



Power

Ref: REL/TPP/EMD/MoEF/EC/1125/20

Date: 25.11.2020

To,  
**Additional Principal Chief Conservator of Forest (APCCF)**  
**Ministry of Environment and Forest & Climate Change**  
**Regional office (WCZ), Ground Floor**  
**East Wing, New Secretariat Building,**  
**Civil Lines, Nagpur – 440 001**

**Sub: Submission of half yearly Environment Clearance (EC) compliance status for 2x685 MW Raipur Thermal Power Plant at village Raikheda, Gaitara and Chicholi in Tilda Block of Raipur District, Chhattisgarh for the period of April'2020 to September'2020.**

**Ref: Environment clearance vide letter no. J-13012/62/2008-IA.II (T) dated 09.05.2011 and its subsequent amendment vide letter dated 10.06.2015, 13.06.2013, 18.11.2014, 04.02.2015**

Dear Sir,

With reference to the above, please find enclosed herewith Six Monthly Environment Clearance (EC) compliance status report along with environmental monitoring reports etc. for the period of **April'2020 to September'2020** of 2x685 MW Super Critical, Coal Based Thermal Power Plant at Village Raikheda, Gaitara and Chicholi in Tilda Block of Raipur District, Chhattisgarh in hard and soft copy (e-mail).

This is for your kind information and record please.

Thanking You,  
Yours faithfully,  
**for Raipur Energen Limited**

**(Santosh Kumar Singh)**  
**Head – Environment**

**Encl.:** As above

**CC:**

**Member Secretary,**  
**Central Pollution Control Board,**  
Parivesh Bhavan, East Arjun Nagar,  
New Delhi – 110 032

**Member Secretary,**  
**Chhattisgarh Environment Conservation Board,**  
Prayavas Bhavan, North Block, Sector-19,  
Naya Raipur – 490 009  
Chhattisgarh

**Regional Officer**  
**Chhattisgarh Environment Conservation Board,**  
Commercial Complex,  
Chhattisgarh Housing Board Colony,  
Kabir Nagar, Raipur – 492 099, Chhattisgarh

**Raipur Energen Limited**  
**(Formerly Known as GMR Chhattisgarh Energy Limited)**  
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# SIX MONTHLY COMPLIANCE REPORT OF ENVIRONMENT CLEARANCE (EC)

FOR

**1370 MW (2x685MW) Thermal Power Plant**

At

**Village Raikheda, Gaitara and Chicholi,  
Tilda Block, Raipur District, Chhattisgarh**

*Submitted to:*

**West Central Zone, Regional Office  
Ministry of Environment, Forests & Climate Change,  
Central Pollution Control Board, New Delhi &  
Chhattisgarh Environment Conservation Board, Naya Raipur**



*Submitted by:*

**Environment Management Department**

**Raipur Energen Limited**

**Adani Corporate House, Shantigram,  
SG Highway, Ahmedabad – 382 421**

**April'2020 – September'2020**

**Raipur Energen Limited**  
1370 MW (2x685 MW) Coal Based Thermal Power Plant

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**Raipur Energen Limited**  
1370 MW (2x685 MW) Coal Based Thermal Power Plant

## **INTRODUCTION**

Raipur Energen Limited (formerly known as GMR Chhattisgarh Energy Generation Limited) has set up a Coal based Thermal Power Plant with capacity 2x685 MW at Village Raikheda, Gaitara and Chicholi in Tilda block of Raipur District, Chhattisgarh

Environmental Clearance has been granted by Hon'ble MoEF&CC to M/s GMR Energy Ltd. vide letter No. J-13012/62/2008-IA.II (T), dated 09/05/2011. It was subsequently amended vide letter dated 13.06.2013, 18.11.2014, 04.02.2015 and 09.12.2015.

The company has been taken over by Adani Power Ltd. & name of the company has been changed from M/s GMR Chhattisgarh Energy Limited to Raipur Energen Limited with effect from 20th August 2019 and Raipur Energen Limited is 100% subsidiary of M/s Adani Power Limited.

REL has also obtained transferred EC vide letter No. J-13012/62/2008-IA.II (T), dated 05.11.2019.

REL has a well-established Environmental Laboratory with equipped monitoring facilities, which used to monitor and test Environmental parameters.

The company has adopted three peripheral villages and executing the CSR activities by the Adani Foundation, in those villages in the field of their livelihood, infrastructure development, cleanliness, community health and education

REL has engaged M/s Vardan Envirolab, Gurugram, Haryana for their service of sampling, monitoring and analysis as per statutory guidelines.

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### Compliance Status of Environmental Clearance

vide letter No. J-13012/62/2008-IA.II (T), dated: 09<sup>th</sup> May 2011 and amendment dated:  
13.06.2013, 18.11.2014, 04.02.2015 & 09.12.2015.

Sl. No.	Conditions of EC	Compliance Status
<b>A.</b>	<b>Specific Conditions</b>	
(i)	Vision document specifying prospective plan for the site shall be formulated and submitted to the Ministry within six months.	Complied. The Vision document of the previous company was submitted with the previous compliance report. Name of the company has been changed to Raipur Energen Limited from 1 <sup>st</sup> July 2019 and company is now a subsidiary of Adani Power Limited.
(ii)	In case source of fuel supply now proposed to be run on imported coal from South Africa for running the power plant is proposed to be changed to domestic coal at a later stage, the project proponent shall apply for such a change in environmental clearance along with necessary documents as required under EIA notification, 2006 (and its amendments). In such a case the necessity for holding public hearing again or otherwise will be determined by the Ministry in consultation with the Expert Appraisal Committee (Thermal Power).	Being complied. Use of 100% domestic coal sourced from tolling linkage and open market. Talabira-1 Mine is not under mining operation as Mining Plan was expired and the revised mining plan is due for approval. Sulphur and Ash content in coal being used in project as fired coal is being ensured within prescribed standards of 0.7% and 34% This condition was complied with advertisement after the amendment. EC with all amendments are kept in public domain at company website <a href="https://www.adanipower.com/Downloads">https://www.adanipower.com/Downloads</a>
(iii)	Provision for installation of FGD shall be provided for future use.	Complied. Space provision for FGD has been made.
(iv)	Stack of 275 m height shall be installed and provided with continuous online monitoring equipment's for SO <sub>x</sub> , NO <sub>x</sub> , PM <sub>2.5</sub> & PM <sub>10</sub> . Exit velocity of flue gases shall not be less than 22 m/sec. Mercury emissions from stack may also monitored on periodic basis.	Complied. Stack Height is 275 meter. On-line continuous emission monitoring system (CEMS) has been installed for PM, SO <sub>2</sub> & NO <sub>x</sub> . Monitoring of Hg in stack emission is also carried out by authorized laboratory by MoEFCC. The exit gas velocity is ensured @ 22m/sec. The Environment Monitoring report is attached herewith as <b>Annexure I</b> .
(v)	High Efficiency Electrostatic Precipitators (ESPs) shall be installed followed by installation of Bag Filter and it shall be ensured that particulate emission does not exceed 50 mg.Nm <sup>3</sup> .	Complied. ESP is installed for ensuring emission level < 50 mg/Nm <sup>3</sup> . The report for stack monitoring is attached in <b>Annexure I</b> .

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Sl. No.	Conditions of EC	Compliance Status
(vi)	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.	Complied. Dust extraction system has been installed in coal crusher, AHP & coal bunker. Dust suppression system through dry fog method has been installed in coal conveyor transfer point & water spray system in coal yard has also been installed for dust suppression.
(vii)	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.	Being Complied. Sulphur and Ash content in coal being used in project as fired coal is being ensured within prescribed standards of 0.3- 0.5% and Ash content 34%.
(viii)	Transport of coal to the plant site shall be strictly by rail. The project proponent shall therefore immediately take up the matter with the Railways. Status of implementation shall be submitted to the Regional Office of the Ministry from time to time.	Complied. The transportation through rail is started. Avenue plantation all along the road has already been done inside the plant premises. Complied after amendment. EC with its amendment time to time is also kept in public domain at the website of holding company <a href="https://www.adanipower.com/Downloads">https://www.adanipower.com/Downloads</a>
(ix)	Existing de-generated water bodies (if any) within 5.0 Km of the site shall be regenerated at the project proponent's expenses in consultation with the state govt.	Complied. REL has regenerated around 6 numbers of Water bodies in nearby villages including 2 numbers of ponds are deepened and beautification has been done in consultation with state government.
(x)	The proponent shall sponsor a detailed study regarding water availability in Mahanadi River for all competing sources such as drinking, agriculture, industrial, minimum flow of water in the river during the lean season etc. through institutions like IIT, Delhi/IIT Roorkee. The draft terms of reference shall be submitted within three months which shall be finalized by the Expert Appraisal Committee. The preliminary report on the above study shall be submitted within one year.	Complied.
(xi)	The project proponent shall undertake proactive water harvesting measures and water storage for a larger period not less than 30 days storage shall be developed. The rain water harvesting system shall be put in place before commissioning of the plant. Central Groundwater Authority. Board shall	Complied. Rainwater harvesting design is approved by CGWA. Copy of approval letter is submitted to MoEF&CC.

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Sl. No.	Conditions of EC	Compliance Status
	be consulted for finalization of appropriate rainwater harvesting technology design within a period of three months from the date of this clearance and details shall be furnished. The design of rain water harvesting shall comprise of rain water collection from the built up and open area in the plant premises. Action plan and road map for implementation shall be submitted to the Ministry within six months.	
(xii)	Hydrogeology in and around the project area shall be reviewed annually from an institute. organization of repute to assess impact of surface water and ground regime (especially around ash dyke). In case and deterioration is observed specific mitigation measures shall be undertaken and reports. data of water quality monitored regularly and maintained shall be submitted to the Regional Office of the Ministry.	Complied. The annual review of hydrogeology study has been carried out, the report is enclosed as <b>Annexure V.</b>
(xiii)	No ground water shall be extracted for use in operation of the power plant even in lean season.	Being Complied.
(xiv)	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.	Complied. No water bodies have been disturbed during construction activity & operational activity of the plant.
(xv)	Water requirement shall be optimized to around 32 MCM and shall accordingly adopt higher COC of at least not less than 5.0.	Complied. Water requirement is being restricted to 25 MCM. COC is being maintained more than 5.0
(xvi)	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.	Complied. REL has revisited and optimized water requirements by reusing and recycling approaches, the water allotment has been reduced from 37 to 25 MCM per annum by Water Resource Department, Government of Chhattisgarh considering the minimum water flow requirement in the river.
(xvii)	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	Being Complied. Six nos. piezometers constructed around periphery of the ash pond. Seasonal monitoring of ground water level and quality is being done and monitoring data is being submitted to the MOEF, CPCB & CECB regularly. The ground water analysis data is attached in <b>Annexure I.</b>

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Sl. No.	Conditions of EC	Compliance Status
	so as to ensure that the ground water quality is not adversely affected due to the project	
(xviii)	Monitoring surface water quality in the region 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.	Complied. Monitoring results of Surface water is being done and monitored data is being submitted to MOEF, CPCB & CECB on regularly. The surface water analysis data is enclosed as <b>Annexure I</b> .
(xix)	Additional soil for levelling 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. Completed during construction phase. No major construction is being executed in operation phase.
(xx)	The project proponent shall undertake measures and ensure that no fugitive fly ash emissions take place at any point of time.	Complied. All the preventive measures have been ensured to mitigate fugitive emission from fly ash.
(xxi)	Utilization of 100% Fly Ash generated shall be made from 4th year of operation. Status of implementation shall be reported to the Regional Office of the Ministry from time to time.	Complied. Fly ash is being supplied to nearest cement industries and brick manufacturer plants Fly Ash generation and utilization is enclosed as <b>Annexure II</b>
(xxii)	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.	Complied. Fly ash is being collected in dry form and unutilized fly ash is being disposed in dedicated ash storage ponds. As per MoEF&CC Office Memorandum dated <b>28<sup>th</sup> August 2019</b> , utilization of fly ash in low lying areas has been permitted and the existing condition in Environmental Clearance may stand replaced, accordingly organization has started utilization of fly ash in low lying areas and land reclamation. Mercury and heavy metals are being monitored in bottom ash. No effluent is emanated from ash pond.
(xxiii)	Ash pond shall be lined with HDPE/LDPE lining or any other suitable impermeable media such that no leachate takes place at any point of time. Adequate safety measures shall also be implemented to protect the ash dyke from getting breached.	Complied. Ash ponds is constructed in the way that no leachate takes place any point of time.



