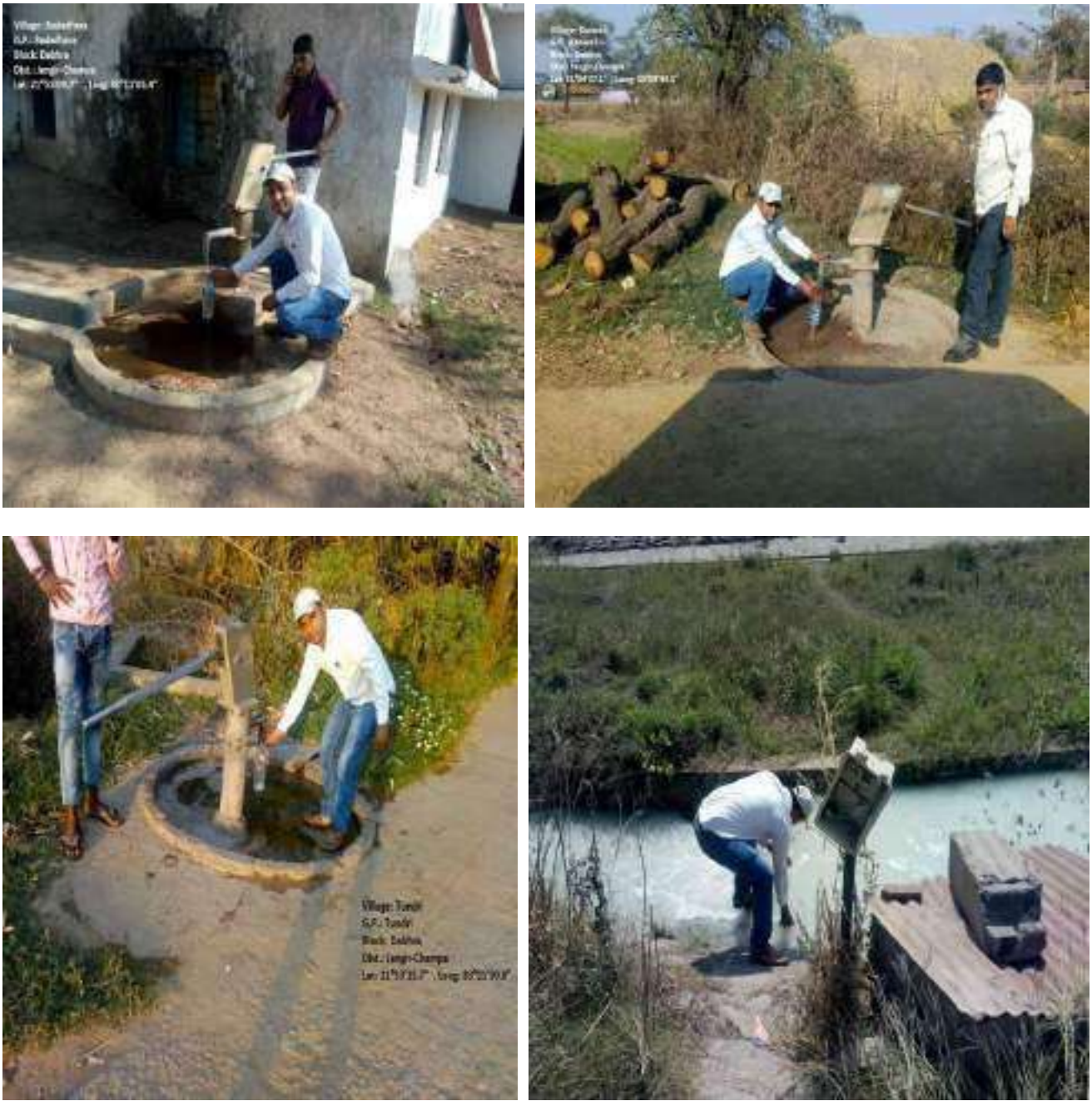


Fig 8.5: Water Sampling in Plant premises and buffer Zone of the Study Area

9. CONCLUSIONS & SUMMARY

DB Power Limited is a coal-based thermal power plant located at Village: Badadarha, Block: Dabhra, Janjgir-Champa district in the state of Chhattisgarh. The plant has produced thermal power having capacity of 1200 MW (2*600 MW).

The area is drained by tributaries of Mand River. The project area is in the interfluves zone of Dantar Nala, Pathari Nala & Mand River.

The study area is characterized by flat undulating terrain with regional slope to the north-east and south west. The average elevation in the southern portion is around 280m while in the north is 275 mamsl. The average land slope of the area is works out about 4 per km from toposheets (1:50000scale), Survey of India.

Geo-morphologically the study area comes under Pediplain, Denudation Hills & Floods Plan. The Physiography of the basin is controlled by geological formations namely Sandstone and shale.

In the area, ground water occurs under phreatic or unconfined condition in weathered portion of rocks and semi-confined to confined conditions in fractures/cavernous part of rocks i.e. Sandstone & shale at depths.

In the Post monsoon period it is observed that the overall depth to water level remains between 1.6 and 9.10 meters below ground level. The post-monsoon depths to water level range of 4 to 6 mbgl are observed at Kenapali, Saraipali, Jaimura & Kanwali villages. Ground water levels more than 6 mbgl are observed in the villages Tayang, Karpipali, Fulbandhia & Basnajhar Villages. Water level less than 4 mbgl are observed in the remaining parts of the study area.

In the Pre monsoon it is observed that the overall depth to water level remains between 3.40 to 13.18 meters below ground level. The pre-monsoon depth to water levels ranges Below 5 mbgl is observed in Badadhara & tundri villages. Water levels is between 5 - 10 mbgl are observed in the villages namely Amapali, Basanpali, Saraipali, Kanwali, Dumerpali & Jaimura villages. Water level greater than 9 mbgl is observed in the remaining parts of the study area

In the study area water level fluctuation varies from 1.8 to 5.08 meters.

The flow direction is of two directions i.e. in western, central and northern part of the study area it is towards East Direction and in southern part of the study area it is towards North-East direction indicating the surface water divide in the central portion of the study area near to project area.

The shallow aquifers of the area are mostly developed by way of dug wells in the area with depth ranges from 7 to 16 m. In general the yield of dug wells ranges from 25 to 40m^3/day. Deeper aquifer in the area mainly formed of Raipur group of rocks constituted of Raigarh formation comprising Sandstone and shale.

In the area the yield ranges between1 to 5 lps in Central, Northern, North-Eastern & North-western indicating the area is covered by Sandstone while in major part of the area it is below 1 lps which is covered with shale.

The aquifer parameters of the study area covered by sandstone for deep aquifer the transmissivity values of phreatic aquifer tapped in open well in general varies from 4 to 8.5m^2/day while specific capacity ranges from 15 to 40 lpm/m/day. However for deep aquifer the transmissivity ranges from 15-32 m^2/day and at places it ranges up to 40m^2/day.

Total recharge potential of **1205322.67** cum of rainfall runoff can be harvested at feasible, viable and sustainable location annually, based on hydrogeological condition trench and recharge pits use for ground water artificial recharge. The plant is already constructed recharge trench & recharge reservoir to recharge the ground water of the study area.

The detailed chemical analysis for water samples drawn at seven locations of plant study area (Ash Dyke ponds, reservoir pond and various villages) for non-metallic ingredients like pH, Turbidity, TDS, TSS, CaCO3, Ca, Cl, Mg, SO4 & SiO2 and metallic ingredients like, Hg,,Mn,Zn, Fe, & Cr etc. were done in-2020.

From the chemical analysis of water it is observed that than 100 % of samples are suitable for drinking purposes.

It is observed that 100% of samples show SAR values below 10 and falling in the Low Sodium (alkali) Hazard Zone (S1). Such type of water can be used for irrigation on almost all soils with little danger of development of sodium exchangeable problem

The geochemical classification of ground water, of study area has been carried out by using Piper Diagrams the ground water is of Ca/Mg/Na-HCO_3 Cl type. The analysis of ground water samples

collected from the area suggests that type of water in the major part is bicarbonate dominating type, The suitability of ground water of study area for irrigation purpose was considered on the basis of U. S Salinity diagram in which electrical conductivity value in μS/cm at 25°C upto 5000 μS/cm at 25°C is plotted on one axis and the SAR values upto 30 on the other. The electrical conductivity and the corresponding SAR & RSC values of each ground water sample collected from the study area.

It is observed that 100% of samples show SAR values below 10 and falling in the Low Sodium (alkali) Hazard Zone (S1). Such type of water can be used for irrigation on almost all soils with little danger of development of sodium exchangeable problem**.** Out of 15samples collected from study area is having EC above > 2250 μS/cm at 25°.

The High Salinity Water (C3) cannot be used on soils with poor drainage. Even with adequate drainage, special management for salinity control may be required and plants with good salt tolerance should be selected.

The Very High Salinity Water (C4) is not at all suitable for irrigation under ordinary conditions, but may be used occasionally if the soil is permeable by providing adequate drainage and irrigation water must be applied in excess to provide considerable leaching and very salt tolerant crops should be selected.

On perusal of the iso-conductivity, it is observed that the electrical conductivity for shallow Aquifer in study area ranges from 180 μMhos/cm (Pond near main gate DB power plant) to 1360μMhos/cm (Ash pond), the electrical conductivity for shallow aquifer is within Permissible Limit (750-2250 μMhos/cm @ 25°C).

The present study reveals that there is no adverse impact of Ash Pond on ground water regime of the area both on water levels as well as water quality.

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Mobile No. : +91 9424203354, +91 7000664898, +91 9424203408
Email : cgwrtestinglab@gmail.com, cgwr.raipur@gmail.com Website : www.cgwr.in

TEST REPORT

ULR - TC681318000001960P

TEST REPORT NO:CGWR/WLT/4586

Customer Name and Address-
M/S. D.B. POWER LTD.
NANDELI ROAD, VILL.-BADADARHA,
DIST-JANJGIR CHAMPA (C.G.)

Date of Reporting : 31/03/2021
SRF No: CGWR/SRF/WTL/1414
Job Order No: CGWR/WTL/4586
Date of receipt sample: 25/03/2021
Start Date of Testing : 26/03/2021
End Date of Testing : 30/03/2021

Sample detail : GROUND WATER	Sample ID: Village-Badadhara N21°55'09.7" E83°11'05.4"	Sample Quantity: 1Ltr	Container : Plastic

Environment Condition -: Temp27°C / Humidity-53%

Sl. No	PARAMETERS	TEST METHOD	UNIT	DRINKING WATER IS:10500-2012		TEST RESULT
				DESIRABLE	MAXIMUM	
A.	*Chemical Parameter*					
1.	pH	APHA 23rd Edition 2017- 4500-H+ A.	-	6.5 to 8.5	No relaxation	6.53
2.	Turbidity	APHA 23rd Edition 2017 -2130 B.	NTU	1	5	1.32
3.	Conductivity	APHA 23rd Edition 2017- 2510 A.	µs/cm	>1000	3200	1040
4.	Total Dissolve Solids	APHA 23rd Edition 2017-2540 C.	mg/l	500	2000	550
5.	Total Hardness	APHA 23rd Edition 2017- 2340-C	mg/l	200	600	272
6.	Calcium as Ca	APHA 23rd Edition 2017- 3500-Ca-B	mg/l	75	200	60.92
7.	Calcium Hardness	APHA 23rd Edition 2017- 3500-Ca-B	mg/l	-	-	151.99
8.	Magnesium as Mg	APHA 23rd Edition 2017- 2340-C	mg/l	30	100	29.16
9.	Magnesium Hardness	APHA 23rd Edition 2017- 2340-C	mg/l	-	-	120.01
10.	Carbonate	APHA 23rd Edition 2017 -2320 B.	mg/l	-	-	162.36
11.	Bi-Carbonate	APHA 23rd Edition 2017 -2320 B.	mg/l	-	-	241.56
12.	Chloride	APHA 23rd Edition 2017- 4500- Cl- B.	mg/l	250	1000	23.77
13.	M- Alkalinity	APHA 23rd Edition 2017 -2320 B.	mg/l	200	600	198
14.	Fluoride as F	APHA 23rd Edition 2017- 4500-F D.	mg/l	1.0	1.5	<0.1
15.	Sulphate as SO4	APHA 23rd Edition 2017- 4500 SO4 - E.	mg/l	200	400	6.98
16.	Iron	APHA 23rd Edition 2017 -3500--B	mg/l	0.3	No relaxation	<0.1
17. .	Nitrate	IS 3025 (Pt.34):1988/RA 2003	mg/l	45	No relaxation	<1
18.	Sodium	APHA- 23rd Edition 2017-3500 Na-B	mg/l	-	-	10
19.	Potassium	APHA- 23rd Edition 2017- 3500 K-B	mg/l	-	-	4

Reviewed by

ChinmayeeMohanty (Sr. Chemist)

Center For Ground Water Recharge
Testing Laboratory
NABL Accreditated Lab
Certificate No:- TC-6813

Authorized Signature

SaritaPanigrahi (QM)

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Mobile No. : +91 9424203354, +91 7000664898, +91 9424203408
Email : cgwrtestinglab@gmail.com, cgwr.raipur@gmail.com Website : www.cgwr.in

TEST REPORT

ULR - TC681318000000001965P

TEST REPORT NO:CGWR/WLT/4591

Customer Name and Address-
M/S. D.B. POWER LTD.
NANDELI ROAD, VILL -BADADARHA,
DIST-JANJGIR CHAMPA (C.G.)

Date of Reporting : 31/03/2021
SRF No: CGWR/SRF/WTL/1414
Job Order No: CGWR/WTL/4591
Date of receipt sample: 25/03/2021
Start Date of Testing : 26/03/2021
End Date of Testing : 30/03/2021

Sample detail : SURFACE WATER | Sample ID: Pond Near main gate of DB Power Plant - Badadahra N21°54'07.4" E 83°11'15.2" | Sample Quantity: 1Ltr | Container : Plastic

Environment Condition -: Temp27°C / Humidity-53%

Sl. No	PARAMETERS	TEST METHOD	UNIT	DRINKING WATER IS:10500-2012		TEST RESULT
A.	*Chemical Parameter*			DESIRABLE	MAXIMUM	
1.	pH	APHA 23rd Edition 2017- 4500-H+ A.	-	6.5 to 8.5	No relaxation	6.85
2.	Turbidity	APHA 23rd Edition 2017 -2130 B.	NTU	1	5	0.14
3.	Conductivity	APHA 23rd Edition 2017- 2510 A.	µs/cm	>1000	3200	180
4.	Total Dissolve Solids	APHA 23rd Edition 2017-2540 C	mg/l	500	2000	100
5.	Total Hardness	APHA 23rd Edition 2017- 2340-C	mg/l	200	600	64
6.	Calcium as Ca	APHA 23rd Edition 2017- 3500-Ca-B	mg/l	75	200	14.42
7.	Calcium Hardness	APHA 23rd Edition 2017- 3500-Ca-B	mg/l	-	-	35.97
8.	Magnesium as Mg	APHA 23rd Edition 2017- 2340-C	mg/l	30	100	6.8
9.	Magnesium Hardness	APHA 23rd Edition 2017- 2340-C	mg/l	-	-	28.03
10.	Carbonate	APHA 23rd Edition 2017 -2320 B.	mg/l	-	-	22.14
11.	Bi-Carbonate	APHA 23rd Edition 2017 -2320 B.	mg/l	-	-	32.94
12.	Chloride	APHA 23rd Edition 2017- 4500- Cl- B.	mg/l	250	1000	5.48
13.	M- Alkalinity	APHA 23rd Edition 2017 -2320 B.	mg/l	200	600	27
14.	Fluoride as F	APHA 23rd Edition 2017- 4500-F D.	mg/l	1.0	1.5	<0.1
15.	Sulphate as SO4	APHA 23rd Edition 2017- 4500 SO4 - E.	mg/l	200	400	5.2
16.	Iron	APHA 23rd Edition 2017 -3500--B	mg/l	0.3	No relaxation	<0.1
17.	Nitrate	IS 3025 (Pt.34):1988/RA 2003	mg/l	45	No relaxation	<1
18.	Sodium	APHA- 23rd Edition 2017-3500 Na-B	mg/l	-	-	4
19.	Potassium	APHA- 23rd Edition 2017- 3500 K-B	mg/l	-	-	<1

Reviewed by

ChinmayeeMohanty (Sr. Chemist)

Center For Ground Water Recharge
Testing Laboratory
NABL Accreditated Lab
Certificate No.- TC-6813

Authorized Signature

SaritaPanigrahi (QM)

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Email : cgwrtestinglab@gmail.com, cgwr.raipur@gmail.com Website : www.cgwr.in

TEST REPORT

ULR - TC681318000000l961P

TEST REPORT NO:CGWR/WLT/4587

Customer Name and Address-
M/S. D.B. POWER LTD.
NANDELI ROAD, VILL -BADADARHA,
DIST-JANJGIR CHAMPA (C.G.)

Date of Reporting : 31/03/2021
SRF No: CGWR/SRF/WTL/1414
Job Order No: CGWR/WTL/4587
Date of receipt sample: 25/03/2021
Start Date of Testing : 26/03/2021
End Date of Testing : 30/03/2021

Sample detail : GROUND WATER	Sample ID: Village-Tundri N21°53'15.7" E83°11'50.0"	Sample Quantity: 1Ltr	Container : Plastic

Environment Condition -: Temp27°C / Humidity-53%

Sl. No	PARAMETERS	TEST METHOD	UNIT	DRINKING WATER IS:10500-2012		TEST RESULT
A.	*Chemical Parameter*			DESIRABLE	MAXIMUM	
1.	pH	APHA 23rd Edition 2017- 4500-H+ A.	-	6.5 to 8.5	No relaxation	6.23
2.	Turbidity	APHA 23rd Edition 2017 -2130 B.	NTU	1	5	0.21
3.	Conductivity	APHA 23rd Edition 2017- 2510 A.	µs/cm	>1000	3200	800
4.	Total Dissolve Solids	APHA 23rd Edition 2017-2540 C.	mg/l	500	2000	400
5.	Total Hardness	APHA 23rd Edition 2017- 2340-C	mg/l	200	600	240
6.	Calcium as Ca	APHA 23rd Edition 2017- 3500-Ca-B	mg/l	75	200	51.30
7.	Calcium Hardness	APHA 23rd Edition 2017- 3500-Ca-B	mg/l	-	-	127.99
8.	Magnesium as Mg	APHA 23rd Edition 2017- 2340-C	mg/l	30	100	27.21
9.	Magnesium Hardness	APHA 23rd Edition 2017- 2340-C	mg/l	-	-	112.01
10.	Carbonate	APHA 23rd Edition 2017 -2320 B.	mg/l	-	-	115.52
11.	Bi-Carbonate	APHA 23rd Edition 2017 -2320 B.	mg/l	-	-	505.08
12.	Chloride	APHA 23rd Edition 2017- 4500- Cl- B.	mg/l	250	1000	16.46
13.	M- Alkalinity	APHA 23rd Edition 2017 -2320 B.	mg/l	200	600	141
14.	Fluoride as F	APHA 23rd Edition 2017- 4500-F D.	mg/l	1.0	1.5	<0.1
15.	Sulphate as SO4	APHA 23rd Edition 2017- 4500 SO4 - E.	mg/l	200	400	5.89
16.	Iron	APHA 23rd Edition 2017 -3500--B	mg/l	0.3	No relaxation	<0.1
17.	Nitrate	IS 3025 (Pt.34):1988/RA 2003	mg/l	45	No relaxation	<1
18.	Sodium	APHA- 23rd Edition 2017-3500 Na-B	mg/l	-	-	8
19.	Potassium	APHA- 23rd Edition 2017- 3500 K-B	mg/l	-	-	2

Reviewed by

ChinmayeeMohanty (Sr. Chemist)

Center For Ground Water Recharge
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Certificate No:- TC-6813

Authorized Signature

SaritaPanigrahi (QM)

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Mobile No. : +91 9424203354, +91 7000664898, +91 9424203408

Email : cgwrtestinglab@gmail.com, cgwr.raipur@gmail.com Website : www.cgwr.in

TEST REPORT

ULR - TC681318000000 1962P

TEST REPORT NO:CGWR/WLT/4588

Customer Name and Address-
M/S. D.B. POWER LTD.
NANDELI ROAD, VILL -BADADARHA,
DIST-JANJGIR CHAMPA (C.G.)

Date of Reporting : 31/03/2021
SRF No: CGWR/SRF/WTL/1414
Job Order No: CGWR/WTL/4588
Date of receipt sample: 25/03/2021
Start Date of Testing : 26/03/2021
End Date of Testing : 30/03/2021

Sample detail : GROUND WATER	Sample ID: Village-Kanwali N21°54'07.1" E 85°09'44.1"	Sample Quantity: 1Ltr	Container : Plastic

Environment Condition -: Temp27°C / Humidity-53%

Sl. No	PARAMETERS	TEST METHOD	UNIT	DRINKING WATER IS:10500-2012		TEST RESULT
A.	*Chemical Parameter*			DESIRABLE	MAXIMUM	
1.	pH	APHA 23rd Edition 2017- 4500-H+ A.	-	6.5 to 8.5	No relaxation	6.90
2.	Turbidity	APHA 23rd Edition 2017 -2130 B.	NTU	1	5	0.79
3.	Conductivity	APHA 23rd Edition 2017- 2510 A.	µs/cm	>1000	3200	1220
4.	Total Dissolve Solids	APHA 23rd Edition 2017-2540 C.	mg/l	500	2000	630
5.	Total Hardness	APHA 23rd Edition 2017- 2340-C	mg/l	200	600	512
6.	Calcium as Ca	APHA 23rd Edition 2017- 3500-Ca-B	mg/l	75	200	112.22
7.	Calcium Hardness	APHA 23rd Edition 2017- 3500-Ca-B	mg/l	-	-	279.98
8.	Magnesium as Mg	APHA 23rd Edition 2017- 2340-C	mg/l	30	100	56.38
9.	Magnesium Hardness	APHA 23rd Edition 2017- 2340-C	mg/l	-	-	232.02
10.	Carbonate	APHA 23rd Edition 2017 -2320 B.	mg/l	-	-	218.94
11.	Bi-Carbonate	APHA 23rd Edition 2017 -2320 B.	mg/l	-	-	325.74
12.	Chloride	APHA 23rd Edition 2017- 4500- Cl- B.	mg/l	250	1000	32.92
13.	M- Alkalinity	APHA 23rd Edition 2017 -2320 B.	mg/l	200	600	267
14.	Fluoride as F	APHA 23rd Edition 2017- 4500-F D.	mg/l	1.0	1.5	0.21
15.	Sulphate as SO4	APHA 23rd Edition 2017- 4500 SO4 - E.	mg/l	200	400	36.35
16.	Iron	APHA 23rd Edition 2017 -3500--B	mg/l	0.3	No relaxation	0.16
17.	Nitrate	IS 3025 (Pt.34):1988/RA 2003	mg/l	45	No relaxation	8.56
18.	Sodium	APHA- 23rd Edition 2017-3500 Na-B	mg/l	-	-	46.6
19.	Potassium	APHA- 23rd Edition 2017- 3500 K-B	mg/l	-	-	8

Reviewed by

ChinmayeeMohanty (Sr. Chemist)

Center For Ground Water Recharge
Testing Laboratory
NABL Accreditated Lab
Certificate No:- TC-6813

Authorized Signature

SaritaPanigrahi (QM)

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Mobile No. : +91 9424203354, +91 7000664898, +91 9424203408
Email : cgwrtestinglab@gmail.com, cgwr.raipur@gmail.com Website : www.cgwr.in

TEST REPORT

ULR - TC681318000000196 3P

TEST REPORT NO:CGWR/WLT/4589

Customer Name and Address-
M/S. D.B. POWER LTD.
NANDELI ROAD, VILL -BADADARHA,
DIST-JANJGIR CHAMPA (C.G.)

Date of Reporting : 31/03/2021
SRF No: CGWR/SRF/WTL/1414
Job Order No: CGWR/WTL/4589
Date of receipt sample: 25/03/2021
Start Date of Testing : 26/03/2021
End Date of Testing : 30/03/2021

Sample detail : GROUND WATER	Sample ID: Village-Dumarpali N21°53'03.1" E 85°10'29.1"	Sample Quantity: 1Ltr	Container : Plastic

Environment Condition -: Temp27°C / Humidity-53%

Sl. No	PARAMETERS	TEST METHOD	UNIT	DRINKING WATER IS:10500-2012		TEST RESULT
A.	*Chemical Parameter*			DESIRABLE	MAXIMUM	
1.	pH	APHA 23rd Edition 2017- 4500-H+ A.	-	6.5 to 8.5	No relaxation	6.94
2.	Turbidity	APHA 23rd Edition 2017 -2130 B.	NTU	1	5	0.53
3.	Conductivity	APHA 23rd Edition 2017- 2510 A.	µs/cm	>1000	3200	1000
4.	Total Dissolve Solids	APHA 23rd Edition 2017-2540 C.	mg/l	500	2000	536
5.	Total Hardness	APHA 23rd Edition 2017- 2340-C	mg/l	200	600	336
6.	Calcium as Ca	APHA 23rd Edition 2017- 3500-Ca-B	mg/l	75	200	80.16
7.	Calcium Hardness	APHA 23rd Edition 2017- 3500-Ca-B	mg/l	-	-	199.99
8.	Magnesium as Mg	APHA 23rd Edition 2017- 2340-C	mg/l	30	100	33.04
9.	Magnesium Hardness	APHA 23rd Edition 2017- 2340-C	mg/l	-	-	136.01
10.	Carbonate	APHA 23rd Edition 2017 -2320 B.	mg/l	-	-	218.94
11.	Bi-Carbonate	APHA 23rd Edition 2017 -2320 B.	mg/l	-	-	325.74
12.	Chloride	APHA 23rd Edition 2017- 4500- Cl- B.	mg/l	250	1000	20.12
13.	M- Alkalinity	APHA 23rd Edition 2017 -2320 B.	mg/l	200	600	267
14.	Fluoride as F	APHA 23rd Edition 2017- 4500-F D.	mg/l	1.0	1.5	0.18
15.	Sulphate as SO4	APHA 23rd Edition 2017- 4500 SO4 - E.	mg/l	200	400	28.6
16.	Iron	APHA 23rd Edition 2017 -3500--B	mg/l	0.3	No relaxation	0.13
17.	Nitrate	IS 3025 (Pt.34):1988/RA 2003	mg/l	45	No relaxation	3.31
18.	Sodium	APHA- 23rd Edition 2017-3500 Na-B	mg/l	-	-	18
19.	Potassium	APHA- 23rd Edition 2017- 3500 K-B	mg/l	-	-	3

Reviewed by

ChinmayeeMohanty (Sr. Chemist)

Center For Ground Water Recharge
Testing Laboratory
NABL Accreditated Lab
Certificate No:- TC-6813

Authorized Signature

SaritaPanigrahi (QM)

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Mobile No. : +91 9424203354, +91 7000664898, +91 9424203408
Email : cgwrtestinglab@gmail.com, cgwr.raipur@gmail.com Website : www.cgwr.in

TEST REPORT

ULR - TC681318000000l964P

TEST REPORT NO:CGWR/WLT/4590

Customer Name and Address-
M/S. D.B. POWER LTD.
NANDELI ROAD, VILL -BADADARHA,
DIST-JANJGIR CHAMPA (C.G.)

Date of Reporting : 31/03/2021
SRF No: CGWR/SRF/WTL/1414
Job Order No: CGWR/WTL/4590
Date of receipt sample: 25/03/2021
Start Date of Testing : 26/03/2021
End Date of Testing : 30/03/2021

Sample detail : SURFACE WATER	Sample ID: Ash Pond -Badadahra N21°54'42.3" E 83°11'36.4"	Sample Quantity: 1Ltr	Container : Plastic

Environment Condition -: Temp27°C / Humidity-53%

Sl. No	PARAMETERS	TEST METHOD	UNIT	DRINKING WATER IS:10500-2012		TEST RESULT
A.	*Chemical Parameter*			DESIRABLE	MAXIMUM	
1.	pH	APHA 23rd Edition 2017- 4500-H+ A.	-	6.5 to 8.5	No relaxation	6.75
2.	Turbidity	APHA 23rd Edition 2017 -2130 B.	NTU	1	5	0.15
3.	Conductivity	APHA 23rd Edition 2017- 2510 A.	µs/cm	>1000	3200	1360
4.	Total Dissolve Solids	APHA 23rd Edition 2017-2540 C.	mg/l	500	2000	700
5.	Total Hardness	APHA 23rd Edition 2017- 2340-C	mg/l	200	600	360
6.	Calcium as Ca	APHA 23rd Edition 2017- 3500-Ca-B	mg/l	75	200	83.36
7.	Calcium Hardness	APHA 23rd Edition 2017- 3500-Ca-B	mg/l	-	-	207.99
8.	Magnesium as Mg	APHA 23rd Edition 2017- 2340-C	mg/l	30	100	36.93
9.	Magnesium Hardness	APHA 23rd Edition 2017- 2340-C	mg/l	-	-	152.01
10.	Carbonate	APHA 23rd Edition 2017 -2320 B.	mg/l	-	-	39.36
11.	Bi-Carbonate	APHA 23rd Edition 2017 -2320 B.	mg/l	-	-	58.56
12.	Chloride	APHA 23rd Edition 2017- 4500- Cl- B.	mg/l	250	1000	16.46
13.	M- Alkalinity	APHA 23rd Edition 2017 -2320 B.	mg/l	200	600	48
14.	Fluoride as F	APHA 23rd Edition 2017- 4500-F D.	mg/l	1.0	1.5	<0.1
15.	Sulphate as SO4	APHA 23rd Edition 2017- 4500 SO4 - E.	mg/l	200	400	8.96
16.	Iron	APHA 23rd Edition 2017 -3500--B	mg/l	0.3	No relaxation	<0.1
17.	Nitrate	IS 3025 (Pt.34):1988/RA 2003	mg/l	45	No relaxation	2.36
18.	Sodium	APHA- 23rd Edition 2017-3500 Na-B	mg/l	-	-	12
19.	Potassium	APHA- 23rd Edition 2017- 3500 K-B	mg/l	-	-	2

Reviewed by

ChinmayeeMohanty (Sr. Chemist)

Center For Ground Water Recharge
Testing Laboratory
NABL Accreditated Lab
Certificate No:- TC-6813

Authorized Signature

SaritaPanigrahi (QM)

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Mobile No. : +91 9424203354, +91 7000664898, +91 9424203408
Email : cgwrtestinglab@gmail.com, cgwr.raipur@gmail.com Website : www.cgwr.in

TEST REPORT

ULR - TC68131800000001965P

TEST REPORT NO:CGWR/WLT/4592

Customer Name and Address-
M/S. D.B. POWER LTD.
NANDELI ROAD, VILL -BADADARHA,
DIST-JANJGIR CHAMPA (C.G.)