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(xxiv)	For disposal of Bottom Ash in abandoned mines (if proposed to be undertaken) shall be done after obtaining due permission from DGMS and after ensuring that the bottom and sides of the mined out areas are adequately lined with clay before Bottom Ash is filled up. The project proponent shall inform the State Pollution Control Board well in advance before undertaking the activity.	Noted & Compliance assured.
(xxv)	Green Belt consisting of 3 tiers of plantations of native species around plant and at least 75 m width shall be raised. Tree density shall not less than 2500 per ha with survival rate not less than 80 %.	<b>Complied.</b> Plantation / Greenbelt development is being developed as per guidelines & in consultation with forest department for local species. Greenbelt Report is enclosed as <b>Annexure III.</b>
(xxvi)	At least three 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 co-ordination with the district administration.	Being complied. The Company undertakes various CSR activities with expenditure within the framework of the CSR Rules under the Companies Act. Community services in three nearby villages namely Raikheda, Chicholi & Gaitera is conducted with focus and Sontara, Gaurkheda and Murra village area also covered. The outreach is also expanded to other nearby villages namely Khamariya, Konari, Tulsi, Tarashiv, Bartori, Chatod and Samoda. The thematic area of work in villages is improving quality of education, access of health care and sanitation, empowerment and livelihood thought SHGs, individual income generation & community vocational training centre and community development. CSR Progress report is enclosed as <b>Annexure IV</b>
(xxvii)	The project proponent shall also adequately contribute in the development of the neighbouring villages. Special package with implementation schedule for providing potable drinking water supply in the nearby villages and schools shall be undertaken in a time bound manner.	Being complied. The Company is undertaking CSR activities within 10 km radius area with focus on project affected and Railway siding villages namely Sontara, Gaurkheda, Khamariya, Konari Murra, Tulsi, Tarashiv, Bartori, Chatod located on western and northern boundary of the proposed plant. The development work in these villages is implemented in planned and time bound manner.
(xxviii)	A time bound implementation of the CSR shall be formulated within six months and submitted to the Ministry. While identifying CSR activities it shall be ensured that need based assessment for the nearby villages within study area shall be conducted to study	Being complied. CSR Plan for the villages is made as per local need and CSR activities are identified by Social work professionals employed exclusively for CSR through the company in consultation with communities and their representatives.

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Sl. No.	Conditions of EC	Compliance Status
	<p>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 shall be undertaken. Development of fodder farm, fruit bearing orchards, vocational training etc. can form a part of such programme. Company shall provide separate budget for community development activities and income generating programmes. Vocational training programme for possible self-employment and jobs shall be imparted to identify villagers free of cost.</p>	<p>Poorest of the poor families are identified basing village Panchayats statistics and special interventions have been planned for their up-liftment.</p> <p>Separate budget has been allocated for community development activities, income generation activities.</p> <p>Vocational training is being provided to youth for self-employment free of cost. We have started <b>Pratibha center</b> for local youths. To increase access of youth to educational and employment opportunities through helping them become aware of and to prepare for these. To prepare youth to become self-reliant through education and employment opportunities at Pratibha centers.</p> <p>CSR Progress report is enclosed as <b>Annexure IV</b></p>
(xxix)	<p>An amount of Rs 33.16 Crores shall be earmarked as one time capital cost for CSR programme as committed by the project proponent. Subsequently a recurring expenditure of Rs 6.63 Crores per annum shall be earmarked as recurring expenditure for CSR activities. Details of the activities to be undertaken shall be submitted within six month along with road map for implementation.</p>	<p>Time bound implementation plan of CSR activities with budget of Rs.33.16 Crores has been completed and recurring expenditure is planned and being implemented in nearby project villages.</p>
(xxx)	<p>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</p>	<p>Complied.</p> <p>Review of Social Audit has been carried out by Indian Institute of Social Welfare and Business Management, Management House, College Square, West Kolkata.</p> <p>The report is enclosed as <b>Annexure VI</b></p>
<b>B.</b>	<b>General Conditions;</b>	
(i)	<p>The treated effluents conforming to the prescribed standards only shall be re-circulated and reused within the plant. Arrangements shall be made that effluents and storm water do not get mixed.</p>	<p>Complied.</p> <p>The treated effluents conforming to the prescribed standards only are re-circulated and reused within the plant.</p> <p>Plant layout has been designed so that effluents and storm water do not get mixed.</p> <p>The ETP analysis report is enclosed as <b>Annexure I.</b></p>
(ii)	<p>A sewage treatment plant shall be provided (as applicable) and the treated sewage shall be used for raising greenbelt plantation.</p>	<p>Complied.</p> <p>A well-equipped Sewage Treatment Plant is installed and commissioned within premises to ensure quality of sewerage.</p>

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Sl. No.	Conditions of EC	Compliance Status
(iii)	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 location plant layout shall be submitted to the Ministry as well as to the Regional Office of the ministry.	Complied. Drawings has been submitted to the MoEF&CC, Delhi as well as Regional Office, MoEF&CC.
(iv)	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.	Complied. Approval for storage facilities for auxiliary liquid fuel such as LDO/ HFO/LSHS has been obtained from Department of Explosives, Nagpur and the same has been submitted. Sulphur content in the liquid fuel will not exceed 0.5%. Disaster Management Plan also is in place.
(v)	First Aid and sanitation arrangements shall be made for the drivers and other contract workers during construction phase.	Complied.
(vi)	Noise levels emanating for turbines shall be so controlled such that the noise in the work zone shall be limited to 85 dBA from the source. For people working in the high noise area, requisite personal protective equipment like ear plugs, 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.	Complied. Engineering control for noise such as acoustic enclosure, silencer have been installed in the turbine. Other than engineering controls, PPE's like ear plug, muff etc. are provided to workers in high noise area. Noise level monitoring report is attached in <b>Annexure I</b> .
(vii)	Regular monitoring of ambient air ground level concentration of SO <sub>2</sub> , NO <sub>x</sub> , PM <sub>2.5</sub> & PM <sub>10</sub> 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.	Complied. REL has installed three nos. of AAQMS station at periphery of the plant for Ambient air quality monitoring. Environment Monitoring report along with Six-Monthly compliance is being submitted to MoEF&CC and is also made available at company's website. <a href="https://www.adanipower.com/Downloads">https://www.adanipower.com/Downloads</a> The monitoring report is enclosed as <b>Annexure I</b> .

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Sl. No.	Conditions of EC	Compliance Status
(viii)	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 completion of the project.	Complied.
(ix)	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 Quality concerned within seven days from the date of this clearance letter, informing that the project has been accorded environmental clearance an 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 at <a href="http://envfor.nic.in">http://envfor.nic.in</a>	<b>Complied.</b> Advertisement has been published in local daily News Papers & details submitted along with compliance report.
(x)	A copy of the clearance letter shall be sent by the proponent to concerned Panchayat, Zilla Parisad, Municipal Corporation, urban local Body and the Local NGO, if any, from whom suggestions, representations. If any, receive while processing the proposal. The clearance letter shall also be put on the website of the Company by the proponent.	Complied. The environment clearance letter is available at website of Adani Power. <a href="https://www.adanipower.com/Downloads">https://www.adanipower.com/Downloads</a>
(xi)	An Environmental Cell comprising of at least one expert in environmental science, engineering, occupational health and social scientist, shall be created at the project site itself and shall be headed by an officer of appropriate superiority and qualification it shall be ensured that the Head the Cell shall directly report to the head of the organization and he shall be held responsible for implementation of environmental regulations and social impact improvement, mitigation measures.	Complied. We have already established Environment Management Dept. headed by a competent experienced expert with relevant academic qualification supported by Environmental Engineers, Chemist & Horticulturist. Environmental laboratory has been established to monitor Environmental Quality Parameters for Ambient Air, Water, Stack emission monitoring etc.

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Sl. No.	Conditions of EC	Compliance Status
(xii)	The proponent shall upload the status of compliance of the stipulated environmental clearance 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 display at a convenient location near the main gate of the company in the public domain.	<p><b>Complied.</b></p> <p>Display board has been installed at main gate of TPP.</p> <p>Environment compliance report will be uploaded in company website.</p> <p><a href="http://www.adanipower.com/Downloads">www.adanipower.com/Downloads</a></p>
(xiii)	The environment statement for each financial year ending 31 March in Form- 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 at the Ministry.	<p>Complied.</p> <p>The Environmental Statement Form V has been submitted vide Letter No, REL/EMD/Sept/72 dated 21<sup>st</sup> September 2020.</p> <p>Copy of Environment Statement is attached as <b>Annexure VIII.</b></p>
(xiv)	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 by e-mail to the Regional Office, Ministry of Environment and Forests.	<p><b>Being Complied.</b></p> <p>Six monthly compliance on the Environmental Clearance granted by MoEF is being submitted to MoEF, CPCB &amp; CECB regularly.</p> <p>Compliance status updated on company's website.</p> <p><a href="http://www.adanipower.com/Downloads">www.adanipower.com/Downloads</a></p> <p>Compliance report for the period of October 2020 to March- 2020 had been submitted to your good office vide letter no.: REL/MoEF&amp;CC/EC/2020/May/29 dated 29.05.2020</p>

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Sl. No.	Conditions of EC	Compliance Status
(xv)	Regional Office of the Ministry of Environment, forest and climate change 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 update the same from time to time at least six monthly basis Criteria pollutants levels including NOX (from stack & ambient air) shall be displayed at the main gate of the power plant.	Noted & Compliance assured. EIA & EMP report with all necessary document & information are already submitted to RO, MoEF&CC and CECB.
(xvi)	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.	Complied. Separate fund has been already allocated for environmental protection.
(xvii)	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 date of start of land development work a commissioning of plant.	Complied. Financial Closure granted on 10 <sup>th</sup> Dec'10. The Project development started after receiving Consent to establish dated 13 <sup>th</sup> Jun'11.
(xviii)	Full cooperation shall be extended to the Scientists/Officers from the Ministry Regional Office of the Ministry at Bangalore/CPCB/SPCB who would be monitoring the compliance of environmental status.	Noted. Full co-operation shall be extended
<b>Conditions of Amended EC dated 13.06.2013</b>		
(v)	High Efficiency Electrostatic Precipitators (ESPs) shall be installed and it shall be ensured that particulate emission does not exceed 50 mg/Nm <sup>3</sup> "	Complied. ESP is installed for ensuring emission well within <50 mg/Nm <sup>3</sup> . The report for stack monitoring is attached in <b>Annexure I</b> .