Date of Reporting : 31/03/2021
SRF No: CGWR/SRF/WTL/1414
Job Order No: CGWR/WTL/4592
Date of receipt sample: 25/03/2021
Start Date of Testing : 26/03/2021
End Date of Testing : 30/03/2021

Sample detail : SURFACE WATER	Sample ID: Reservior Pond - Badadahra N21°54'54.4" E 83°11'36.0"	Sample Quantity: 1Ltr	Container : Plastic

Environment Condition -: Temp27°C / Humidity-53%

Sl. No	PARAMETERS	TEST METHOD	UNIT	DRINKING WATER IS:10500-2012		TEST RESULT
A.	*Chemical Parameter*			DESIRABLE	MAXIMUM	
1.	pH	APHA 23rd Edition 2017- 4500-H+ A.	-	6.5 to 8.5	No relaxation	6.83
2.	Turbidity	APHA 23rd Edition 2017 -2130 B.	NTU	1	5	0.21
3.	Conductivity	APHA 23rd Edition 2017- 2510 A.	µs/cm	>1000	3200	300
4.	Total Dissolve Solids	APHA 23rd Edition 2017-2540 C.	mg/l	500	2000	170
5.	Total Hardness	APHA 23rd Edition 2017- 2340-C	mg/l	200	600	64
6.	Calcium as Ca	APHA 23rd Edition 2017- 3500-Ca-B	mg/l	75	200	16.03
7.	Calcium Hardness	APHA 23rd Edition 2017- 3500-Ca-B	mg/l	-	-	39.99
8.	Magnesium as Mg	APHA 23rd Edition 2017- 2340-C	mg/l	30	100	5.83
9.	Magnesium Hardness	APHA 23rd Edition 2017- 2340-C	mg/l	-	-	24.01
10.	Carbonate	APHA 23rd Edition 2017 -2320 B.	mg/l	-	-	19.68
11.	Bi-Carbonate	APHA 23rd Edition 2017 -2320 B.	mg/l	-	-	29.28
12.	Chloride	APHA 23rd Edition 2017- 4500- Cl- B.	mg/l	250	1000	3.65
13.	M- Alkalinity	APHA 23rd Edition 2017 -2320 B.	mg/l	200	600	24
14.	Fluoride as F	APHA 23rd Edition 2017- 4500-F D.	mg/l	1.0	1.5	<0.1
15.	Sulphate as SO4	APHA 23rd Edition 2017- 4500 SO4 - E.	mg/l	200	400	1.36
16.	Iron	APHA 23rd Edition 2017 -3500--B	mg/l	0.3	No relaxation	<0.1
17.	Nitrate	IS 3025 (Pt.34):1988/RA 2003	mg/l	45	No relaxation	<1
18.	Sodium	APHA- 23rd Edition 2017-3500 Na-B	mg/l	-	-	3
19.	Potassium	APHA- 23rd Edition 2017- 3500 K-B	mg/l	-	-	<1

Reviewed by

ChinmayeeMohanty (Sr. Chemist)

Center For Ground Water Recharge Testing Laboratory NABL Accreditated Lab Certificate No:- TC-6813

Authorized Signature

SaritaPanigrahi (QM)

1. This test report refers only this particular item's submitted for testing
2. The test results reported in this report are valid at the time time of and under the stated condition of measurement.
3. This particular test report cannot be reproduced expact in full, without prior permission of quality manager.
4. Parameter marked with "*" are not covered in scope for NABL accreditation.

SOCIAL AUDIT REPORT

APRIL 2020 –MARCH 2021

Of

DB Power Limited
Village: Badadarha
Block & Tehsil: Dabhra
Distt: Janjgir-Champa
Chhattisgarh - 495695

Prepared By: Dr. Vikram Singh
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1. Introduction (DB Power Ltd):

DB Power Limited ("DBPL"), a special purpose vehicle (SPV), incorporated on October 12, 2006, is subsidiary of Diligent Power Private Limited (DPPL), an associate company of the Dainik Bhaskar group, a diversified Indian conglomerate. DBPL has set up coal based Super thermal Power Plant (TPP) of capacity 1200 MW (2 X 600 MW) at village Badadarha District Janjgir -Champa in the state of Chhattisgarh. The major components of project include Boiler, Turbine, and Generator. The other components include coal handling system, switch yard, ash handling system. It also includes wagon tippler, railway siding, transmission lines besides water pipeline drawn between intake well at Mahanadi River, Chandrapur to plant site. The plant is accessible by major district road between Raigarh and Bilaspur. The site is also approachable from Kharsia via Kharsia Dabhra road. The nearest urban area is Raigarh, located at a distance of about 25 km towards East from the plant. The nearest railway station is at Robertson, 15 km away while the nearest commercial airport is at a distance of 250 km away at Raipur.

2. Social Audit:

In the wake of rapid globalization and pressing ecological issues, the perception towards the role of corporate in the broader social paradigm is undergoing a sea change. In the recent years, society and the state have put forward an expectation before public sector corporate to integrate the social responsibility aspects in their business persuasion. This scenario not only affects large-scale public-sector undertakings, but also includes firms of small scale. The underlying assumption that Corporate Social Responsibility (CSR) is one way through which companies can demonstrate their commitments towards being socially responsible. In fact, CSR as an integral aspect of corporate has double edge effect in terms of creating goodwill to the company and acting as a social and economic intervention to bring about large-scale change in the life of people from different walks. Social audit is an independent evaluation of the performance of an organization as it relates to the attainment of its social goals. It is an instrument of social accountability of an organization.

In other words, social audit may be defined as an in-depth scrutiny and analysis of working of any public utility vis-à-vis its social relevance. Social auditing is a process that enables an organization to asses and demonstrates its social, economic and environmental benefits. Social Audit gained significance after the 73rd amendment of the constitution relating to the Panchayati raj institutions. It demonstrates its social, economic and environmental benefits. Social Audit gained significance after the 73rd amendment of the constitution relating to the Panchayati raj institutions.

Social audit is based on the principle that democratic local governance should be carried out, as far as possible, with the consent and understanding of all concerned demonstrates its social, economic and environmental benefits. Social Audit gained significance after the 73rd amendment of the constitution relating to the Panchayati raj institutions. It is thus a process and not an event. A social audit is a way of measuring, understanding, reporting and ultimately improving an organization's social and ethical performance. A social audit helps to narrow gaps between vision/goal and reality, between efficiency and effectiveness. It is a technique to understand, measure, verify, report on and to improve the social performance of the organization.

Social auditing creates an impact upon governance. It values the voice of stakeholders, including marginalized/poor groups whose voices are rarely heard. Social auditing is taken up for the purpose of enhancing local governance, particularly for strengthening accountability and transparency in local bodies. The key difference between development and social audit is that a social audit focuses on the neglected issue of social impacts, while a development audit has a broader focus including environment and economic issues, such as the efficiency of a project or programme. The Social Audit has been carried out of CSR for FY:2020-2021. There are 08 villages where CSR activities have been carried out details are as follows;

Table-1 Number of Households in Affected Villages

S. No	Name of Village	Numbers of Household
1.	Badadarha	356
2.	Tundri	956

Table-02 Population of Villages beneficiaries under CSR Activities in Affected Villages

S.No.	Villages	Population
A.	**Project-Affected Villages**	
1.	Badadarha	**1634**
2.	Tundri	**3810**

3. Objectives of Social Audit:

1. Assessing the actual needs of village development and resources provided by DB power for village development.
2. Provide suggestion for Increasing efficacy and effectiveness of village development programmes carried-out by DB Power Ltd.
3. Analysis of work carried out keeping in view stakeholder interests and priorities, particularly of villagers.
4. To assess infrastructural development and its impact on the quality of lives (well-being) of the residents
5. Assessing the physical and financial gaps between needs and resources available for local development.
6. Creating awareness among beneficiaries and providers of local social and productive services.
7. Increasing efficacy and effectiveness of local development programmes.
8. Scrutiny of various policy decisions, keeping in view stakeholder interests and priorities, particularly of rural poor at community level.
9. Estimation of the opportunity cost for stakeholders of not getting timely access to public services.

4.0. Methods Used for Social Audit:

Preliminary surveys of two category villages' i.e., Project Affected and Railway Corridor has been conducted from personal field observations, personal interviews, and obtaining information through schedules from various beneficiary groups.

Series of meetings has been conducted with various SHGs Groups and Sewing Centre beneficiaries.

5.0. Sources of Data for Social Audit:

The sources of data to prepare social audit was primary data collected by auditor and secondary data provided by DB power Ltd such as Stock, meeting registers, Quarterly and Monthly reports published by CSR of DB Power.

6.0. Major Thrust Areas of CSR at DB Power Ltd:

Corporate social responsibility (CSR) refers to strategies corporations or firms conduct their business in a way that is ethical, society friendly and beneficial to community in terms of development. The present-day CSR (also called corporate responsibility, corporate citizenship, responsible business and corporate social opportunity) is a concept whereby business organizations consider the interest of society by taking responsibility for the impact of their activities on communities and other stakeholders as well as their environment.

This obligation shows that the organizations have to comply with legislation and voluntarily take initiatives to improve the well-being of the effected local community and society at large. CSR simply refers to strategies corporations or firms conduct their business in a way that is ethical and society friendly. The focus of the corporate social responsibility unit of DB Power Plant Janjgir-Champa is the holistic development and improvement in the quality of life of habitations and affected communities, particularly of the disadvantaged groups, in and around the neighborhoods of power station project

sites. DB power plant under its CSR policy has implemented various projects in financial year from 2020-21 based on the needs of the neighboring affected villages above mentioned communities with the participation of the villagers, district and local administrations. Based on the CSR guidelines issued by department of public enterprises, Government of India, DB Power Ltd have to carry out CSR activities on affected villages in every financial year. All activities undertaken by DB Power under CSR in the 8 Project Affected Villages will be covered in the Social Audit. The activities pertain to various developmental fields which are as follows:

A. Rural Infrastructure Programme
B. Education and Skill Development
C. Health, Hygiene & Sanitation
D. Women Empowerment
E. Social Welfare and Development Programme

7.0. The Profile of Dabhra Block

Dabhra is a Tehsil / Block (CD) in the Janjgir Champa District of Chhattisgarh. Total area of Dabhra is 437 km^2 including 419.48 km^2 rural area and 17.19 km^2 urban area. Dabhra has a population of 1,64,863 peoples. There are 43,160 houses in the sub-district. There are about 121 villages in Dabhra block. In which 8 Villages are selected for CSR Activities and rural development.

8.0. Expenses of Budget Allocated in Financial Year 2020-2021 for CSR Activities

Financial Year	Rural Infrastructure Development	Health & Sanitation	Education & Skill Development	Women Empowerment	Rehabilitation &Compensation	Social & Cultural Programmes	Operating
2020-2021	11517471	7500211	137630	67239	30294532	4668613	367727

The above details are given about the expenditure done by CSR Unit of DB Power Ltd in different thrust areas in affected villages in financial year 2020-2021. After calculating the sub-heads, the total expenditure is Rs. 54553423/-. The expenses details have been cross-checked through maintained records.

9. Detail description of Activities Carried-Out in different thrust areas

10. Rural Infrastructure Programme : Rural infrastructure is generally defined as the physical framework of facilities in rural areas through which, facilities and services are provided to the public. Rural infrastructure assumes great importance in India because of the country's predominant rural nature, the crucial linkages of infrastructure to economic growth, poverty alleviation, and human development. Rural infrastructure covers a wide spectrum of services such as transportation, power generation, transmission and distribution, telecommunication, port handling facilities, water supply, sewage disposal, irrigation, medical, education and other primary services. Rural areas would have a high concentration of poverty given the existence of disguised unemployment in a big way in agriculture.

Access to land and ownership of land is the key to income differences since land is the major productive asset in rural areas. Rural areas may be more usefully viewed as the concentration of poor resulting in little value for economic demand for infrastructural services.

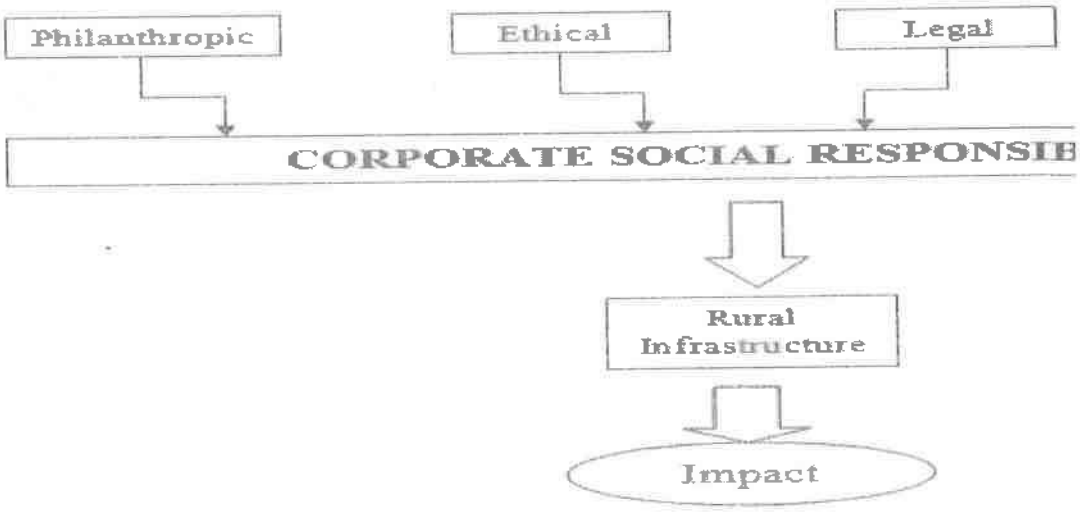

Figure: 01 Conceptual Framework of DB Power Ltd CSR Unit in Rural Infrastructure

This section covered the details of CSR intervention in rural infrastructure, public relation, activities based on preserving the environment like pollution prevention programs, awareness program in the community. It also analyzed how CSR activities have provided significant employment to the local community people and production of crops and enhancement in services Infrastructure assets such as rural roads, tracks, bridges, irrigation schemes, water supplies, schools, health Centre and markets are needed in rural areas for the local population to fulfill their basic needs and live a social and economic productive life.

10.1. Overview of Badadarha: According to Census 2011 information the location code or village code of Badadarha village is 437104. Badadarha village is located in Dabhra Tehsil of Janjgir Champa district in Chhattisgarh, India. It is situated 30km away from sub-district headquarter Dabhra and 85km away from district headquarter Janjgir. As per 2009 status, Badadarha is the gram panchayat of Badadarha village.

The total geographical area of village is 458.82 hectares. Badadarha has a total population of 1,634 peoples. There are about 436 houses in Badadarha village. Kharsia is nearest town to Badadarha which is approximately 15km away. In Badadarha village population of children with age 0-6 is 218 which makes up 13.34 % of total population of village. Average

Sex Ratio of Badadarha village is 907 which is lower than Chhattisgarh state average of 991. Child Sex Ratio for the Badadarha as per census is 1057, higher than Chhattisgarh average of 969. Badadarha village has higher literacy rate compared to Chhattisgarh. In 2011, literacy rate of Badadarha village was 75.07 % compared to 70.28 % of Chhattisgarh.

In Badadarha Male literacy stands at 86.28 % while female literacy rate was 62.41 %. Schedule Tribe (ST) constitutes 16.89 % while Schedule Caste (SC) were 11.44 % of total population in Badadarha village. In Badadarha village out of total population, 1076 were engaged in work activities. 47.12 % of workers describe their work as Main Work (Employment or Earning more than 6 Months) while 52.88 % were involved in Marginal activity providing livelihood for less than 6 months. Of 1076 workers engaged in Main Work, 85 were cultivators (owner or co-owner) while 206 were Agricultural labourers.[i]

Badadarha is a medium size village located in Dabhra Tehsil of Janjgir Champa district, Chhattisgarh with total 436 families residing. The Badadarha village has population of 1634 of which 857 are males while 777 are females as per Population Census 2011. In Badadarha village population of children with age 0-6 is 218 which make up 13.34 % of total population of village. Average Sex Ratio of Badadarha village is 907 which is lower than Chhattisgarh state average of 991. Child Sex Ratio for the Badadarha as per census is 1057, higher than Chhattisgarh average of 969. Badadarha village has higher literacy rate compared to Chhattisgarh. In 2011, literacy rate of Badadarha village was 75.07 % compared to 70.28 % of Chhattisgarh. In Badadarha Male literacy stands at 86.28 % while female literacy rate was 62.41 %. As per constitution of India and Panchayati Raj Act, Badadarha village is administrated by Sarpanch (Head of Village) who is elected representative of village. Our website, don't have information about schools and hospital in Badadarha village. Schedule Tribe (ST) constitutes 16.89 % while Schedule Caste (SC) was 11.44 % of total population in Badadarha village. In Badadarha village out of total population, 1076 were engaged in work activities. 47.12 % of workers describe their work as Main Work (Employment or Earning more than 6 Months) while 52.88 % were involved in Marginal activity providing livelihood for less than 6 months. Of 1076 workers engaged in Main Work, 85 were cultivators (owner or co-owner) while 206 were Agricultural labourers.

Table: 03 Population Profile of Badadarha (in Percentage)

Particulars	Total
Total No. of Houses	436
Population	1,634
Child (0-6)	218
Schedule Caste	187
Schedule Tribe	276
Literacy	75.07 %

Table 04: Badadarha Village Profile

Particulars	Total	Male	Female
Total No. of Houses	436	-	-
Population	1,634	857	777
Child (0-6)	218	106	112
Schedule Caste	187	96	91
Schedule Tribe	276	137	139
Literacy	75.07 %	86.28 %	62.41 %
Total Workers	1,076	594	482
Main Worker	507	-	-
Marginal Worker	569	169	400

Source: Census 2011

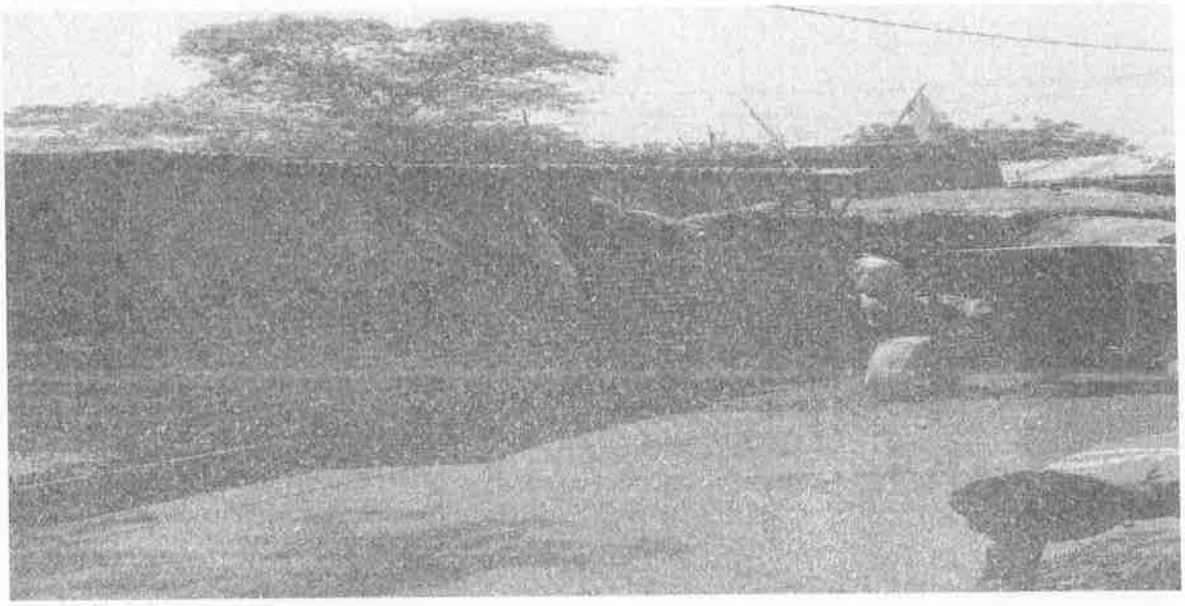

Photo: 1 Constructed 150-meter CC road along with 300-meter Drain in village Badadarha.

10.2. Impact on Village People of Constructing CC Road: The CC Road has been constructed by DB Power Ltd under CSR which has improved the transportation with in the village **(See Photograph 1).** "Interest in concrete roads exists for many reasons, especially in developing countries. Concrete roads offer several advantages to other solutions from both technical and economic points of view."[ii] A good load distribution, which eliminates the need for thick and expensive bases; A great resistance to deformation and wear at any temperature; and an insensitivity to stagnant oil, clay, or fecal matter. An estimated service life of more than 30 yrs. Now Villagers are connected to urban pockets.

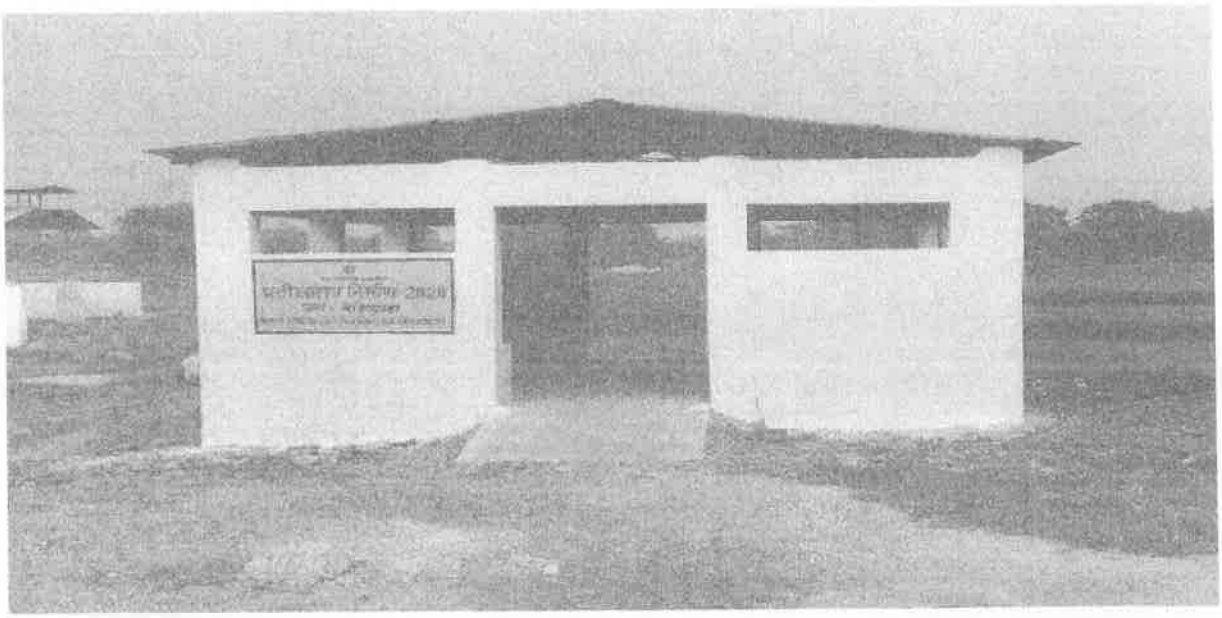

Photo 2: Constructed shed near cremation ground at Badadarha.

Photo 3: Cleaning & repairing of Kachcha canal for irrigation near bypass road at Badadarha.

In rural set-up Canal is main source of irrigation in crop fields. Repairing of Kachcha Canal has been done for irrigation purpose at Badadarha by the DB Power Pvt. Ltd. Canals can be an effective source of irrigation in areas of low-level relief, deep fertile soils, perennial

source of water and extensive command area.[iii] In India 22 million hector by irrigated canals and about two third of cultivation in India is still depending on monsoon.[iv]

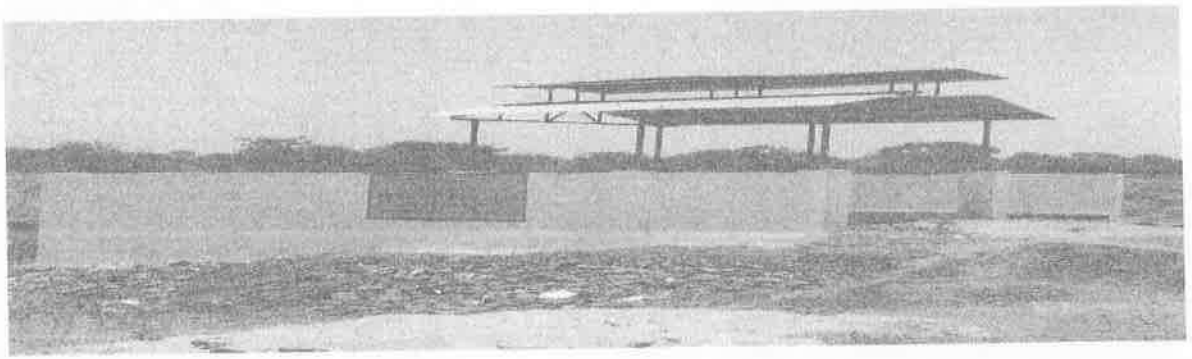

Photo 04: Constructed boundary wall of cremation shed at Badadarha.

In the above-mentioned village by assistance of DB Power Pvt. Ltd. Construction of shed near Cremation Ground. Such initiatives are expected to improve the durability of area of Cremation place within the village. The successive provision in the budget and created approach roads to the burial ground and cremation sheds. Creation of Shed is one of the identities of the area and prevents from the encroachment. Further, the aim of creating the shed is to provide sitting place to people who go to criminate the body during sunny days.

DB Power Ltd. along with the Stakeholders has develops the shed facility near cremation ground at village the ground using modern design. The first step would be to convert the kutcha ground of cremation into cemented area. The second step would be to develop the essential services like Shed, boundary wall, Wood cutting area, and sitting area. This shall provide a comfortable surrounding for the family of the deceased. Since the Crematorium system at the village has been unavailable for many years. Construction of shed at village by DB Power Ltd. Religious traditions show that cremation can be a moving, spiritual, and even creative choice, helping family members and loved ones along grieving journey.

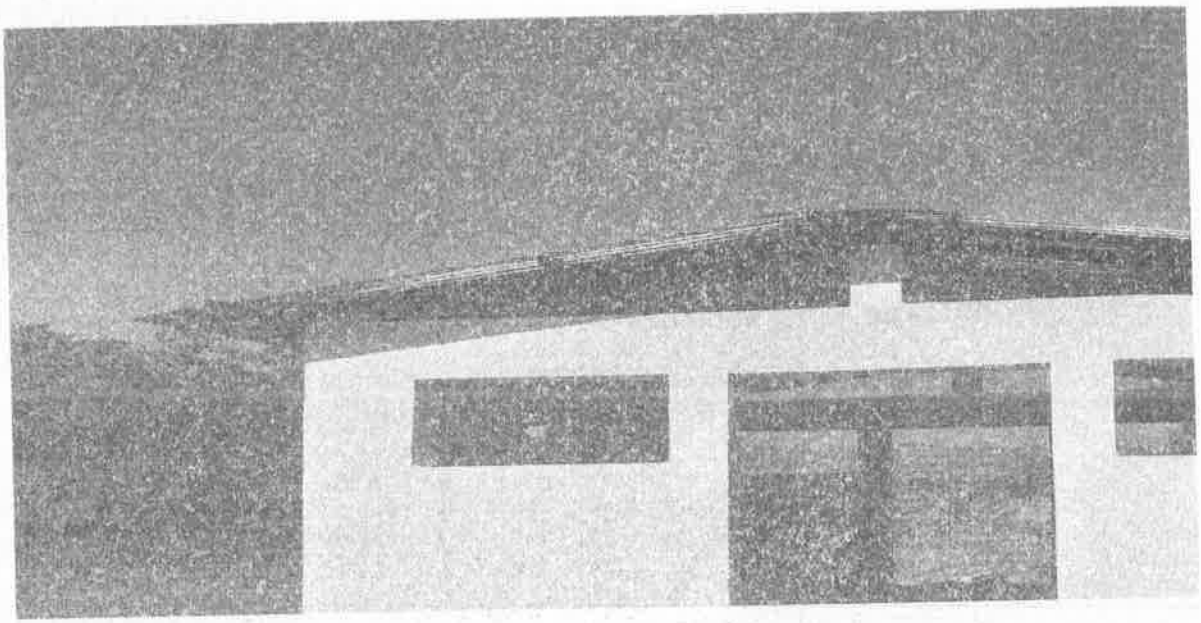

Photo 05: Construction of shed near cremation ground of mahant community at Badadarha.

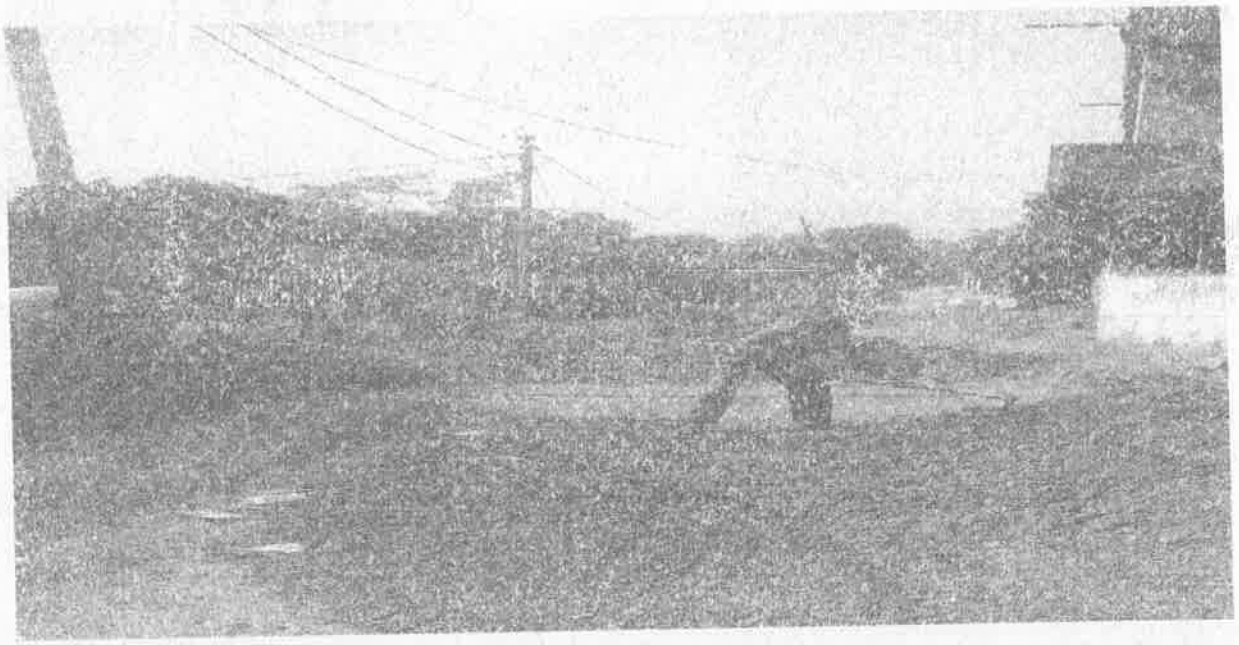

Photo 06: Repaired village road at Badadarha

Rural transport is double faced: first it is a transport chain with one end in the agricultural fields and the other on the local market. But secondly it is also the transport chain from the main highway network up to the local market. It is important to note that both of these rural transport chains should be considered separately, as ownership and responsibility on the one hand and road standards as well as the level of division of labor of the transport systems.[v] In Badadarha with help out of DB Power Pvt. Ltd roads are repaired by murrum and concrete. **(See Photograph *06*)**