## Raipur Energen Limited

1370 MW (2x685 MW) Coal Based Thermal Power Plant

Sl. No.	Conditions of EC	Compliance Status
(xxx1)	The GCV of the imported coal from South Africa shall not be less than 4911 Kcal/kg and the ash and sulphur contents shall not exceed the limits stated under: Ash contents: 33.7% Sulphur contents: 0.7%	Being Complied. Sulphur and Ash content in coal is ensured within prescribed standards of 0.7% and 34% respectively
(xxxii)	A long term study of radio activity and heavy metals contents on coal to be used shall be carried out through a reputed institute. Thereafter mechanism for an in-built continuous monitoring for radio activity and heavy metals in coal and fly ash (including bottom ash) shall be put in place.	Radioactivity analysis in coal and ash has been carried out by Board of Radiation and Isotope Technology (BRIT) Government of India, the report is enclosed as <b>Annexure VII</b> .
(xxxiii)	Continuous monitoring for heavy metals in and around the ash pond area shall be carried out through reputed institutes like IIT, Kanpur and records/ data maintained.	Complied. The reports for heavy metals in Piezometric wells is enclosed as <b>Annexure I</b>
<b>Conditions of Amended EC Extension dated 18.11.2014</b>		
(i)	The coal transportation by road shall be through mechanically covered trucks to the extent feasible, else, shall be through tarpaulin covered trucks.	Complied. The Coal transportation through Rail has been started.
(ii)	Avenue plantation of 2/3 rows all along the road shall be carried out by the project proponent at its own expenses in consultation with the State Government Authorities.	Complied. The Coal transportation through Rail has been started. Avenue plantation all along the road has already been done inside the plant premises.
(iii)	Periodic maintenance of the road shall be done by the project proponent at its own expenses and shall facilitate the traffic control on the road in consultation with the State Government Authorities.	Complied. The Coal transportation through Rail has been started. Avenue plantation all along the road has already been done inside the plant premises.
(iv)	The PP shall advertise in the newspaper and place on the website, the amendment issued by the Ministry for public information.	Complied. Advertisement has been published in local daily News Papers. & details submitted along with compliance report. Copy of EC & amendment from time to time is also kept in public domain at the website of holding _____ company <a href="https://www.adanipower.com/Downloads">https://www.adanipower.com/Downloads</a>
(xxxiv)	Harnessing solar power within the premises of the plant particularly at available rooftops shall be undertaken and status of implementation shall be submitted periodically to the Regional Office of the Ministry.	Complied. The feasibility study has been done & the work is awarded to M/s Mundra Solar PV Limited (MSPVL).

## Raipur Energen Limited

1370 MW (2x685 MW) Coal Based Thermal Power Plant

Sl. No.	Conditions of EC	Compliance Status
(xxxv)	Green belt shall also be developed around the Ash Pond over and above the Green Belt around the plant boundary.	Being Complied. Greenbelt development report is enclosed as <b>Annexure III.</b>
(xxxvi)	The project proponent shall formulate a well-laid Corporate Environment Policy, identify and designate responsible officers at all levels of its hierarchy for ensuring adherence to the policy and compliance with the conditions stipulated in this clearance letter and other applicable environmental laws and regulations.	Noted, A well laid environmental policy is in place, with competent and committed workforce for compliance.

### Conditions of Amended EC Extension dated 04.02.2015

(i)	Sulphur and ash contents in the coal to be used in the project shall not exceed 0.7 % and 34% respectively for at any given time. In case of variation of coal quality at any point of time, fresh reference shall be made to the Ministry for suitable amendments to environmental clearance condition wherever necessary.	Being Complied. Sulphur and Ash content in coal is ensured within prescribed standards of 0.7% and 34% respectively
(ii)	The PP shall advertise in the local newspapers and place on the website, the proposed amendment for public information.	Complied. Advertisement has been published in local daily News Papers. & details submitted with previous compliance report.

### Conditions of Amended EC Extension dated 09.12.2015

(i)	The Sulphur and ash contents in the coal shall not exceed 0.7 % and 34% respectively. In case of variation of coal quality at any point of time, fresh reference shall be made to the Ministry for consideration.	Being Complied. Sulphur and Ash content in coal is ensured within prescribed standards of 0.7% and 34% respectively
(ii)	The PP shall advertise in the local leading newspapers and place on the website, the proposed amendment of EC (after receipt from Ministry) for change in source of coal for public information.	Complied. Advertisement has been published in local daily News Papers & details submitted along with compliance report.

### EC amendment – MoEF&CC notification vide letter number S.O. 1561 (E) dated 21<sup>st</sup> May, 2020

Sl. No.	Condition of Notification	Compliance Status
1)	Setting up technology solution for emission norms i) Compliance of specified emission norms for Particulate Matter, as per extent notifications and instructions of Central Pollution Control Board, issued from time to time. ii) In case of washeries, middling and rejects to be utilized in FBC (Fluidised Bed Combustion) technology based thermal	Noted.  i) Technology solutions are being implemented for mitigating fugitive emissions of Particulate Matter.  ii) Washeries, middling and rejects are not applicable for this Thermal Power Plant.



## Raipur Energen Limited

1370 MW (2x685 MW) Coal Based Thermal Power Plant

Sl. No.	Condition of Notification	Compliance Status
	power plant. Washery to have linkage for middling and rejects in Fluidised Bed Combustion plants.	
2)	<p>Management of Ash Ponds</p> <p>i) The thermal power plants shall comply with conditions, as notified in the Fly Ash notifications issued from time to time, without being entitled to additional capacity of fly ash pond (for existing power generation capacity) on ground of switching from washed coal to unwashed coal.</p> <p>ii) Appropriate Technology solutions shall be applied to optimise water consumption for Ash management.</p> <p>iii) The segregation of ash may be done at the Electro- Static Precipitator stage, if required, based on site specific conditions, to ensure maximum utilisation of fly ash</p> <p>iv) Subject to 2(i) above, the thermal power plants to dispose fly ash in abandoned or working mines (to be facilitated by mine owner) with environmental safeguards.</p>	<p>i) Noted &amp; being complied. Fly ash is being supplied to nearest cement industries and brick manufacturer. Fly Ash generation and utilization is regularly submitted to MoEFCC, CPCB, CEA &amp; CECB Please refer <b>Annexure II</b></p> <p>ii) Water requirement is being restricted to 25 MCM. Optimization of water has been incorporated as part of plant design and COC is being maintained more than 5.0</p> <p>iii) Noted &amp; being complied</p> <p>iv) Noted &amp; will be complied as &amp; when fly ash is disposed in abandoned or working mines</p>
3)	<p>Transportation</p> <p>i) Coal transportation may be undertaken by covered Railway wagon (railway wagons covered by tarpaulin or other means) and/or covered conveyor beyond the mine area. However, till such time enabling Rail transport/conveyer beyond infrastructure is not available, road transportation may be undertaken in trucks, covered by tarpaulin or other means.</p> <p>ii) It shall be ensured by the thermal power plant that</p> <p>a) Rail siding facility or conveyer facility is set up at or near the power plant, for transportation by rail or conveyor; and</p> <p>b) If transportation by rail or conveyor facility is not available, ensure that the coal is transported out from the Delivery Point of the respective mine in covered trucks (by tarpaulin or other means), or any mechanized closed trucks by roads.</p>	<p>i) Noted &amp; being complied. Rail siding facility has been made operational &amp; Coal is being transported through covered Rail wagons only</p> <p>ii)</p> <p>a) Rail siding facility has been made operational &amp; Coal is being transported through covered Rail wagons only</p> <p>b) Not applicable as Rail siding facility has been made operational &amp; coal is being transported through covered rail wagons</p>

# ANNEXURE -I

# 1st Quarterly Environmental Monitoring Report



## **Submitted To:**

**M/s Raipur Energen Limited**

***Formerly GMR Chhattisgarh Energy Ltd.***

**Village: Raikheda, Block-Tilda, Dist.-Raipur (Chhattisgarh)**

## **Conducted by:**

**M/s Vardan EnviroLab**

**Plot no. 82A, Sector-5, IMT Manesar, Gurugram (Haryana)**

**(Recognized by MoEF & CC, NABL Government of India)**

## PREFACE

The growing concern for environmental protection and the passing of various environmental legislations have increased the responsibilities of Ministry of Environment, Forests & Climate Change, Pollution Control boards in many folds. Besides enforcing the various environmental legislations MoEF&CC, CPCB & SPCB strive to propagate the necessity awareness regarding the various legal provisions and environmental protection measures in the country.

Electric Power scenario has occupied a significant place in the development program of the country. Development and environment can neither be separated nor ignored. In fact, they are complimentary to each other. These issues have become a concern of the community, particularly the environment impact due to industries in the developing countries.

However, the prerequisite for sustainable development is judicious planning of environmental status, likely impacts of the approach adopted on the environment including inhabitants of the locality, availability of the eco-friendly technology, emerging waste disposal and waste utilization processes, techniques of land reclamation for the restoration of aesthetic beauty and soon.

M/s Raipur Energy Limited, Formerly GMR Chhattisgarh Energy Ltd. Village: Raikheda, Block-Tilda, Dist.-Raipur (Chhattisgarh), India, has engaged M/S Vardan EnviroLab, Gurugram, (HR) to provide Environmental Services in respect of ambient air quality monitoring, stack emission, noise level monitoring & Sampling and Analysis of ground water quality, surface water quality, treated effluent sewage, effluent water from ETP, and soil for Raipur Energy Limited, Raipur district of Chhattisgarh, as per guidelines of MoEF & CC and CPCB Gazette notification.

M/S Vardan EnviroLab, Gurugram, (HR) has deployed entirely its own personnel, facilities and expertise for doing this service. Sampling / Monitoring Stations were identified by the Environmental Officer of Raipur Energy Limited, Raipur. The samples were analyzed partly at site and partly at our MoEF Recognized laboratory situated at Gurugram (HR).

This report presents the data generated for the period from 27th June 2020 to 30th June 2020, i.e. for First quarter which includes sampling locations, Methodology, testing procedure and compilation for the Environmental parameters i.e. Air, Water, Soil & Noise with a view to evaluate the impact due to the thermal power plant activities.

During the course of our operations for the above task, the staff and management of Raipur Energy Limited, were extremely co-operative. We are grateful to them for their invaluable support and assistance rendered to us during the course of the sampling and monitoring.