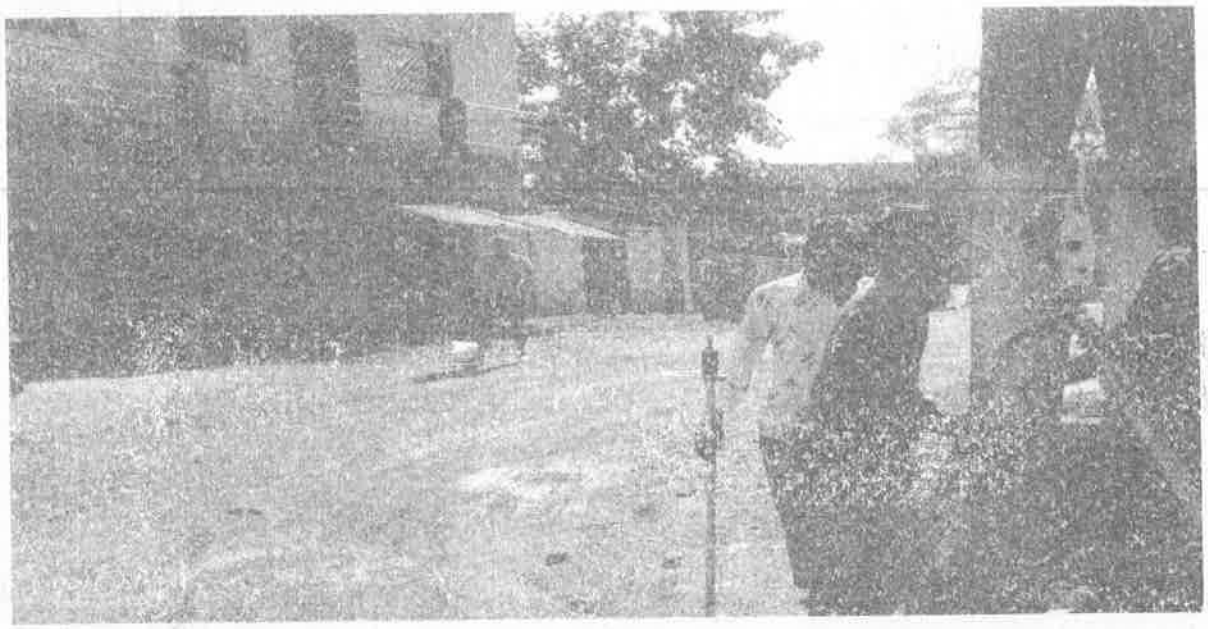

Photo 07: Road survey to Construct CC Road at Badadarha, Rampur & Tundri

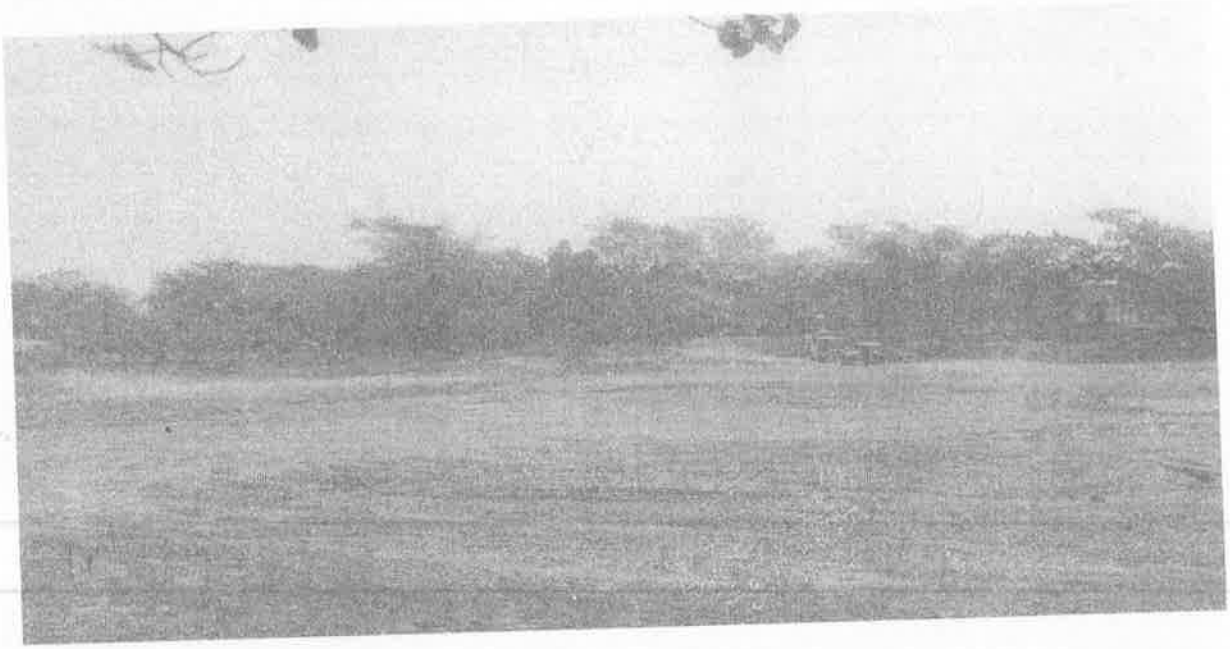

Photo 08: Cleaning of dadu pond at Badadarha.

Water pond in rural area is more important because ponds are resource of rain water storage which can use for many purposes with an increased variability of monsoons and rapidly depleting groundwater tables, large parts of rural are reeling under water stress.

Photo 09: Cleaning of canal at Badadarha.

In rural set-up Canal is main source of irrigation in crop fields. Cleaning of Canal has been done for irrigation purpose at Badadarha by the DB Power Pvt. Ltd. Canals can be an effective source of irrigation in areas of low-level relief, deep fertile soils, perennial source of water and extensive command area.[vi] In India 22 million hector by irrigated canals and about two third of cultivation in India is still depending on monsoon.[vii]

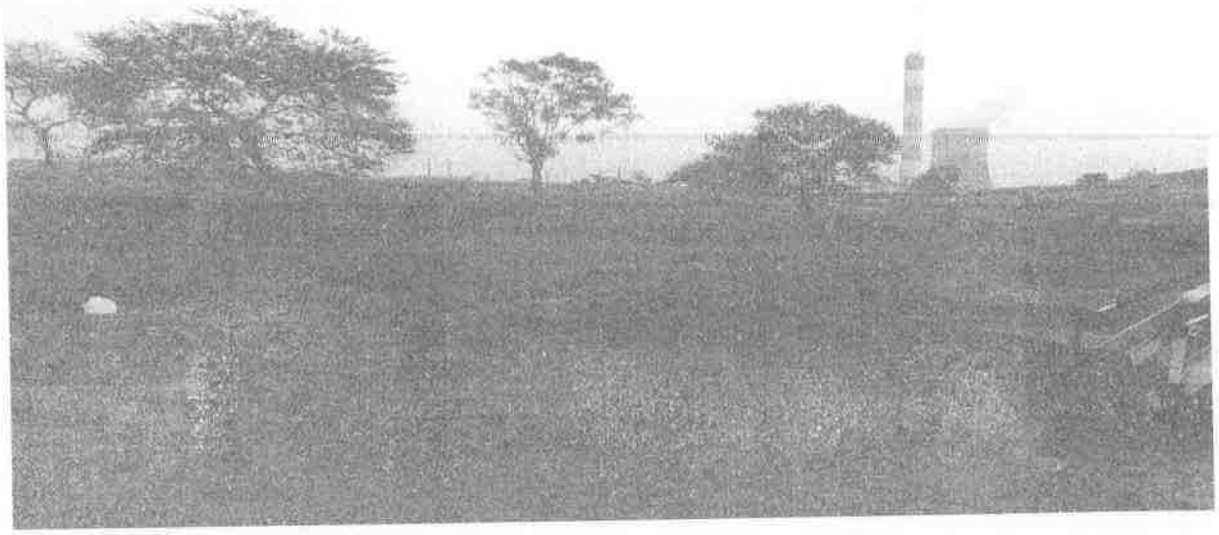

Photo 10: Construction of Kachcha stop dam near patadi nala at Badadarha

10.3. About Tundri: Tundri is a large village located in Dabhra Tehsil of Janjgir Champa district, Chhattisgarh with total 1074 families residing. The Tundri village has population of 3810 of which 1936 are males while 1874 are females as per Population Census 2011. In Tundri village population of children with age 0-6 is 513 which make up 13.46 % of total population of village. Average Sex Ratio of Tundri village is 968 which is lower than Chhattisgarh state average of 991. Child Sex Ratio for the Tundri as per census is 832, lower than Chhattisgarh average of 969. Tundri village has higher literacy rate compared to Chhattisgarh. In 2011, literacy rate of Tundri village was 74.55 % compared to 70.28 % of Chhattisgarh. In Tundri Male literacy stands at 87.56 % while female literacy rate was 61.43 %. As per constitution of India and Panchayati Raj Act, Tundri village is administrated by Sarpanch (Head of Village) who is elected representative of village. Our website, don't have information about schools and hospital in Tundri village. In Tundri village, most of the village population is

from Schedule Tribe (ST). Schedule Tribe (ST) constitutes 41.55 % while Schedule Caste (SC) was 8.58 % of total population in Tundri village.

In Tundri village out of total population, 1760 were engaged in work activities. 44.66 % of workers describe their work as Main Work (Employment or Earning more than 6 Months) while 55.34 % were involved in Marginal activity providing livelihood for less than 6 months. Of 1760 workers engaged in Main Work, 388 were cultivators (owner or co-owner) while 219 were Agricultural labourers.

Table: 05 Population Profile of Tundri (in Percentage)

Particulars	Total
Total No. of Houses	1,074
Population	3,810
Child (0-6)	513
Schedule Caste	327
Schedule Tribe	1,583
Literacy	74.55 %

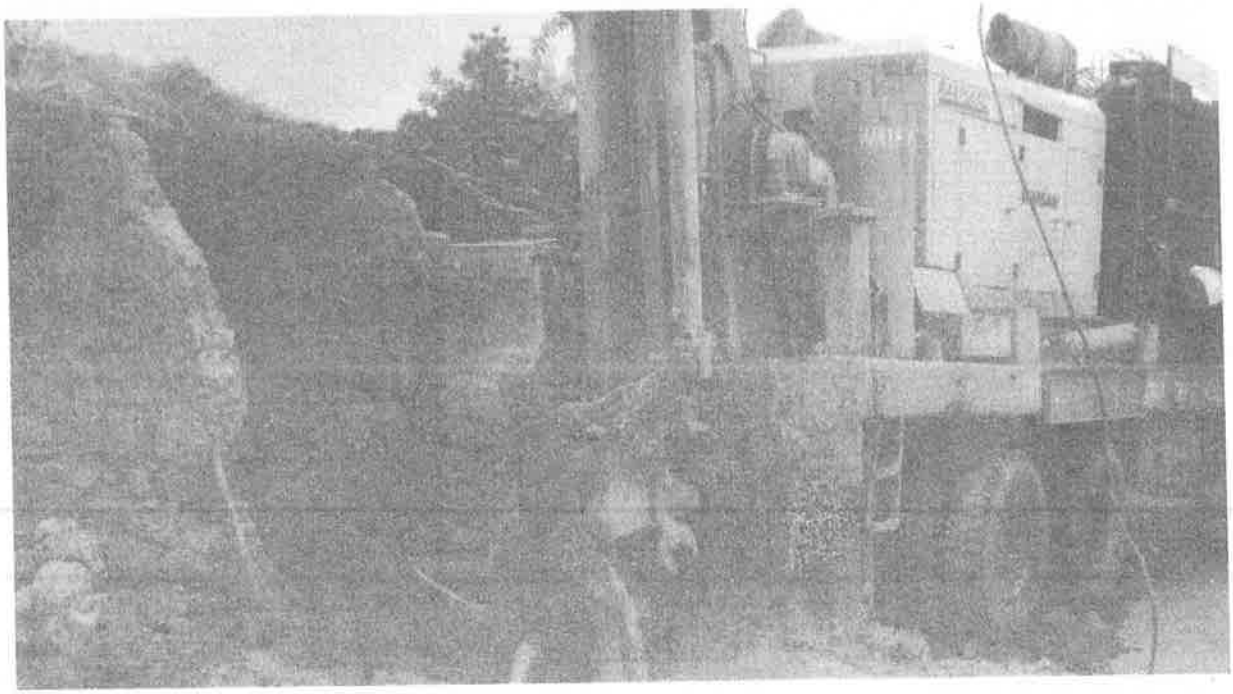

Photo 11: Drilling of bore well & Installation of Hand pump in village Amapali & Kunkuni and also installation of submersible pump near Dussehra chowk Tundri

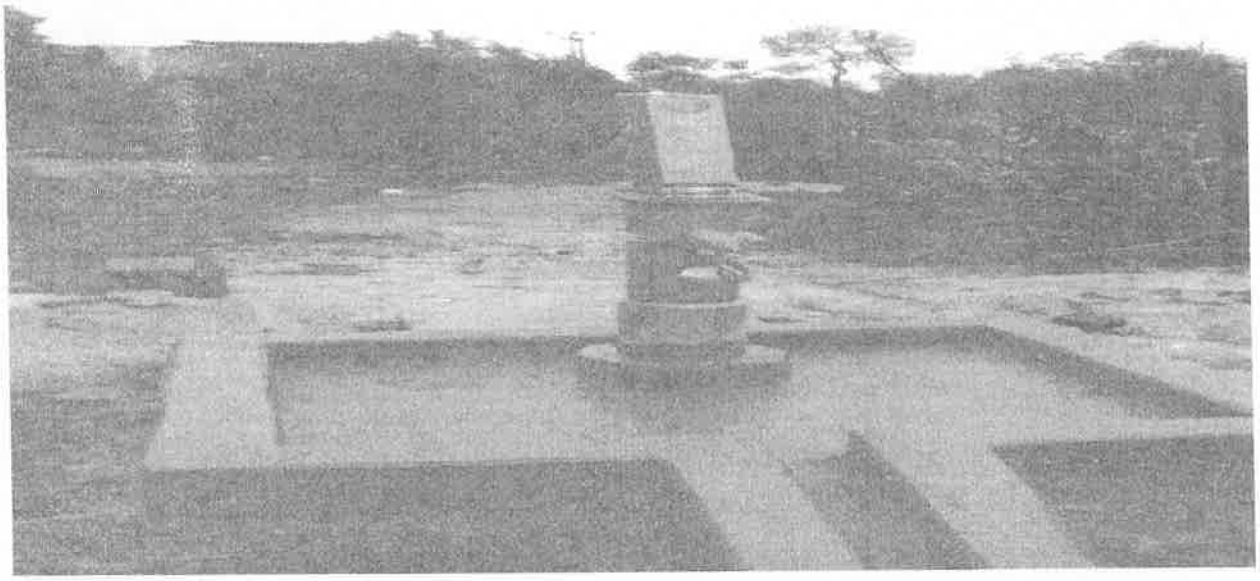

Photo 12: Drilling of bore well & Installation of Hand pump in village Amapali & Kunkuni and also installation of submersible pump near Dussehra chowk Tundri.

In these two villages rural poor do not have access to safe Drinking water. The drinking water crisis in Indian villages has reached explosive proportions. Under these conditions, the worst affected are the poor. They cannot afford to buy water from private suppliers. Thus, they are forced to use any water that is available even it is highly contaminated. Consequently, it is this section of the population that is most often hit by water borne epidemics of Jaundice, Cholera or gastroenteritis. Hence initiative to provide drinking water facilities has reduced the epidemics.

The people in the target villages have to go long distances to collect water from the streams which are contaminated. The women, girl child and children spend much time in getting pots of water for their drinking and usage purposes. Traditionally, poor rural women have worked alongside their husbands in fields, brought up children and managed the house, collect water, fuel wood, and fodder, looked after the animals, and looked after their family.

They are poorly educated (mostly illiterate), either due to the prevailing custom of not educating girl children or a lack of means while growing up, and they have little time or opportunity once they are married off. The people especially, the children are affected with water-borne diseases.

The provision of safe drinking water is a key development issue in these targeted villages, where rural households have no access to clean and safe water and communicable diseases are water-related. Rural households in these villages suffer frequent outbreaks of jaundice, diarrhea, and gastroenteritis. Some of the challenges in providing clean water in these villages include geographic remoteness, poor maintenance of existing systems, and a paucity of public funds. Social factors also contribute to poor service levels in the mentioned areas, notably the caste system and high rates of illiteracy.

The beneficiaries are laborers in the agricultural fields and some of them go to nearby town in search of their livelihood. While digging up borewells in these villages the people in the villages came forward and explained about the need to combat the scarcity of Water with the help of Community worker of CSR Unit. Hence villagers came forward for their participation in owning the bore well and its maintenance. Furthermore, DB Power outreach team also organized Community meetings with village people. This is to mobilize

interest and enthusiasm as well as raise awareness about the work carried out by DB Power. The location of this work is decided by the Local people along with Sarpanch (Village Head). The Children are also beneficiaries in this carried out work.

Groundwater is an important source for irrigation in large tracks of India. This source has been considered as infinite and used indiscriminately without any disregard to recharge prospects[viii]. In India about 45% rural poor do not have access to safe Drinking water. The drinking water crisis in Indian Cities has reached explosive proportions. In rural areas inadequate drinking water supplies forced to use any water that is available even it is highly contaminated. Consequently, it is this section of the population that is most often hit by water borne epidemics of Jaundice, Cholera or gastroenteritis.[ix] "In rural area being an agrarian, farmers are depend mainly on groundwater for irrigation. With increasing population, lesser land holdings and urbanization, deeper borewells are dug for groundwater abstraction.

Borewells are basically vertical drilled wells, bored into an underground aquifer in the earth's surface, to extract water for various purposes."[x] Drilling of Bore well & Installation of Hand pump in respective area of Amapali & Kunkuni villages through assist of DB Power Pvt. Ltd help out the villagers to safe and drinking water **(See Photograph: *11* & *12*).**

10.4. Impact on Village People of water facilities: There is no doubt that Water and Sustainable Development are inextricably linked. Without adequate supplies and management of fresh water sources, sustainable development simply cannot take place. 'Smile Always' has been providing Drinking Water Bore Wells in the affected villages of DB Power Ltd. However, the resources are limited but there is a great need for safe water in these villages adopted by Power Plant.