Date : 6/7/2020



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## **Chapter - 1.0**

### **INTRODUCTION**

M/s Raipur Energen Limited., a subsidiary of Adani Power, is a power generation company based at Raipur in the State of Chattisgarh. Raipur Energen Limited., has commissioned its Thermal Power Plant 1370MW (2x685 MW) Unit at Village Raikheda, Block -Tilda, Dist- Raipur, Chhattisgarh (India).

Raipur Energen Limited., is also committed towards the environment and the community it operates in. It has successfully implemented several community welfare schemes in the field of livelihood, infrastructure, community health and education which has so far benefited over 60,000 people from close to 75 villages.



**Figure No.1. Raipur Energen Limited.**

## **Chapter - 2.0**

### **PROJECT PROFILE**

#### **2.1 Topography & Drainage**

Topography of this area is generally undulating. The area is drained by Raikheda Talab approximately 2.5 km. away from plant in SW direction and Bangoli dam approximately 2 km. away from plant in SW direction. Mura Talab approximately 5 km. away from plant in South direction. Chhicholi Talab approximately 2 km. away from plant in East direction.

#### **2.2 Location**

Plant is bounded by Northern Latitudes of 21° 26' 23" to 21° 27' 48" and Eastern Longitude of 81° 50'34.6" to 81° 52'08.5". This area falls in the survey of India toposheet no. 64 G/14, 64 G/15 in parts(1:50000 Scale) The location of the Plant area is shown in **Fig. No. 2**

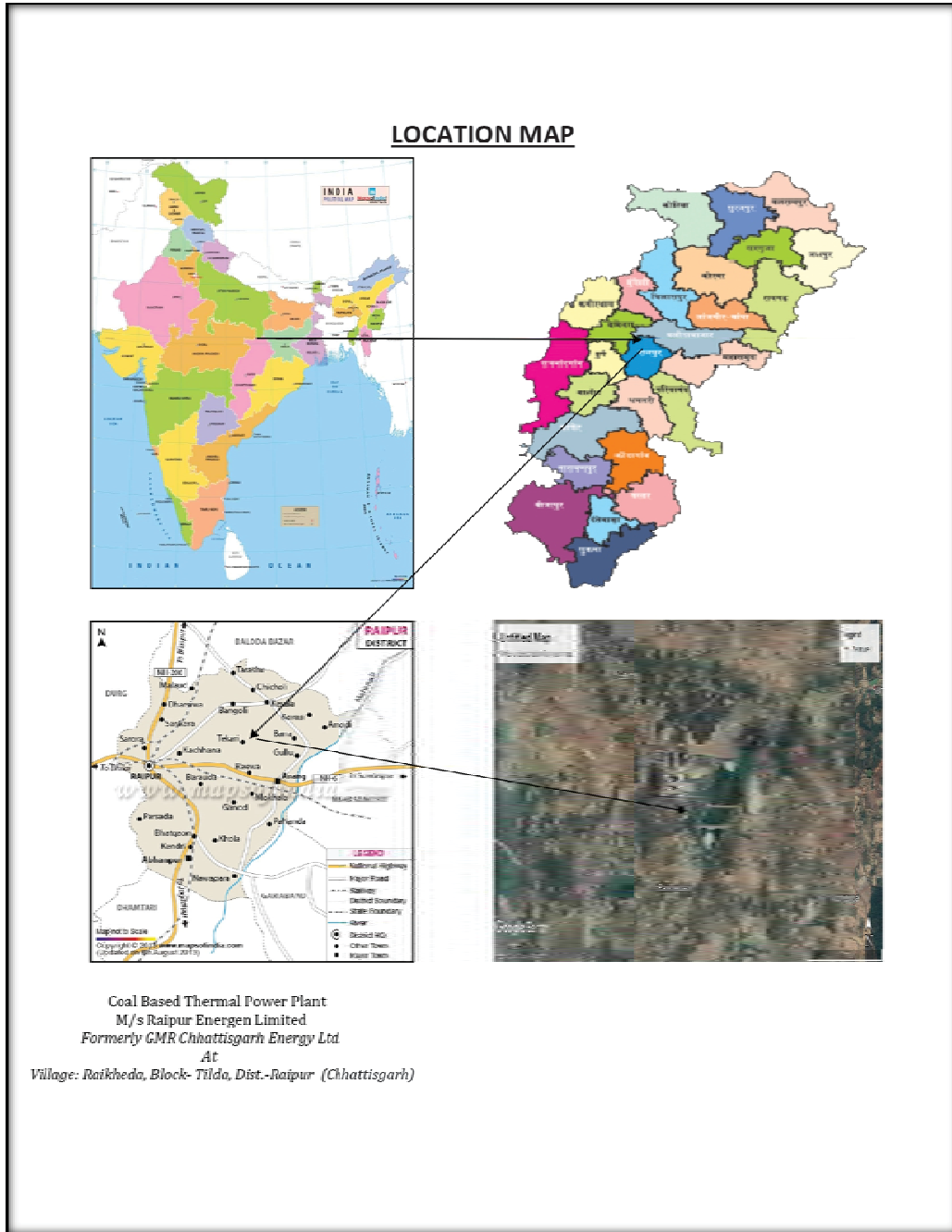
#### **2.3 Climate**

The climate of the area is Sub-tropical type. It is in the zone of humid tropic climate where temperature and humidity of air are very high. The temperature varies from the minimum - maximum temperature range between 29.5°C - 49 °C in summer, and 8°C - 25 °C in winter. The humidity varies from 35% to 82%. The annual average rainfall in the area is about 1300 mm.

#### **2.4 Communication**

The nearest railway station is Tilda, which is at a distance of ~14 Km towards West direction. The area is well connected with S.H. No. 9. Nearest Airport is Raipur ~32 km in SW direction. Nearest village is Raikheda ~ 1.5 km. in South direction and nearest town is Raipur ~31 km. in SW direction.

### 2.5 Location Map



**Figure No.2. Location Map**



## **Chapter – 3.0**

### **SCOPE OF STUDY AND METHODOLOGY**

#### **3.1 Scope of Study**

The scope of study includes Environmental Services in respect of ambient air quality monitoring, noise level monitoring & Sampling and Analysis of ground water quality, surface water quality, treated effluent sewage, effluent water from ETP and soil.

#### **3.2 Methodology**

As mentioned in the scope of work covering the various Environmental components monitoring and sampling and its analysis was carried out on the basis of guidelines of Ministry of Environment Forest & Climate Control of Government of India & Chattisgarh State Pollution Control Board. Sampling procedure method reference and Analysis procedure method reference are mentioned in monitoring reports.

##### **3.2.1 Ambient Air Quality Monitoring**

The ambient air quality has been carried out at various sources of air pollution surrounding and in the Plant. The prime objective of the ambient air quality monitoring is to assess the existing air quality of the area.

The ambient air quality monitoring was carried out for 24 hours at each station. At all stations SO<sub>2</sub>, NO<sub>2</sub>, PM<sub>10</sub>, PM<sub>2.5</sub>, CO and Mercury were monitored. All the samples collected were analyzed for quantitative analysis of various pollutants.

The ambient air quality sampling locations were identified by the Environmental Officer of Raipur Energen Limited.

##### **3.2.2 Water Environment**

The ground water samples, surface water samples were collected from selected locations in two liter sterilized plastic cans. These samples were analyzed as per IS 10500:2012. The domestic effluent and Industrial effluent samples were collected and analyzed for parameters: pH, Total suspended solids, Biochemical Oxygen Demand, Chemical Oxygen Demand and Oil & Grease.

### **3.2.3 Noise Environment**

Sound level meter was used to know the sound levels generated due to plant activities at different locations. The measurements were taken for Equivalent sound level over a time period for day and night which is expressed in dB(A).

### **3.2.4 Soil**

The Soil samples were collected from selected locations. These samples were analyzed for Physico-Chemical parameters including heavy metals.

## Chapter – 4.0

### SAMPLING LOCATION MAP AND ANALYSIS REPORTS

#### 4.1 Ambient Air Quality Monitoring



**Figure No.3. Plan Showing Ambient Air Quality Location Map**

Location Code: -

- A1- Raikheda Village
- A2- Mura Village
- A3- Gaitara Gate Village
- A4- Chicholi Village



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 Corp. Off.: Plot No. 82A, Sector- 5, IMT Manesar, Gurugram- 122051  
 MoEF & CC Recognised (ISO 9001 | OHSAS 45001)

## Test Report

Sample Number: VEL/REL/A/05 Report No.: VEL/A/2007010005  
 Name & Address of the Party: M/s Raipur Energen Limited, Format No.: 5.10 F-01  
 Village: Raikheda, Block-Tilda, Dist. Raipur 493225 (C.G.) Party Reference No.: NIL  
 Reporting Date: 06/07/2020  
 Receipt Date: 01/07/2020 Period of Analysis: 01/07/2020-04/07/2020

Sample Description: AMBIENT AIR QUALITY MONITORING

### General Information:-

Sample collected by: Vardan EnviroLab Representative  
 Sampling Location: Village Raikheda  
 Instrument Used: RDS & FPS sampler with all Accessories  
 Instrument Code: VEL/RDS/02 & VEL/FPS/02  
 Instrument Calibration Status: Calibrated  
 Meteorological condition during monitoring: Clear Sky  
 Date of Monitoring: 29/06/2020 to 30/06/2020  
 Time of Monitoring: 24 Hrs.  
 Longitude: --  
 Latitude: --  
 Ambient Temperature (°C): Min 34 Max 43  
 Surrounding Activity: Human & Vehicular Activities  
 Scope of Monitoring: Regulatory Requirement  
 Control measure if Any: No  
 Sampling & Analysis Protocol: IS 5182  
 Parameter Required: As per Work Order

S. No.	Parameter	Protocol	Result	Unit	NAAQS*
1.	Particulate Matter (PM <sub>2.5</sub> )	IS : 5182 (P-23),2019	38.5	µg/m <sup>3</sup>	60
2.	Particulate Matter (PM <sub>10</sub> )	IS : 5182 (P-23),2006	78.4	µg/m <sup>3</sup>	100
3.	#Mercury as Hg	CPCB Guideline	BDL(DL0.5)	ng/m <sup>3</sup>	--
4.	Nitrogen Dioxide (NO <sub>2</sub> )	IS 5182 (P 6), Reaffirmed-2006	24.2	µg/m <sup>3</sup>	80
5.	Sulphur Dioxide (SO <sub>2</sub> )	IS: 5182 (P-2), Reaffirmed-2012	11.4	µg/m <sup>3</sup>	80
6.	Suspended Particulate Matter (SPM)	IS: 5182 (P-4),1999 Reaffirmed-2006	184	µg/m <sup>3</sup>	--
7.	Ozone (O <sub>3</sub> ) , µg/m <sup>3</sup>	IS 5182 (P-9)Colorimetric Method	9.8	µg/m <sup>3</sup>	130

\* NAAQS – National Ambient Air Quality Standards, Schedule-VII [Rule 3 (3B)], (Part-II-sec-3(i)) 18.11.2009.