Poor rural households collect water from community sources, which are often remote and spend much time in collecting water. The collected water is causing water-borne diseases. Diseases due to contamination of drinking water constitute a major burden on health. Improvement in the quality of drinking water will significantly benefit the health and wellbeing of people. Therefore, the DB Power Ltd working towards providing safe drinking

water to the maximum extent possible in its target villages. Children are perhaps the most cheerful and omnipresent facet of rural villages. Curious, unafraid to stare, and ready to smile, they are unconcerned about their running noses, bare feet, unkempt hair and ragged clothes. If they are fortunate enough to have a school and a regular and dedicated teacher – and if their parents can spare them from work - they get an education. But more often than not, the conditions are not ripe. They are often uninformed about health issues, hygiene and sanitation, since their mothers are often uninformed too. Diseases can still kill and infant mortality is still high in these villages.

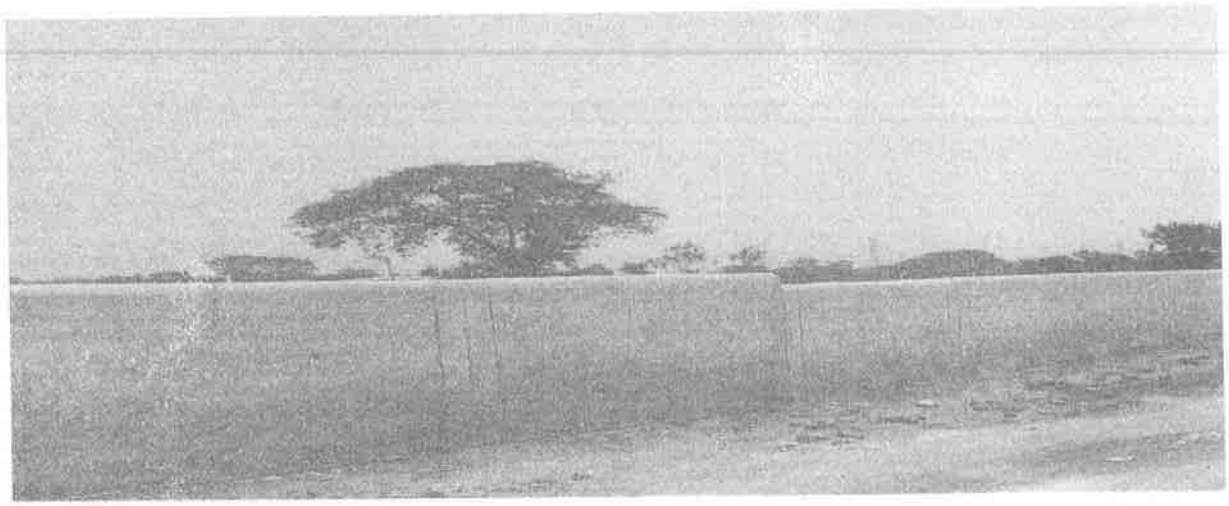

Photo 13: Constructed Boundary wall (65 meter) of Govt. Hospital at Tundri.

Previously the hospital at Tundri has not the boundary wall, in absence of boundary wall it was not secure place for the attendant who stays over there at night and with patients. Therefore, there is an urgent need for providing safe and secure place for the hospital by construction of wall

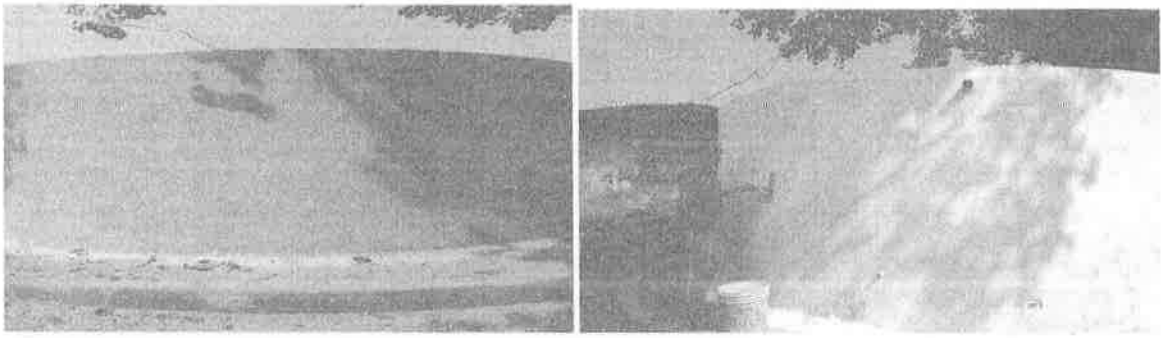

Photo 14: Constructed water tank (10000 litre) near Dussehra chowk Tundri and connection of pipe line for drinking water

Construction of Drinking Water Pipeline along with the provision of Water tank was carried out in the above-mentioned Village during FY 2020-21. It highlighted the following: Most of the beneficiaries stated that water distribution pipeline connected to their households and half of them responded that they were access to water twice a day, whereas half of them have access water throughout the day which is sufficient for their household. All of them replied that the quality of water is good and potable. Almost all of the respondents stated that the DB Power infrastructure fulfills the community needs and water becomes available for everyone.

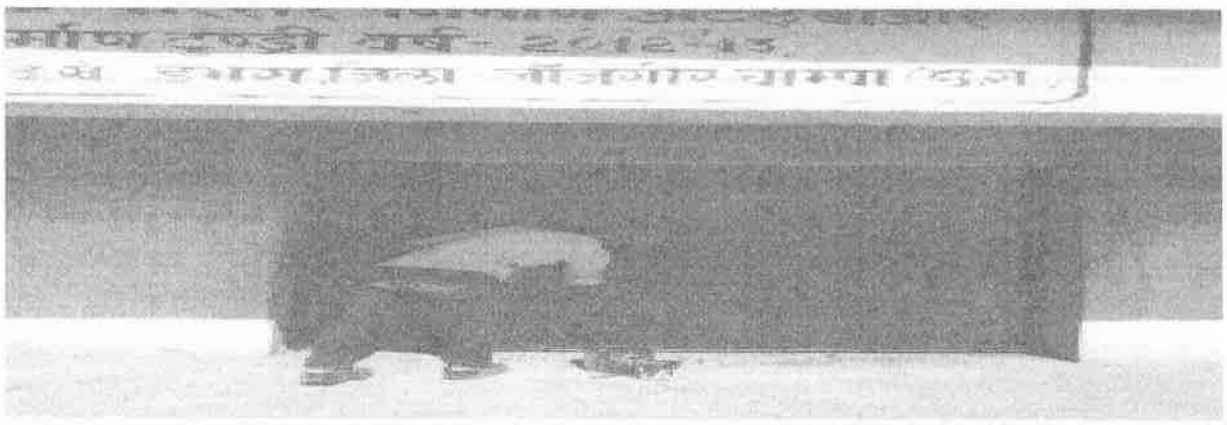

Photo 15: Wall painting of Tailoring Training Center Tundri

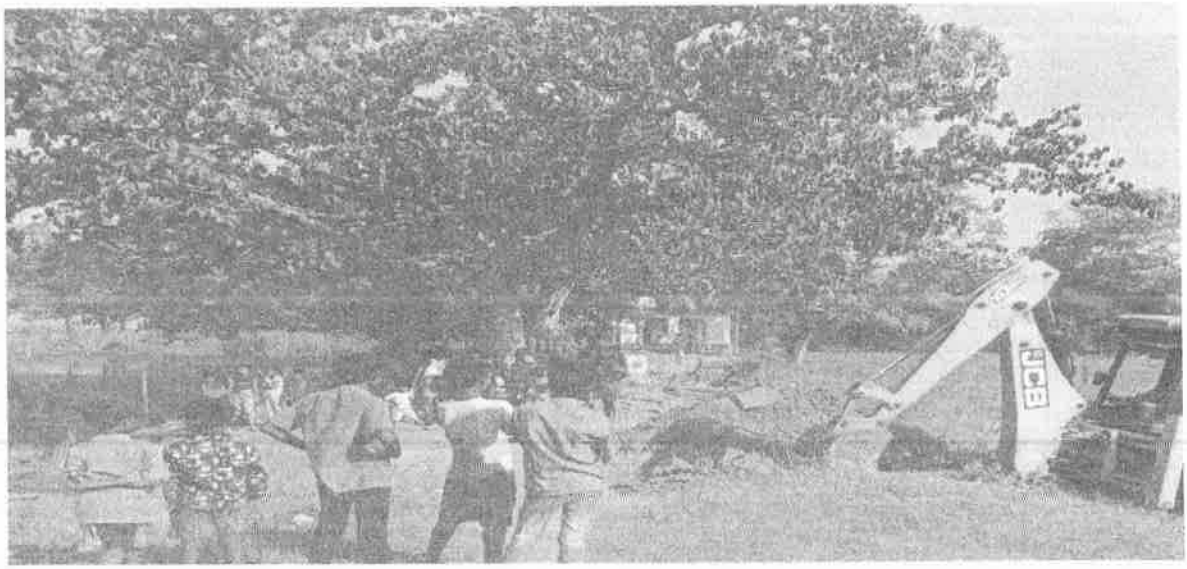

Photo 16: 03 Hume pipe provided at Rampur in bhadri pond & 2 hume pipe provided at Tundri for water filling in bandhawa pond at Tundri.

A hume pipe is formed by pouring concrete into a formwork, and axially rotating it, and allowing it to compact using centrifugal force. A hume pipe can withstand internal and external pressure well, and is primarily used for sewer pipes, agricultural waterways, and residential construction. Therefore, reinforced cement Pipes, also known as Hume Pipes provided to village people used in to use in agriculture, for carrying-out water from one place to the other.

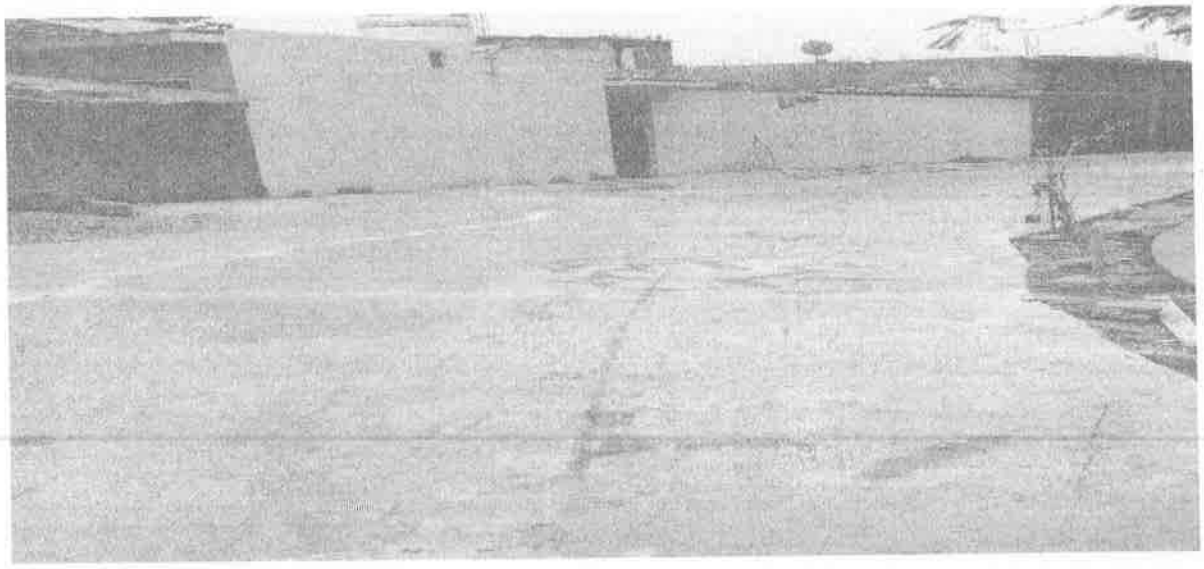

Photo 17: Construction of road near pond at other than adopted/affected village

In Rural areas many years' farmers and villagers have been building ponds for livestock water and for irrigation. The demand for water has increased tremendously in recent years, and ponds are one of the most reliable and economical sources of water. Ponds are now serving a variety of purposes, including water for livestock and for irrigation, fish production, fire protection, energy conservation, wildlife habitat, bath, erosion control, and landscape improvement. Hence development of road nearby to the pond helping people in maximum utilization of the pond with minimal or no risk factor which were presented previously.

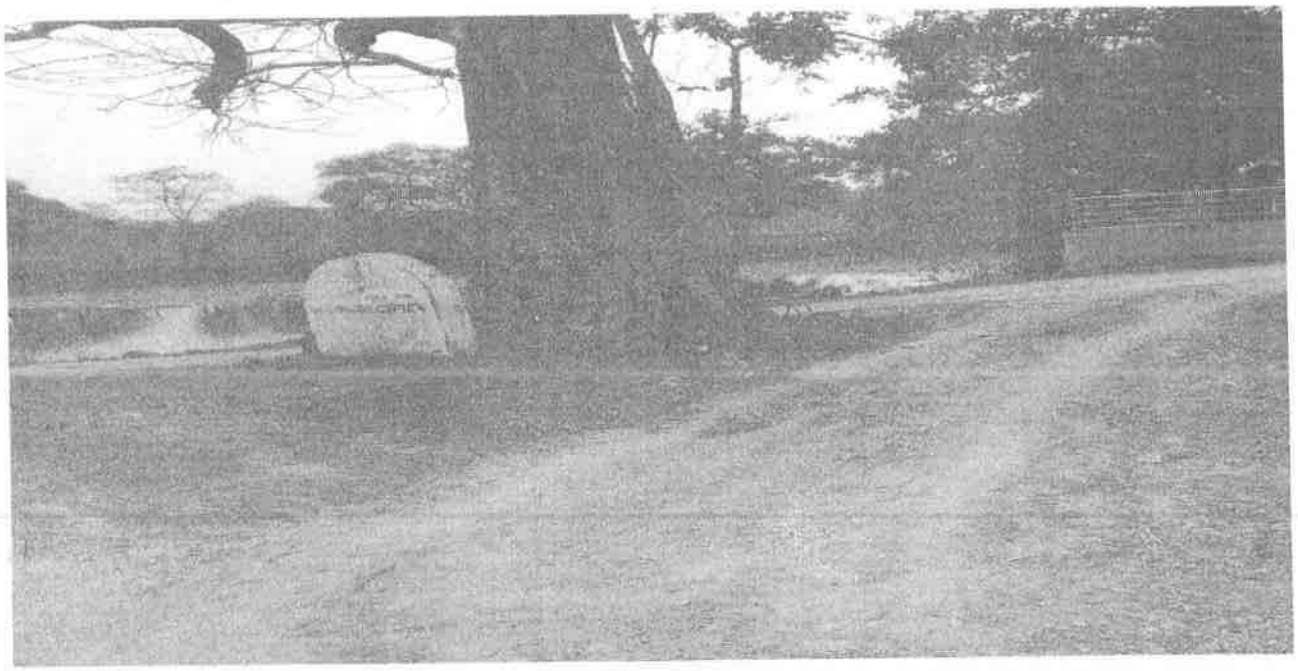

Photo 18: Construction of culvert at other than adopted/affected village

Culverts function primarily as hydraulic conduits, conveying water from one side of a roadway or similar traffic embankment to the other; therefore, culverts serve the dual purposes of functioning as hydraulic structures as well as acting as traffic load bearing structures. Culvert is defined as a tunnel structure constructed under roadways or railways to provide cross drainage or to take electrical or other cables from one side to other. It is totally enclosed by soil or ground. The design of culvert is based on hydraulic, water surface elevation, and roadway height and other conditions. The Culvert at Jamgahan help to the pond-water conduits, conveying water from one side of a roadway situated in village specially in rainy season (See Photo: *18*).