#Not Covered in NABL Scope

- Note: a) The results listed refer only to the tested samples & applicable parameters  
 b) The facilities of our lab will be restricted to the invoice amount only  
 c) The Sample will be destroyed after retention time unless otherwise specified  
 d) This report is not to be reproduced wholly or in part and cannot be used as evidence in the court of law





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 MoEF & CC Recognised | ISO 9001 | OHSAS 45001

## Test Report

Sample Number: VEL/REL/A/06 Report No.: VBL/A/2007010006  
 Name & Address of the Party: M/s Raipur Energy Limited. Format No.: S.10 F-01  
 Village: Ralhadra, Block-Pilwa, Dist. Party Reference No.: Nil  
 Raipur - 493225 (C.G.) Reporting Date: 06/07/2020  
 Receipt Date: 01/07/2020 Period of Analysis: 01/07/2020-04/07/2020

Sample Description: AMBIENT AIR QUALITY MONITORING

### General Information:-

Sample collected by : Vardan EnviroLab Representative  
 Sampling Location : Village Mura  
 Instrument Used : RDS & FPS sampler with all Accessories  
 Instrument Code : VEL/RDS/01 & VEL/FPS/01  
 Instrument Calibration Status : Calibrated  
 Meteorological condition during monitoring : Clear Sky  
 Date of Monitoring : 29/06/2020 to 30/06/2020  
 Time of Monitoring : 24 Hrs.  
 Longitude : --  
 Latitude : --  
 Ambient Temperature (°C) : Min.36 Max. 44  
 Surrounding Activity : Human & Vehicular Activities  
 Scope of Monitoring : Regulatory Requirement  
 Control measure if Any : No  
 Sampling & Analysis Protocol : IS-5182  
 Parameter Required : As per Work Order

S. No.	Parameter	Protocol	Result	Unit	NAAQS*
1.	Particulate Matter (PM <sub>2.5</sub> )	IS : 5182 (P-23),2019	35.5	µg/m <sup>3</sup>	60
2.	Particulate Matter (PM <sub>10</sub> )	IS : 5182 (P-23),2006	74.1	µg/m <sup>3</sup>	100
3.	#Mercury as Hg	CPCB Guideline	BDL(DL0.5)	ng/m <sup>3</sup>	--
4.	Nitrogen Dioxide (NO <sub>2</sub> )	IS: 5182 (P-6), Reaffirmed-2006	18.7	µg/m <sup>3</sup>	80
5.	Sulphur Dioxide (SO <sub>2</sub> )	IS: 5182 (P-2), Reaffirmed-2012	10.9	µg/m <sup>3</sup>	80
6.	Suspended Particulate Matter (SPM)	IS: 5182 (P-4),1999 Reaffirmed-2006	165	µg/m <sup>3</sup>	--
7.	Ozone (O <sub>3</sub> ), µg/m <sup>3</sup>	IS: 5182 (P-9)Colorimetric Method	7.4	µg/m <sup>3</sup>	180

\* NAAQS - National Ambient Air Quality Standards; Schedule VII, [Rule 3 (3B)]. [Part-I]-sec -3(i) | 8.11.2009.

#Not Covered in NABL Scope

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MoEF & CC (Recognised [ISO 9001 | OHSAS 45001])

## Test Report

Sample Number: VEL/ REGL/A/07      Report No.: VEL/A/2007010007  
 Name & Address of the Party: M/s Raipur Energen Limited,      Format No.: 5.10 F-01  
 Village: Raikbeda, Block- Pilda, Dist. Raipur - 493225 (C.G.)      Party Reference No.: NIL  
 Reporting Date: 06/07/2020  
 Receipt Date: 01/07/2020      Period of Analysis: 01/07/2020-04/07/2020

Sample Description: AMBIENT AIR QUALITY MONITORING

### General Information:-

Sample collected by : Vardan EnviroLab Representative  
 Sampling Location : Village Galtara  
 Instrument Used : RDS & FPS sampler with all Accessories  
 Instrument Code : VEL/RDS/01 & VEL/FPS/01  
 Instrument Calibration Status : Calibrated  
 Meteorological condition during monitoring : Clear Sky  
 Date of Monitoring : 29/06/2020 to 30/06/2020  
 Time of Monitoring : 24 Hrs.  
 Longitude : 83.3590°  
 Latitude : 21.8336°  
 Ambient Temperature (°C) : Min.32 Max. 41  
 Surrounding Activity : Human & Vehicular Activities  
 Scope of Monitoring : Regulatory Requirement  
 Control measure if Any : No  
 Sampling & Analysis Protocol : IS-5182  
 Parameter Required : As per Work Order

S. No.	Parameter	Protocol	Result	Unit	NAAQS*
1.	Particulate Matter (PM <sub>2.5</sub> )	IS : 5182 (P-23),2019	37.6	µg/m <sup>3</sup>	60
2.	Particulate Matter (PM <sub>10</sub> )	IS : 5182 (P-23),2006	74.8	µg/m <sup>3</sup>	100
3.	#Mercury as Hg	CPCB Guideline	BDL(0.05)	ng/m <sup>3</sup>	--
4.	Nitrogen Dioxide (NO <sub>2</sub> )	IS: 5182 (P-6), Reaffirmed-2006	22.2	µg/m <sup>3</sup>	80
5.	Sulphur Dioxide (SO <sub>2</sub> )	IS: 5182 (P-2), Reaffirmed-2012	11.6	µg/m <sup>3</sup>	80
6.	Suspended Particulate Matter (SPM)	IS: 5182 (P-4),1999 Reaffirmed-2006	172	µg/m <sup>3</sup>	--
7.	Ozone (O <sub>3</sub> ) , µg/m <sup>3</sup>	IS: 5182 (P-9)Colorimetric Method	9.8	µg/m <sup>3</sup>	150

\* NAAQS – National Ambient Air Quality Standards, Schedule-VII, [Rule 3 (3B)], [Part-II-sec. 3(i)] (18.11.2009).

#Not Covered in NABL Scope

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 MoEF & CC Recognised (ISO 9001 | OHSAS 45001)

## Test Report

Sample Number: VEL/REL/A/00 Report No.: VEL/A/2007010008  
 Name & Address of the Party: M/s Raipur Energen Limited, Format No.: S.10 F-01  
 Village: Raikheda, Block-Tilda, Dist. Raipur - 493225 (C.G.) Party Reference No.: NIL  
 Reporting Date: 06/07/2020  
 Receipt Date: 01/07/2020 Period of Analysis: 01/07/2020-04/07/2020

Sample Description: AMBIENT AIR QUALITY MONITORING

### General Information:-

Sample collected by : Vardan EnviroLab Representative  
 Sampling Location : Chatamura Chowk  
 Instrument Used : RDS & FPS sampler with all Accessories  
 Instrument Code : VEL/RDS/04 & VEL/FPS/04  
 Instrument Calibration Status : Calibrated  
 (Meteorological) condition during monitoring : Clear Sky  
 Date of Monitoring : 29/06/2020 to 30/06/2020  
 Time of Monitoring : 24 Hrs.  
 Longitude : -  
 Latitude : -  
 Ambient Temperature (°C) : Min.34 Max. 44  
 Surrounding Activity : Human & Vehicular Activities  
 Scope of Monitoring : Regulatory Requirement  
 Control measure if Any : No  
 Sampling & Analysis Protocol : IS-5182  
 Parameter Required : As per Work Order

S. No.	Parameter	Protocol	Result	Unit	NAAQS*
1.	Particulate Matter (PM <sub>2.5</sub> )	IS : 5182 (P-23),2019	39.4	µg/m <sup>3</sup>	60
2.	Particulate Matter (PM <sub>10</sub> )	IS : 5182 (P-23),2006	82.4	µg/m <sup>3</sup>	100
3.	#Mercury as Hg	CPCB Guideline	BDL(DL0.5)	ng/m <sup>3</sup>	-
4.	Nitrogen Dioxide (NO <sub>2</sub> )	IS: 5182 (P-6), Reaffirmed-2006	22.7	µg/m <sup>3</sup>	80
5.	Sulphur Dioxide (SO <sub>2</sub> )	IS: 5182 (P-2), Reaffirmed-2012	10.5	µg/m <sup>3</sup>	80
6.	Suspended Particulate Matter (SPM)	IS: 5182 (P-4),1999 Reaffirmed-2006	198	µg/m <sup>3</sup>	-
7.	Ozone (O <sub>3</sub> ) , µg/m <sup>3</sup>	IS: 5182 (P-9)Colorimetric Method	9.9	µg/m <sup>3</sup>	180

\* NAAQS – National Ambient Air Quality Standards; Schedule-VI, (Rule 3 (3B)), [Part-II-sec.-3(i)] 18.11.2009  
 #Not Covered in NABL Scope

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### 4.2 Noise Level Monitoring



**Figure No.4. Plan Showing Noise Level Monitoring Location Map**

#### **Ambient Noise Level Monitoring Locations**

- Location Code: -
- N1- Admin Building
  - N2- Field Hostel
  - N3- Gate-1 Main gate
  - N4- Gate-2 Gaitara Gate
  - N5- Gate-3 Bhatapara
  - N6- Gate-4 Mura Colony
  - N7- Gate-5 Labour Colony
  - N8- Near OHC





Laboratory: Plot No. 24, 25, Narayan Vihar B Block, Jaipur (Raj.) 302035  
 Corp. Off.: Plot No. 82A, Sector- 5, IMT Manesar, Gurugram- 122051  
 MoEF & CC Recognised (ISO 9001 ) OHSAS 45001)

## Test Report

Sample Number : VEL/N/2007010001  
 Name & Address of the Party : M/s Raipur Energen Limited  
 Village, Raikheda, Block-Tilda Dist. Raipur -493225 (CG)

Report No. : VEL/N/2007010001  
 Format No : 7 & F-01  
 Party Reference No : NIL  
 Reporting Date : 03/07/2020  
 Receipt Date : 01/07/2020  
 Sampling Duration : 24 Hrs.  
 Sample Collected by : Vardan EnviroLab Team  
 Instrument : Calibrated  
 Calibration Status :

Sample Description : Ambient Noise  
 Scope of Monitoring : Regulatory Requirement  
 Protocol Used : IS 9889; IS 9876  
 Instrument Used : SLM

### General Information

Sampling Location : Admin Building  
 Instrument Code : VEL/SLM/01  
 Meteorological condition during monitoring : Clear Sky  
 Date of Monitoring : 27/06/2020 To 28/06/2020  
 Time of Monitoring : 6.00 to 6.00 AM  
 Ambient Temperature (°C) : Min. 29°C Max. 43°C  
 Surrounding Activity : Human, Vehicular & Plant Acti  
 Parameter Required : As Per Work Order *E*

S.No.	Test Parameters	Protocol	Test Result dB (A)	
			Day Time	Night Time
1	L max	IS: 9989-1981, IS 9876: 1981	69.3	54.2
2	L min	IS: 9989-1981, IS 9876: 1981	50.3	41.9
3	Leq	IS: 9989-1981, IS 9876: 1981	58.46	47.6