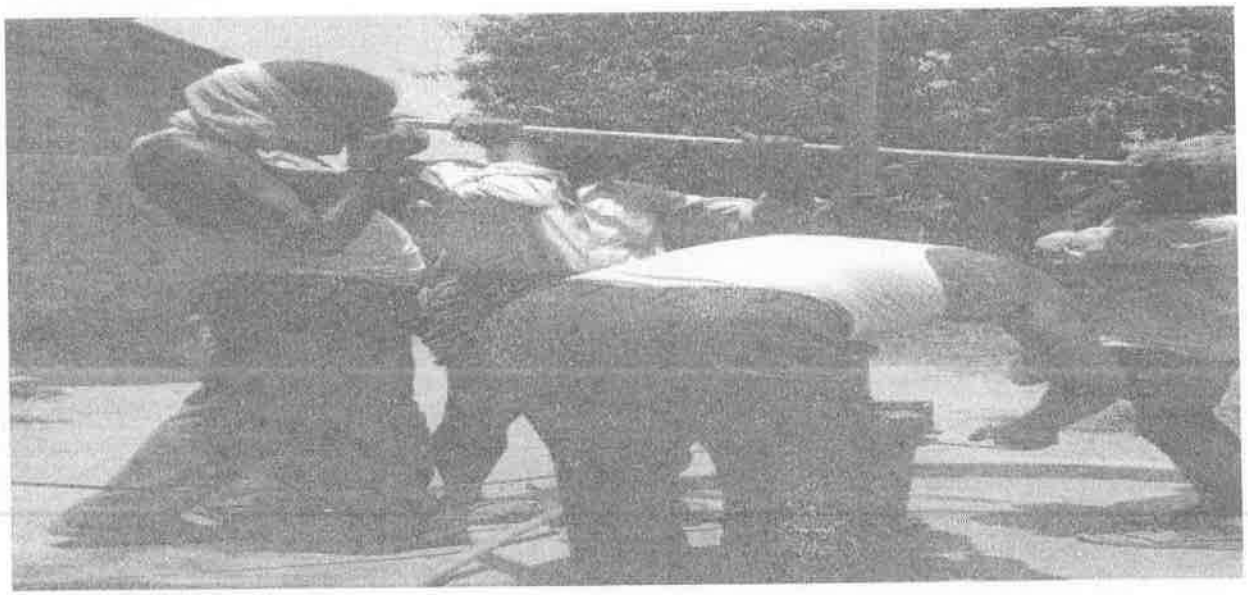

Photo 2 : Other Miscellaneous Work carried out in Rural Infrastructure Development

11. Education and Skill Development

This section covered the details of CSR intervention in Education and Skill Development. In English the term "Education" has been derived from two Latin words Educare (Educere) and **Educatum.** "Educare" means to train or mould. It again means to bring up or to lead out or to draw out, propulsion from inward to outward. The term "Educatum" denotes the act of teaching. It throws light on the principles and practice of teaching. The term Educare or Educere mainly indicates development of the latent faculties of the child. But child does not know these possibilities. It is the educator or the teacher who can know these and take appropriate methods to develop those powers. In Hindi, the term "Shiksha" has come from the Sanskrit word "Shash". "Shash" means to discipline, to control, to order, to direct, to rule etc. Education in the traditional sense means controlling or disciplining the behaviour of an individual. In Sanskrit "Shiksha" is a particular branch of the Sutra literature, which has six branches: Shiksha, Chhanda, Byakarana, Nirukta, Jyotisha and Kalpa. The Sutra literature was designed to learn the Vedas. Siksha denotes rules of pronunciation. In India, skill development occurs through two broad institutional structures – formal and non-

informal. The formal structure includes higher technical education in colleges, vocational education in post-secondary schools, technical skills in specialized institutions and apprenticeship training. As part of the Government's social development agenda, there are several schemes which provide basic employable skill development.

India is an Agrarian Society; here more than 70 percent population living in rural area. They depend on agriculture and associated sectors of agriculture for their livelihood. The ability of the individuals in any society is necessity to vest them for social alteration, economic growth, contribution in development process. Therefore, a Nation seeking towards development requires institutions, entrepreneurship and skill development, to initiate, engross and achieve the course of change and the changing societal structure and livelihood profiles. In 40's after independence India was developing nation because of the burden of imperialism. It is understood that restraints and possibilities towards development of rural area is itself embedded in the agrarian society. In 20th century Industrial Revolution fetched fundamental alterations in agrarian societal structures that were entrenched in agriculture sector. 'The Industrial Revolution took away this responsibility from women's, brought about a rural-urban dichotomy, particularly in agrarian societies and created a demand for some other educational agent outside homes. The educational agent, the school, was assigned two basic goals: (1) development of human resource (particularly men) with skills for the manufacturing sector; (2) undertaking partial responsibility of the home, namely value addition and moral education' (India, 2006). It gave rise to separation in all sectors; and bulk of deficient Rural Youth in productive and technical skills. Hence, youth living in the rural areas have to struggle to get earnings or voluntarily/forcibly migrated to urban areas in search of Job. The migration arrangement varies with the region, prospects and socio-economic status of the families. The poorest families, particularly the landless and marginal holders have poor quality land inclined to migrate. Such migrations severely affected the quality of life, because of poor health, lack of education, skill development and social pressures leading to erosion of moral values. 'In 50's, almost national governments in Asia formulated 'community development' programme with a view to achieve self-reliance and development through local institutions and

participation of the rural communities for their development' (CIRDP, 1987). The core elements of community development were (i) People's participation in local community development projects, (ii) democratic decentralization, (iii) transfer of technology, (iv) self-help efforts. 'The rural development pursued in the 1950's and 1960's was largely centered around 'growth first' models. Despite robust growth in the 1960's, economic benefits did not 'trickle down' and majority of the population was languishing in abject poverty, rising unemployment and increased inequalities' (India, 2006).

11.1 Work carried out under Education and Skill Development is as follows;

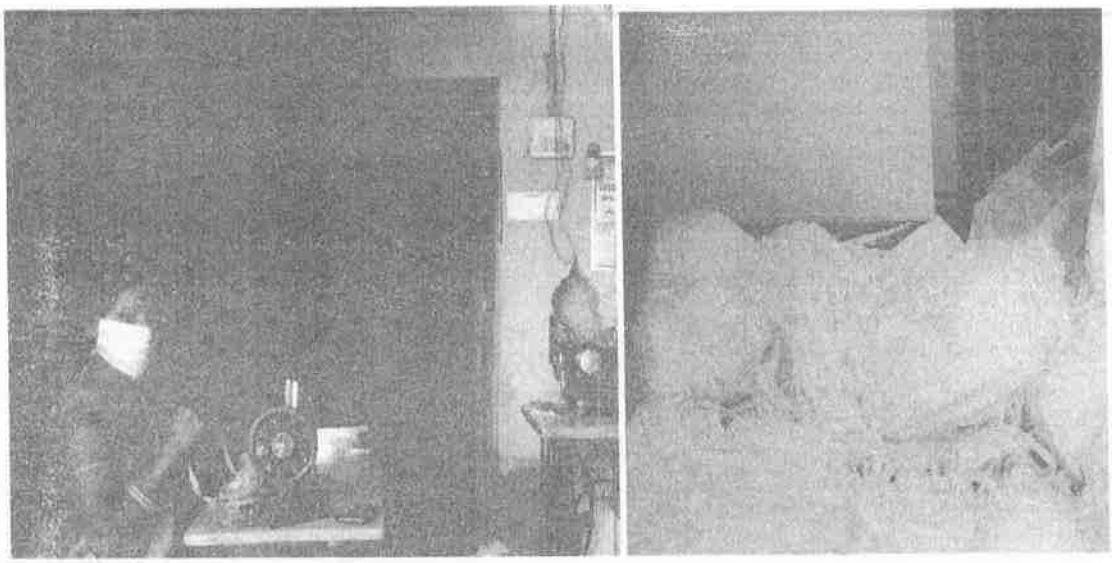

Photo 3 & 20.1:

- **Training Provided to SHGs women to prepare mask**
- **Production of Mask at Large-Scale during COVID-19 Mask Made during COVID-19**
- **Distribution of masks to Local Administration dept. Raigarh and Janjgir-Champa, MLA Chandrapur and local villages adopted by DB Power**

Destitute women as well women who affected with bigamy, sent back to parents for additional dowry or lack of children, aged deserted by children, not married due to disability or due to poor financial position of their parents and women deceived in the name of love will be covered under this project. They were unable to raise their

children properly due to financial problems and were forced to send them for work at tender age as child labor.

The CSR unit have conducted survey and identified such women in Tundri village. They are almost invariably dependent on others — typically male members of their family, because they are unable to secure an independent means of livelihood for themselves. In many instances, being separated or divorced or even abandoned women do not get recognition as a separate household and become reliant on their father or brother. The livelihoods have affected badly.

There are important implications here for empowerment of women, especially in difficult family relationships as access to a separate income would provide them with a viable source of livelihoods, giving women the opportunity to live with dignity and independence. This is possible, if their skills are developed and provided work in a production center for sustainable livelihoods. The centre is designed to provide financial stability as well as employment/working opportunities to the destitute women and adolescent girls who are the vulnerable group of social neglect and exploitation.

Out of 393 registered women 277 women were already trained in 16 batches by two appointed Instructors in the above trades. After the training, with in a period of six months, forward and backward linkages will be provided for the establishment of Training-cum-Production center & self-employment units of their own to all the 20 women. They will also be provided marketing assistance. They will be provided all the necessary assistance for the economic empowerment. DB power CSR unit will facilitate for the establishment of the production center. The said centre will be managed and run by themselves through a managing committee. The trained women will work at the center and earn wages. All necessary facilitation done by DB Power Ltd i.e., Raw material supply is ensured, Marketing assistance is also provided by DB power ltd. Due to COVID-19 the products -made by SHGs was in a marginal sell therefore a great initiative took by DB Power to help all rural women associated with CSR-Unit.

The CSR-Unit organised a training to all women to made mask in first wave of COVID-19, afterwards three-layer masks production has been done at mass level and distributed to Local-Administration of Raigarh & Jangir-Champa, MLA of Chandrapur and local village people adopted by DB Power. This initiative of DB Power has catered two dimensional needs the first -one is provided employment opportunity to rural women & second-one is to distribution of masks free of cost at mass level which reduced the spread of COVID-19.

12. Health, Hygiene & Sanitation

Sanitation, hygiene, and cleanliness are the symbols of a cultured society. Sanitation is critical for health and sustainable socio-economic development. Sanitation plays vital role in the human health. ""Sanitation is more important than independence," this quotation said by Mahatma Gandhi in 1923 which reveal the importance of sanitation in a civilized society. India is the country whose majority of the population lives in a rural area where the rural population where the rural population has high tendency to use vicinities area for defecation.

The challenge for the healthcare sector, the government, medical profession, health care provider, as well as for healthcare business manager, is to continually explore ways to ensure that the welfares of individual patients remain the utmost primacy and promote health care equity via corporate socially responsible activities. The main issue of health care sector and sanitation is lack of resources and awareness related to the rights and availability of services. There is an essential need to truly embrace corporate social responsibility (CSR) and ethical principles that would promote equal distribution of health care resources.

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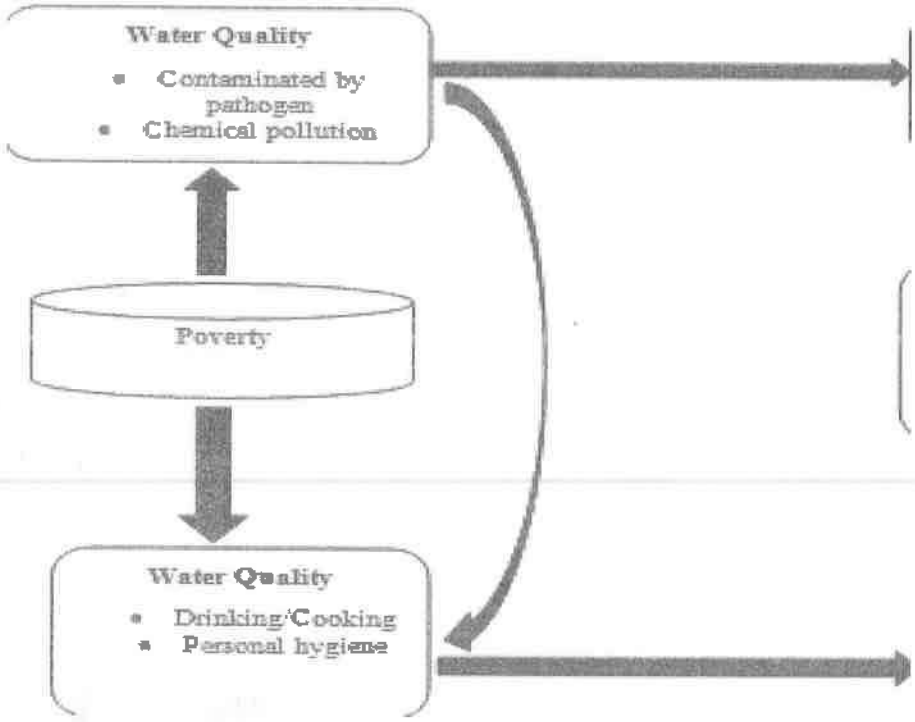

Figure: 02 Conceptual frameworks depicting Role of CSR in Health and Sanitation

This section covered the details of CSR intervention in Health & Sanitation. It also discusses how Health is increasingly becoming a focal point of Corporate Social Responsibility (CSR), largely due to the recognition that a healthy workforce and community are fundamental to the longevity of a business and success of an economy.

Importance of sanitation in the world that is struggling to break the rapid spread of COVID-19, cannot be stressed enough. Sanitary and hygiene practices directly affect the health of individuals. This makes it crucial for India – home to a population of over 1.3 billion people, with the not-overly impressive healthcare system. For India, sanitation is not just about social development but also economic development.

The following work has carried out by under Health and Sanitation by CSR-UNIT during COVID-19;

Photo 4: Ambulance referral services have been provided to 311 patients

The facility and availability of ambulance service is 24X7 during COVID-19. The attendants also maintain Patient Registration and Medicine Stock Register. **Good Health** is the greatest blessing of life. Life is a weary burden to a person of broken health.

Rural places in backward States like Chhattisgarh, health is considered as the major issues and economically backward populations are unable to access to the better health services, other than availability of health center's is the major problem. In spite of significant growth in the healthcare units many villages in backwards States like Chhattisgarh Indian continues to face serious challenges of unavailability of Institutional Health Care. Hence DB Power has made significant efforts towards Institutional Health Care during pandemic.

Photo 5: 2023 Cases attended in CHC.

Presently this Community Health Centre is functioning in temporary shed as shown in above photograph because connectivity of CHC with road is not completed; hence construction of Road is in Progress. This CHC constitute of 06 staff, (03 Male & 01 female Attendants, 01 BAMS & 01 MBBS Doctor. The timing is 9:30 am to 5:00 pm. In this CHC after diagnosis Doctor provide medicines to the patients and in case of emergency patients has referred to Raigarh with the help of Ambulance Service of CSR unit. During Pandemic distribution of generic medicines prescribed by District-Hospital medical practitioners provided to the wards of the patients who was home Quarantine free of Cost in all adopted villages. Distribution of Hand-sanitizers/Hand-wash/Oximeter is also done by DB Power during COVID-19.

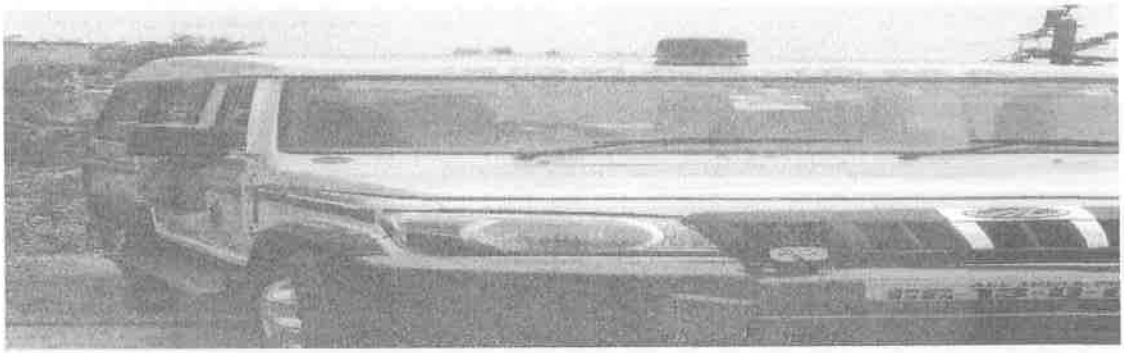

Photo 6: Provided Ambulance facility to District Administration Raigarh during Covid-19

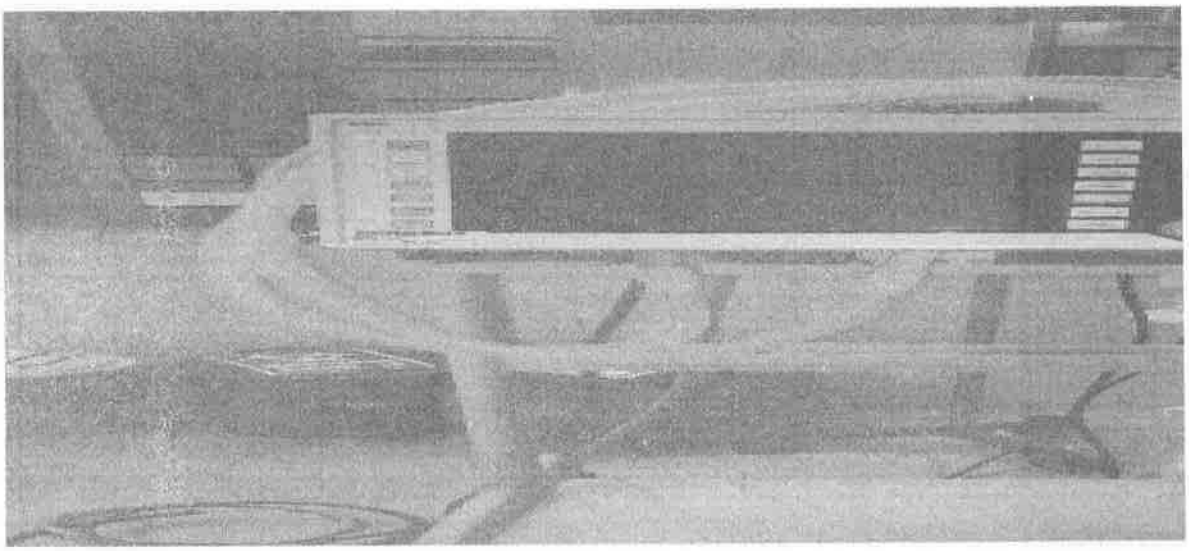

Photo 7:

- **Provided ventilator machine to District Govt. hospital Janjgir-Champa,**
- **01 sanitizer cabin to CHC Chaple and also 01 sanitizer cabin provided to Police office Kharsia**

The Covid-19 pandemic has shown us that despite several policies oriented towards rural growth and development, the widening socio-economic disparities have posed a huge challenge for the critical health care sector, especially in the rural areas. A study by National Health Profile–2019 observed that there are only 0.55 hospital beds in government hospitals per 1000 population. This is an alarming figure and with 70% of

India's population still living in the rural areas, it is extremely vital to work towards building a robust and sustainable critical health infrastructure, apart from government intervention various non-government bodies and corporates must take note to address this crucial problem.

Covid-19 has set the stage for companies to relook at their CSR initiatives and work effectively to build a long-term roadmap in terms of a robust critical health infrastructure that can benefit rural India not just during the subsequent waves of Covid-19 but also beyond that.

In this context CSR-UNIT of DB Power Ltd initiated a step to equip the Healthcare facilities, therefore one ventilator machine provided to district hospital. Moreover, to help-out the frontline-workers (police) who were working 24X7 during Lockdown one sanitized cabin provided with daily needs essentials (water, fruits, gloves and masks). Furthermore, one cabin provides for Health-care workers of Community Health Centre, Chaple. Additionally, the funds provided to following Local Administrative people i.e., Rs. 500000/- District Administration Janjgir-Champa, Rs. 100000/- to Tundri panchayat & Rs. 50000/- to Badadarha panchayat, cater the problem of Pandemic.

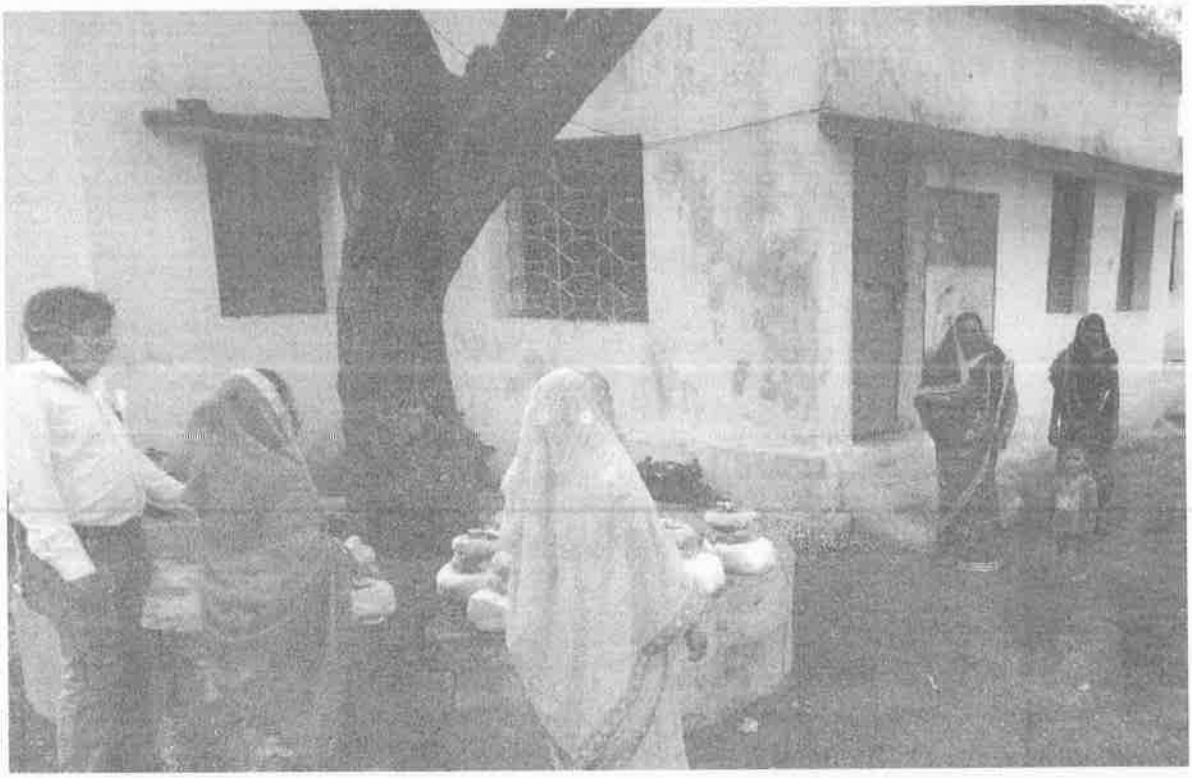

Photo 8:Distribution of Ration/food Packets in all eight adopted Villages during pandemic

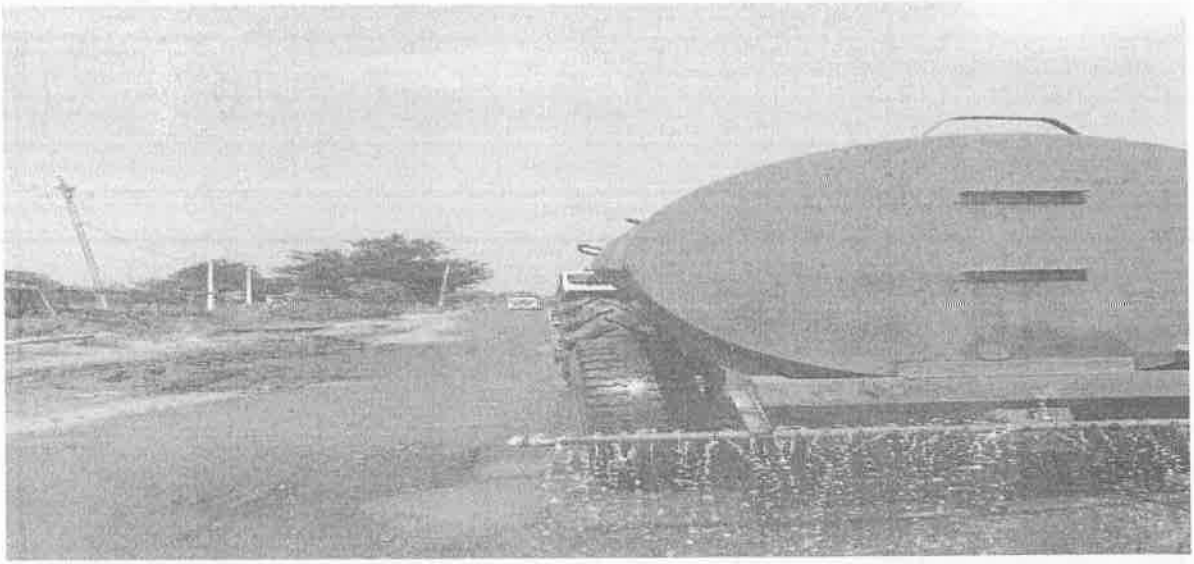

Photo 9: Sprinkling of water on main road of Tundri to Kanwali & Tundri to Bye-Pass Road Badadarha /Ash-dyke to L&T gate.

During the pandemic the continuous sprinkling of water has been done by the CSR-Unit of DB Power Ltd so the dust at uncemented roads would not spread to the House-holds of the adopted villages because it may also cause the other lungs infections. However, the efforts and initiatives took by CSR-UNIT of DB Power Ltd were at micro-level but ultimately contributed towards at Macro-level during the Pandemic.

13.0. Social -Welfare programme: Under this miscellaneous work has been done which are as follows;

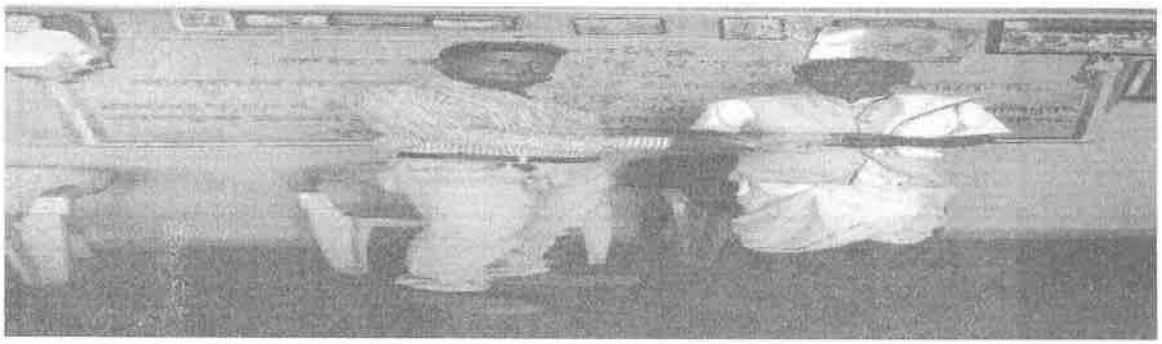

Photo 10:Distribution of sweets among village-representatives and peoples of adopted Villages under CSR on the occasion of Diwali festival.

Photo 11: Distribution of Ra- grocery items at old age home, orphanage-home and deaf & dumb school Raigarh on the occasion of 76th Birth anniversary of hon'ble Chairman Late Shri Ramesh Chandra Agarwal Ji.

Additionally, under Social Welfare Programmes One Air-Conditioner donated to office of DIC Janjgir-Champa. Moreover, On the occasion of the marriage -Lambodar Yadav Badadarah, Banshilal Yadav and Santu-Ram Rathiya at Rampur & Puniram Rathia, Amarica Bai & Ramprasad Rathia at Tundri, six sewing machines and six Dinner sets has been given to them by CSR UNIT of DB Power Ltd. Furthermore, Raw-grocery items provided to Rohit Kumar Yadav, Samaylal Yadav & Ram Mhilange on the occasion of Daskarm at Badadarha & Rampur.

14. Conclusion:

While we speak a lot on inclusive growth, our negligence to 70 per cent Indians who live in rural areas won't help us to achieve the talk. That's why, off late, most of the bodies including the government started focusing on rural development not just because of helping the rural masses but most importantly for helping themselves in sustenance. Dreaming of improving the fate of rural masses without creating necessary infrastructure is just a day- dreaming that will never happen in reality.

Thus, in the backdrop of rural development what lies most sternly is rural infrastructure like rural roads, rural water supply, rural housing, rural electrification, irrigation, etc. Government in India is not affluent enough to cater all necessary infrastructures to rural areas for their development. That's why the concepts of public-private partnership (PPP) and corporate social responsibility (CSR) have gained popularity in recent times. Keeping this in background, the DB Power Ltd has started CSR activities with the aim of improving the fate of the masses of nearby areas. Although, the said Power Plant has been serving the society by way of launching a good number of CSR initiatives, the rural infrastructures given by the Power Generation Unit is key to change the lifestyle of the villagers.

This report has attempted to unfold whether the infrastructures provided have impacted the lives of rural masses in a positive way. As analyzed and discussed in previously in

report, it is inferred that there is a seeable improvement in the life-style of the villagers due to the village infrastructure facilities provided in the villages of the DB Power Ltd.

Education, Skill Development and Health have been the prime concern of Indian economy owing to their importance in social sector. Although updated facilities and offerings in these two sectors are being availed of by the affluent society, meeting the hefty expenses required, people living in rural areas are deprived of basic facilities necessary in these two sectors. While the government of India along with the governments of different states has been initiating various schemes to cater the basic needs in education and health, owing to constraints in terms fiscal deficit and administration, the core objective is yet to be materialized.

Considering this, potential business houses have been taking up some responsibility in this direction. The power plant in Raigarh of Chhattisgarh (India) has been initiating multiple facilities in these three social sectors. However, facilities offered in the villages affected by DB Power Ltd in the Health sector have been proved to be essential and of paramount importance.

Hence this report has empirically unfolded that the Education, Skill Development and health-related facilities initiated by DB power plant have impacted the health condition of the targeted villagers positively.

The Socio-economic dimension of development paradigm is inadequate without developing the human, financial and social capital because through these three components promotion of well-being is possible. Above mentioned evidence shows that process of Engendering Rights is the key component used by DB power Ltd through SHGs formation in villages. Because if wellbeing indicators like health, education, housing, infrastructure and sustainable livelihood have not taken into consideration formation of SHGs will not be worthy. Hence the process of integrating women for the sustenance of livelihood needs facilitation in social connection, between both members of the SHGs with other community members.

After analyzing the documents, it is evident that by participating in SHGs, women members are able to secure and enhance all three kinds of Capitals namely human, financial because through bonding solidarity arise among SHGs members and they will be able to bridge gaps through savings and credit. Last but not the least it also reveals how CSR Unit DB Power works in different dimension to cater the problems faced during pandemic.

15. Overall-Impact on Community:

Chhattisgarh is a backward state where about more than half of population is living in rural areas. These villages are underdeveloped. There are poverty, unemployment, hunger, illiteracy, ill health, inadequate infrastructure and high mortality in rural areas. Though rural areas have enough resources, planning process and investment pattern kept these villages underdeveloped. No doubt, State government has that capability to meet the challenges in rural areas. Therefore, it is important to provide adequate and quality social services and minimum basic needs for economic growth and social justice. However, the efforts taken by the state government are inadequate to provide basic things to rural communities. Of course, the people in rural areas should get the same quality of life as is available in urban areas.

However, this is not the sole responsibility of the government. There is a need of more participants to be involved in the process of rural development. CSR is the commitment of companies to contribute to sustainable development and improve the lives of the society. Caring the community is a vital component of CSR. Hence the DB power Pvt limited has made an attempt to contribute to the underprivileged section of the society by supporting socio-economic initiatives. The organization encourages the companies to shoulder the responsibility for the impact of initiatives on different stakeholders and environment. It was expected that companies undertake further steps voluntarily to improve the quality of life of employees and their families, local communities and society at large.

16. NOTES & REFERENCES

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