Category of Zones	Leq in dB(A)	
	Day	Night
Industrial	75	70
Commercial	65	55
Residential	55	45
Silence Zone	50	40

1. Day Time is from 6.00 AM to 10.00 PM.  
 2. Night Time is reckoned between 10.00 PM to 6.00 AM  
 3. Silence Zone is defined as an area up to 100m around premises of Hospitals, Educational Institutions and Courts. Use of vehicle horn, loudspeaker and bursting of crackers is banned in these zones.  
 Note: Mixed categories of areas be declared as one of the four above mentioned categories by the competent Authority and the corresponding standards shall apply

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Corp. Off.: Plot No. 82A, Sector- 5, IMT Manesar, Gurugram- 122051

MoEF & CC Recognised (ISO 9001 | OHSAS 45001)

## Test Report

Sample Number : VEL/N/2007010002

Name & Address of the Party : M/s Raipur Energen Limited

Village: Rakheda, Block-Tilda Dist. Raipur -493225 (CG)

Sample Description : Ambient Noise

Scope of Monitoring : Regulatory Requirement

Protocol Used : IS 9889; IS 9876

Instrument Used : SLM

Report No. : VEL/N/2007010002

Format No : T 8 F-01

Party Reference No : NIL

Reporting Date : 03/07/2020

Receipt Date : 01/07/2020

Sampling Duration : 24 Hrs

Sample Collected by : Vardan EnviroLab Team

Instrument : Calibrated

Calibration Status

### General Information

Sampling Location : Field Hostel

Instrument Code : VEL/SLM01

Meteorological condition during monitoring : Clear Sky

Date of Monitoring : 28/06/2020 To 29/06/2020

Time of Monitoring : 6:00 to 8:00 AM

Ambient Temperature (°C) : Min. 30°C Max. 44°C

Surrounding Activity : Human, Vehicular & Plant Acti.

Parameter Required : As Per Work Order

S.No.	Test Parameters	Protocol	Test Result dB (A)	
			Day Time	Night Time
1	L max	IS: 9889-1981, IS 9876: 1981	79.3	64.1
2	L min	IS: 9889-1981, IS 9876: 1981	41.1	45.6
3	Leq	IS: 9889-1981, IS 9876: 1981	54.1	43.8

Category of Zones	Leq in dB(A)	
	Day	Night
Industrial	75	70
Commercial	65	55
Residential	55	45
Silence Zone	50	40

1. Day Time is from 6.00 AM to 10.00 PM.

2. Night Time is reckoned between 10.00 PM to 6.00 AM

3. Silence Zone is defined as an area up to 100m around premises of Hospitals, Educational Institutions and Courts. Use of vehicle horn, loudspeaker and bursting of crackers is banned in these zones.

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(Tested-By)



Page No. 1/1

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## Test Report

Sample Number : VELN/2007010003  
 Name & Address of the Party : M/s Raipur Energen Limited  
 Village: Raikheda, Block-Tilda Dist. Raipur-493225 (CG)  
 Sample Description : Ambient Noise  
 Scope of Monitoring : Regulatory Requirement  
 Protocol Used : IS 9080, IS 9076  
 Instrument Used : SLM

Report No. : VELN/2007010003  
 Format No : 7.8 F-01  
 Party Reference No : NIL  
 Reporting Date : 03/07/2020  
 Receipt Date : 01/07/2020  
 Sampling Duration : 24 Hrs.  
 Sample Collected by : Vardan EnviroLab Team  
 Instrument : Calibrated  
 Calibration Status

### General Information

Sampling Location : Gate No. 1 (Main Gate)  
 Instrument Code : VEL/SLM/02  
 Meteorological condition during monitoring : Clear Sky  
 Date of Monitoring : 27/06/2020 To 28/06/2020  
 Time of Monitoring : 6.00 to 6.00 AM  
 Ambient Temperature (°C) : Min. 28°C Max. 42°C  
 Surrounding Activity : Human, Vehicular & Plant Act.  
 Parameter Required : As Per Work Order

S.No.	Test Parameters	Protocol	Test Result dB (A)	
			Day Time	Night Time
1	L <sub>i</sub> max.	IS: 9989-1981, IS 9876: 1981	74.2	58.9
2	L min	IS: 9989-1981, IS 9876: 1981	48.2	44.1
3	Leq	IS: 9989-1981, IS 9876: 1981	* 62.11	47.2

Category of Zones	Leq in dB(A)	
	Day	Night
Industrial	75	70
Commercial	65	55
Residential	55	45
Silence Zone	50	40

1. Day Time is from 6.00 AM to 10.00 PM  
 2. Night Time is reckoned between 10.00 PM to 6.00 AM  
 3. Silence Zone is defined as an area up to 100m around premises of Hospitals, Educational Institutions and Courts. Use of vehicle horn, loudspeaker and bursting of crackers is banned in these zones.  
 Note: Mixed categories of areas be declared as one of the four above mentioned categories by the competent Authority and the corresponding standards shall apply

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## Test Report

Sample Number : VEL/N/2007010004  
 Name & Address of the Party : M/s Raipur Energen Limited  
 Village: Rakheda, Block-Tilda Dist. Raipur -493226 (CG)

Report No : VEL/N/2007010004  
 Format No : 7.6 F-01  
 Party Reference No : NIL  
 Reporting Date : 03/07/2020  
 Receipt Date : 01/07/2020  
 Sampling Duration : 24 Hrs  
 Sample Collected by : Vardan EnviroLab Team  
 Instrument : Calibrated  
 Calibration Status :

Sample Description : Ambient Noise  
 Scope of Monitoring : Regulatory Requirement  
 Protocol Used :  
 Instrument Used : SLM

### General Information

Sampling Location : Gate No. 2 (Gallara Gate)  
 Instrument Code : VEL/SLM/04  
 Meteorological condition during monitoring : Clear Sky  
 Date of Monitoring : 27/06/2020 To 28/06/2020  
 Time of Monitoring : 6:00 to 6:00 AM  
 Ambient Temperature (°C) : Min. 28°C Max. 42°C  
 Surrounding Activity : Human, Vehicular & Plant Acti  
 Parameter Required :

S.No.	Test Parameters	Test Method	Results	
			Observed	Standard
1	L max	IS: 9989-1981, IS 9876: 1981	72.4	72.4
2	L min	IS: 9989-1981, IS 9876: 1981	46.2	41.3
3	Leq	IS: 9989-1981, IS 9876: 1981	57.2	44.8

Category of Zones	Leq in dB(A)	
	Day	Night
Industrial	75	70
Commercial	65	55
Residential	55	45
Silence Zone	50	40

1. Day Time is from 6:00 AM to 10:00 PM.  
 2. Night Time is reckoned between 10:00 PM to 6:00 AM  
 3. Silence Zone is defined as an area up to 100m around premises of Hospitals, Educational institutions and Courts. Use of vehicle horn, loudspeaker and bursting of crackers is banned in these zones.  
 Note: Mixed categories of areas be declared as one of the four above mentioned categories by the competent Authority and the corresponding standards shall apply

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## Test Report

Sample Number : VEL/N/2007010005  
 Name & Address of the Party : M/s Raipur Energen Limited  
 Village Raikheda, Block-Tilda Dist Raipur -493225 (CG)  
 Sample Description : Ambient Noise  
 Scope of Monitoring : Regulatory Requirement  
 Protocol Used :  
 Instrument Used : SLM

Report No. : VEL/N/2007010005  
 Format No : 7.8 F-01  
 Party Reference No : NIL  
 Reporting Date : 03/07/2020  
 Receipt Date : 01/07/2020  
 Sampling Duration : 24 Hrs  
 Sample Collected by : Vardan EnviroLab Team  
 Instrument : Calibrated  
 Calibration Status :

**General Information**  
 Sampling Location : Gate No. 3 (Bhatapara)  
 Instrument Code : VEL/SLM/05  
 Meteorological condition during monitoring : Clear Sky  
 Date of Monitoring : 27/06/2020 To 28/06/2020  
 Time of Monitoring : 6:00 to 6:00 AM  
 Ambient Temperature (°C) : Min. 26°C Max. 40°C  
 Surrounding Activity : Human, Vehicular & Plant Acti.  
 Parameter Required :

S.No.	Test Parameters	Test Method	Results	
1	L max	IS: 9989-1981, IS 9876: 1981	73.2	59.3
2	L min	IS: 9989-1981, IS 9876: 1981	45.2	41.2
3	Leq	IS: 9989-1981, IS 9876: 1981	57.2	44.5

Category of Zones	Leq in dB(A)	
	Day	Night
Industrial	75	70
Commercial	65	55
Residential	55	45
Silence Zone	50	40

- Day Time is from 6:00 AM to 10:00 PM.
  - Night Time is reckoned between 10:00 PM to 6:00 AM.
  - Silence Zone is defined as an area up to 100m around premises of Hospitals, Educational Institutions and Courts. Use of vehicle horn, loudspeaker and bursting of crackers is banned in these zones.
- Note: Mixed categories of areas be declared as one of the four above mentioned categories by the competent Authority and the corresponding standards shall apply.

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 (Tested By)



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## Test Report

Sample Number : VEL/N/2007010006  
 Name & Address of the Party : M/s Raipur Energen Limited  
 Village: Raikheda, Block-Tikda Dist. Raipur -493225 (CG)  
 Sample Description : Ambient Noise  
 Scope of Monitoring : Regulatory Requirement  
 Protocol Used :  
 Instrument Used : SLM

Report No. : VEL/N/2007010006  
 Format No : 7.8 F-01  
 Party Reference No : NIL  
 Reporting Date : 03/07/2020  
 Receipt Date : 01/07/2020  
 Sampling Duration : 24 Hrs  
 Sample Collected by : Vardan EnviroLab Team  
 Instrument : Calibrated  
 Calibration Status :

General Information  
 Sampling Location : Gate No. 4 (Mura Gate)  
 Instrument Code : VEL/SLM/02  
 Meteorological condition during monitoring : Clear Sky  
 Date of Monitoring : 27/06/2020 To 28/06/2020  
 Time of Monitoring : 6.00 to 6.00 AM  
 Ambient Temperature (°C) : Min 26°C Max 40°C  
 Surrounding Activity : Human, Vehicular & Plant Acti.  
 Parameter Required :

S.No.	Test Parameters	Test Method	Results	
1	L max	IS: 9989-1981, IS 9876: 1981	76.2	50.1
2	L min	IS: 9989-1981, IS 9876: 1981	43.2	42.7
3	Leq	IS: 9989-1981, IS 9876: 1981	53.6	43.1

Category of Zones	Leq in dB(A)	
	Day	Night
Industrial	75	70
Commercial	65	55
Residential	55	45
Silence Zone	50	40

1. Day Time is from 6.00 AM to 10.00 PM  
 2. Night Time is reckoned between 10.00 PM to 6.00 AM  
 3. Silence Zone is defined as an area up to 100m around premises of Hospitals, Educational institutions and Courts. Use of vehicle horn, loudspeaker and bursting of crackers is banned in these zones.  
 Note: Mixed categories of areas be declared as one of the four above mentioned categories by the competent Authority and the corresponding standards shall apply

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Corp. Off.: Plot No. 82A, Sector- 5, IMT Manesar, Gurugram- 122051

MoEF & CC Recognised [ISO 9001 | OHSAS 45001]

## Test Report

Sample Number : VEL/N/2007010007

Name & Address of the Party : M/s Raipur Energy Limited

Village, Raikheeda, Block-Tilda Dist. Raipur -493225  
(CO)

Sample Description : Ambient Noise

Scope of Monitoring : Regulatory Requirement

Protocol Used :

Instrument Used : SLM

Report No. : VEL/N/2007010007

Format No : 7.8 F-01

Party Reference No : NIL

Reporting Date : 03/07/2020

Receipt Date : 01/07/2020

Sampling Duration : 24 Hrs.

Sample Collected by : Vardan EnviroLab Team

Instrument : Calibrated

Calibration Status

### General Information

Sampling Location : Near OHC

Instrument Code : VEL/SLM/05

Meteorological condition during monitoring : Clear Sky

Date of Monitoring : 27/06/2020 To 28/06/2020

Time of Monitoring : 8.00 to 8.00 AM

Ambient Temperature (°C) : Min. 28°C Max. 40°C

Surrounding Activity : Human, Vehicular & Plant Acti

Parameter Required :

S.No.	Test Parameters	Test Method	Results	
1	L max	IS: 9969-1981, IS 9876: 1981	68.8	51.3
2	L min	IS: 9969-1981, IS 9875: 1981	48.9	40.8
3	Leq	IS: 9969-1981, IS 9878: 1981	54.8	44.5

Category of Zones	Leq in dB(A)	
	Day	Night
Industrial	75	70
Commercial	65	55
Residential	55	45
Silence Zone	50	40

1. Day Time is from 6.00 AM to 10.00 PM.

2. Night Time is reckoned between 10.00 PM to 6.00 AM

3. Silence Zone is defined as an area up to 100m around premises of Hospitals, Educational Institutions and Courts. Use of vehicle horn, loudspeaker and bursting of crackers is banned in these zones.

Note: Mixed categories of areas to be declared as one of the four above mentioned categories by the competent Authority and the corresponding standards shall apply

\*\*\*End of Report\*\*\*

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(Checked By)



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 Corp. Off.: Plot No. 82A, Sector-5, IMT Manesar, Gurugram- 122051  
 MoEF & CC Recognised [ISO 9001 | OHSAS 45001]

## Test Report

Sample Number : VEL/N/2007010008  
 Name & Address of the Party : M/s Raipur Energen Limited  
 Village: Raikheda, Block-Tilda Dist. Raipur -493225 (CG)  
 Sample Description : Ambient Noise  
 Scope of Monitoring : Regulatory Requirement  
 Protocol Used :  
 Instrument Used : SLM

Report No. : VEL/N/2007010008  
 Format No : 7.8 F-01  
 Party Reference No : Nil  
 Reporting Date : 03/07/2020  
 Receipt Date : 01/07/2020  
 Sampling Duration : 24 Hrs  
 Sample Collected by : Vardan EnviroLab Team  
 Instrument : Calibrated  
 Calibration Status :

### General Information

Sampling Location : Gate 5 Labour Colony  
 Instrument Code : VEL/SLM/03  
 Meteorological condition during monitoring : Clear Sky  
 Date of Monitoring : 28/06/2020 To 29/06/2020  
 Time of Monitoring : 6:00 to 6:00 AM  
 Ambient Temperature (°C) : Min. 25°C Max. 40°C  
 Surrounding Activity : Human, Vehicular & Plant Act.  
 Parameter Required :

S.No.	Test Parameters	Test Method	Results	
1	L max	IS: 9989-1981, IS 9876: 1981	71.3	57.1
2	L min	IS: 9989-1981, IS 9876: 1981	44.1	41.2
3	Leq	IS: 9989-1981, IS 9876: 1981	54.3	43.06

Category of Zones	Leq in dB(A)	
	Day	Night
Industrial	75	70
Commercial	65	55
Residential	55	45
Silence Zone	50	40

- Day Time is from 6:00 AM to 10:00 PM
  - Night Time is reckoned between 10:00 PM to 6:00 AM
  - Silence Zone is defined as an area up to 100m around premises of Hospitals, Educational Institutions and Courts. Use of vehicle horn, loudspeaker and bursting of crackers is banned in these zones.
- Note: Mixed categories of areas be declared as one of the four above mentioned categories by the competent Authority and the corresponding standards shall apply

\*\*\*End of Report\*\*\*

*Tripathi*  
 (Tested By)



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### 4.3 Ground water Quality Analysis



**Figure No.5. Plan Showing Ground Water Quality Monitoring Location Map**

Location Code: -

GW1- Raikheda Village

GW2- Mura Village

GW3- Gaitara Village

GW4- Chicholi Village

GW5- Nr. Field Hostel



Laboratory: Plot No. 24, 25, Narayan Vihar B Block, Jaipur (Raj.) 302035  
 Corp. Off.: Plot No. 82A, Sector- 5, IMT Manesar, Gurugram- 122051  
 MoEF & CC Recognised [ISO 9001 | OHSAS 45001]

## Test Report

Sample Number : VEL/W/2007010001

Name & Address of the Party : M/s Raipur Energen Limited

Village: Raikheda, Block-Tilde Dist. Raipur -493225  
(CG)

Report No. : VEL/W/2007010001

Format No : 7.8 F-01

Party Reference No : NIL

Reporting Date : 08/07/2020

Period of Analysis : 01/07/2020-06/07/2020

Receipt Date : 01/07/2020

Sampling Date : 29/06/2020

Sampling Quantity : 2.0

Sampling Type : Grab

Sample Description : Water Sample

Location : Village Raikheda

Sample Collected by : Vardan EnviroLab Team

Preservation : 25 DEGREE

Sampling and Analysis Protocol : IS 10500 2012

S.No.	Test Parameters	Test Method	Results	Units	IS:10500-2012	
					Acceptable Limit	Permissible Limit
1	pH (at 25°C)	IS 3025(P-11): 1983 Reaff. 2017	7.38		6.5 to 8.5	No Relaxation
2	#Colour	IS 3025: 1983 (P-4) Reaff. 2017	*BDL(**DL 5Hazen)		5	15
3	Turbidity	IS 3025 (Part 10): 1984, Reaff. 2017	*BDL(**DL 0.1NTU)	NTU	1	5
4	#Odour	IS 3025 (P-5) : 2018	Agreeable	**	Agreeable	Agreeable
5	#Taste	IS 3025 (P-8): 1984 Reaff. 2017	Agreeable	**	Agreeable	Agreeable
6	Total Hardness (as CaCO <sub>3</sub> )	IS: 3025 (Part 21): 2009, Reaff. 2019	204.00	mg/l	200	600
7	Calcium (as Ca)	IS: 3025 (Part 40): 1991 Reaff. 2019	63.77	mg/l	75	200
8	Alkalinity (as CaCO <sub>3</sub> )	IS: 3025 (Part 23): 1986, Reaff. 2019	202.80	mg/l	200	600
9	Chloride (as Cl)	IS: 3025 (Part 32): 1988, Reaff. 2019	85.16	mg/l	250	1000
10	#Cyanide (as CN)	APHA 23rd Edition 2017, 4500CN D	*BDL(**DL-0.05 mg/L)	mg/l	0.05	No Relaxation
11	Magnesium (as Mg)	IS: 3025 (Part 46): 1984, Reaff. 2019	10.90	mg/l	30	100
12	Total Dissolved Solids	IS 3025 (P-16): 1984 Reaff. 2017	406.20	mg/l	500	2000
13	Sulphate (as SO <sub>4</sub> )	IS: 3025 (Part 24): 1986, Reaff. 2019	46.45	mg/l	200	400
14	Fluoride (as F)	APHA 23rd Edition 2017, 4500FD	0.35	mg/l	1.0	1.5
15	Nitrate (as NO <sub>3</sub> )	IS: 3025 (Part 34): 1988, Reaff. 2019 (Chromotropic Method)	8.06	mg/l	<45.0	No Relaxation
16	Iron (as Fe)	IS 3025(P-63): 2003 Reaffirm 2019	0.21	mg/l	0.3	No Relaxation
17	Aluminium (as Al)	IS 3025 (Part-55): 2003, Reaff. 2019	*BDL(**DL-0.03 mg/L)	mg/l	0.03	0.2
18	Boron (as B)	APHA 23rd Edition Year 2017 Method No. 4500B	*BDL(**DL-0.2 mg/L)	mg/l	0.5	1.0
19	Phenolic Compounds (C <sub>6</sub> H <sub>5</sub> OH)	APHA 23rd Edition 2017, 5530C	*BDL(**DL-0.001 mg/L)	mg/l	0.001	0.002
20	#Mineral Oil	IS 3025 (P-39)	*BDL(**DL-0.5 mg/L)	mg/l	0.5	No Relaxation
21	#Anionic Detergents (as MBAS)	APHA 23rd Edition 2017, 5540C	*BDL(**DL-0.10 mg/L)	mg/l	0.2	1.0



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Laboratory: Plot No. 24, 25, Narayan Vihar B Block, Jaipur (Raj.) 302035

Corp. Off.: Plot No. 82A, Sector- 5, IMT Manesar, Gurugram- 122051

MoEF & CC Recognised [ISO 9001 | OHSAS 45001]

## Test Report

Sample Number : VEL/W/2007010001

Report No. : VEL/W/2007010001

S.No.	Test Parameters	Test Method	Results	Units	IS:16500-2012	
					Acceptable Limit	Permissible Limit
22	Zinc (as Zn)	APHA (23rd edition-2017), 3330D, 3113 B	*BDL(**DL-0.2 mg/L)	mg/l	5.0	15.0
23	Copper (as Cu)	APHA 23rd Edition Year 2017 Method No. 3111B	*BDL(**DL-0.02 mg/L)	mg/l	0.05	1.5
24	Manganese (as Mn)	APHA 23rd edition-2017), 3030D, 3111 B	*BDL(**DL-0.05 mg/L)	mg/l	0.1	0.3
25	Selenium (as Se)	APHA (23rd edition-2017), 3114C	*BDL(**DL-0.005 mg/L)	mg/l	0.01	No Relaxation
26	Arsenic (as As)	APHA (23rd edition-2017), 3114C	*BDL(**DL-0.005 mg/L)	mg/l	0.01	0.05
27	#Total Coliform	IS 1622:2009	Absent	MPN/100 ml	Shall not be detectable in any 100 ml sample	-
28	#E.Coli	IS 1622:2009	Absent	MPN/100 ml	Shall not be detectable in any 100 ml sample	-
29	Ammonia	IS-3026 (Part-34)- 1988, Reaff: 2019	*BDL(**DL-0.5 mg/L)	mg/l	0.5	No Relaxation
30	Sulphide	IS 3026 (P-29) :1985 Reaff 2019 Idometric	*BDL(**DL-0.05 mg/L)	mg/l	0.05	No Relaxation
31	#Chloramines as CL2	APHA 4500G	*BDL(**DL-0.5 mg/L)	mg/l	4.0	No relaxation
32	#Barium as Ba	APHA 3111B	*BDL(**DL-0.01 mg/L)	mg/l	0.7	No relaxation
33	Residual Free Chlorine	APHA 4500 Cl-B	*BDL(**DL-0.2 mg/L)	mg/l	0.2	1.0
34	#Fecal Coliform	IS 1622,1981 (Ref.2003)	Absent	MPN/100 ml	-	-

\*BDL-Below Detection Limit, \*\*DL-Detection Limit

\*\*\*End of Report\*\*\*

(Checked By)



- Note:
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  - This report is not to be reproduced wholly or in part and cannot be used as evidence in the court of law



Laboratory: Plot No. 24, 25, Narayan Vihar B Block, Jaipur (Ra.) 302035  
 Corp. Off.: Plot No. 82A, Sector- 5, IMT Manesar, Gurugram- 122051  
 MoEF & CC Recognised (ISO 9001 | OHSAS 45001)

## Test Report

Sample Number : VEL/W/2007010002

Report No. : VEL/W/2007010002

Name & Address of the Party : M/s Raipur Energy Limited

Formal No : 7.8 F-01

Village: Raikhedra, Block-Tilda Dist. Raipur -493226 (CG)

Party Reference No : NIL

Reporting Date : 05/07/2020

Period of Analysis : 01/07/2020-05/07/2020

Receipt Date : 01/07/2020

Sampling Date : 29/06/2020

Sampling Quantity : 2.0

Sampling Type : Grab

Sample Description : Water Sample

Location : Village - MURA

Sample Collected by : Vardan EnviroLab Team

Preservation : 25 DEGREE

Sampling and Analysis Protocol : IS 10500 2012

S.No.	Test Parameters	Test Method	Results	Unit	IS-10500-2012	
					Acceptable Limit	Permissible Limit
1	pH (at 25°C)	IS 3025(P-11): 1983 Reaff. 2017	7.28		6.5 to 8.5	No Relaxation
2	#Colour	IS 3025: 1983 (P-4) Reaff. 2017	*BDL(**DL 6Hazen)		5	15
3	Turbidity	IS 3025 (Part 10): 1984, Reaff. 2017	*BDL(**DL 0.1NTU)	NTU	1	5
4	#Odour	IS 3025 (P-5) : 2018	Agreeable	-	Agreeable	Agreeable
5	#Taste	IS 3025 (P-8): 1984 Reaff. 2017	Agreeable	--	Agreeable	Agreeable
6	Total Hardness (as CaCO3)	IS: 3025 (Part 21): 2009, Reaff. 2019	183.60	mg/l	200	500
7	Calcium (as Ca)	IS: 3025 (Part 40): 1991 Reaff. 2019	52.32	mg/l	75	200
8	Alkalinity (as CaCO3)	IS: 3025 (Part 23): 1988, Reaff. 2019	171.80	mg/l	200	500
9	Chloride (as Cl)	IS: 3025 (Part 32): 1988, Reaff. 2019	56.77	mg/l	250	1000
10	#Cyanide (as CN)	APHA 23rd Edition 2017, 4500CN D	*BDL(**DL-0.05 mg/L)	mg/l	0.05	No Relaxation
11	Magnesium (as Mg)	IS: 3025 (Part 46): 1994, Reaff. 2019	12.89	mg/l	30	100
12	Total Dissolved Solids	IS 3025 (P-16): 1984 Reaff. 2017	298.20	mg/l	500	2000
13	Sulphate (as SO4)	IS: 3025 (Part 24): 1986, Reaff. 2019	22.58	mg/l	200	400
14	Fluoride (as F)	APHA 23rd Edition 2017, 4500FD	0.30	mg/l	1.0	1.5
15	Nitrate (as NO3)	IS: 3025 (Part 34): 1988, Reaff. 2019 (Chromotropic Method)	1.17	mg/l	45.0	No Relaxation
16	Iron (as Fe)	IS 3025(P-53): 2003 Reaffirm 2019	0.18	mg/l	0.3	No Relaxation
17	Aluminium (as Al)	IS 3025 (Part-55): 2003, Reaff. 2019	*BDL(**DL-0.03 mg/L)	mg/l	0.03	0.2
18	Boron (as B)	APHA 23rd Edition Year 2017 Method No. 4500B	*BDL(**DL-0.2 mg/L)	mg/l	0.5	1.0
19	Phenolic Compounds (C6H5OH)	APHA 23rd Edition 2017, 5530C	*BDL(**DL-0.001 mg/L)	mg/l	0.001	0.002
20	#Mineral Oil	IS 3025 (P-39)	*BDL(**DL-0.5 mg/L)	mg/l	0.5	No Relaxation
21	#Anionic Detergents (as MBAS)	APHA 23rd Edition 2017, 5540C	*BDL(**DL-0.10 mg/L)	mg/l	0.2	1.0

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## Test Report

Sample Number: VEL/W/2007010002

Report No:

VEL/W/2007010002

S.No.	Test Parameters	Test Method	Results	Units	IS:10500-2012	
					Acceptable Limit	Permissible Limit
22	Zinc (as Zn)	APHA (23rd edition-2017), 3030D, 3111 B	*BDL(**DL-0.2 mg/L)	mg/l	5.0	15.0
23	Copper (as Cu)	APHA 23rd Edition Year 2017 Method No. 3111B	*BDL(**DL-0.05 mg/L)	mg/l	0.05	1.5
24	Manganese (as Mn)	APHA 23rd edition-2017), 3030L, 3111 B	*BDL(**DL-0.05 mg/L)	mg/l	0.1	0.3
25	Selenium (as Se)	APHA (23rd edition-2017), 3114C	*BDL(**DL-0.005 mg/L)	mg/l	0.01	No Relaxation
26	Arsenic (as As)	APHA (23rd edition-2017), 3114C	*BDL(**DL-0.005 mg/L)	mg/l	0.01	0.05
27	#Total Coliform	IS 1622:2009	Absent	MPN/100 ml	Shall not be detectable in any 100 ml sample	--
28	#E.Coli	IS 1622:2009	Absent	MPN/100 ml	Shall not be detectable in any 100 ml sample	--
29	Ammonia	IS-3025 (Part-34)- 1988, Reaff. 2019	*BDL(**DL-0.5 mg/L)	mg/l	0.5	No Relaxation
30	Sulphide	IS 3026 (P-29) :1986 Reaff 2019 Idometric	*BDL(**DL-0.05 mg/L)	mg/l	0.05	No Relaxation
31	#Chloramines as CL2	APHA 4500G	*BDL(**DL-0.5 mg/L)	mg/l	4.0	No relaxation
32	#Barium as Ba	APHA 3111B	*BDL(**DL-0.01 mg/L)	mg/l	0.7	No relaxation
33	Residual Free Chlorine	APHA 4500 Cl-B	*BDL(**DL-0.2 mg/L)	mg/l	0.2	1.0
34	#Fecal Coliform	IS 1622,1981 (Ref.2003)	Absent	MPN/100 ml		-

\*BDL-Below Detection Limit. \*\*DL-Detection Limit

\*\*\*End of Report\*\*\*

(Checked By)



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Laboratory: Plot No. 24, 25, Narayan Vihar B Block, Jaipur (Raj.) 302035  
 Corp. Off.: Plot No. 82A, Sector - 5, IMT Manesar, Gurugram- 122051  
 MoEF & CC Recognised [ISO 9001 | OHSAS 45001]

## Test Report

Sample Number : VEL/W/2007010003

Name & Address of the Party : M/s Rajpur Energen Limited

Village: Rajkheda, Block-Tilda Dist. Rajpur -493225 (UG)

Report No. : VEL/W/2007010003

Format No : 7.8 F-01

Party Reference No : Nil

Reporting Date : 06/07/2020

Period of Analysis : 01/07/2020-06/07/2020

Receipt Date : 01/07/2020

Sampling Date : 29/06/2020

Sampling Quantity : 2.0

Sampling Type : Grab

Sample Description : Water Sample

Location : Village - Galfara

Sample Collected by : Vardan EnviroLab Team

Preservation : 25 DEGREE

Sampling and Analysis Protocol : IS 10500 2012

S.No.	Test Parameters	Test Method	Results	Units	IS:10500-2012	
					Acceptable Limit	Permissible Limit
1	pH (at 25°C)	IS 3025(P-11): 1983 Reaff. 2017	7.52		6.5 to 8.5	No Relaxation
2	#Colour	IS 3025: 1983 (P-4) Reaff. 2017	*BDL(**DL 5Hazen)		5	15
3	Turbidity	IS 3025 (Part 10): 1984, Reaff. 2017	*BDL(**DL 0.1NTU)	NTU	1	5
4	#Odour	IS 3025 (P-5) - 2018	Agreeable	--	Agreeable	Agreeable
5	#Taste	IS 3025 (P-8): 1984 Reaff. 2017	Agreeable	--	Agreeable	Agreeable
6	Total Hardness (as CaCO <sub>3</sub> )	IS: 3025 (Part 21): 2009, Reaff. 2019	191.76	mg/l	200	500
7	Calcium (as Ca)	IS: 3025 (Part 40): 1991 Reaff. 2019	67.04	mg/l	75	200
8	Alkalinity (as CaCO <sub>3</sub> )	IS: 3025 (Part 23): 1986, Reaff. 2019	179.40	mg/l	200	500
9	Chloride (as Cl)	IS: 3025 (Part 32): 1988, Reaff. 2019	66.91	mg/l	250	1000
10	#Cyanide (as CN)	APHA 23rd Edition 2017, 4500CN D	*BDL(**DL-0.05 mg/L)	mg/l	0.05	No Relaxation
11	Magnesium (as Mg)	IS: 3025 (Part 46): 1994, Reaff. 2019	5.95	mg/l	30	100
12	Total Dissolved Solids	IS 3025 (P-16): 1984 Reaff. 2017	316.40	mg/l	500	2000
13	Sulphate (as SO <sub>4</sub> )	IS: 3025 (Part 24): 1986, Reaff. 2019	16.12	mg/l	200	400
14	Fluoride (as F)	APHA 23rd Edition 2017, 4500FD	0.24	mg/l	1.0	1.5
15	Nitrate (as NO <sub>3</sub> )	IS: 3025 (Part 34): 1988, Reaff. 2019 (Chromotropic Method)	1.26	mg/l	45.0	No Relaxation
16	Iron (as Fe)	IS 3025(P-53): 2003 Reaffirm 2019	0.15	mg/l	0.3	No Relaxation
17	Aluminium (as Al)	IS 3025 (Part-55): 2003, Reaff. 2019	*BDL(**DL-0.03 mg/L)	mg/l	0.03	0.2
18	Boron (as B)	APHA 23rd Edition Year 2017 Method No. 4500B	*BDL(**DL-0.2 mg/L)	mg/l	0.5	1.0
19	Phenolic Compounds (C <sub>6</sub> H <sub>5</sub> OH)	APHA 23rd Edition 2017, 5530C	*BDL(**DL-0.001 mg/L)	mg/l	0.001	0.002
20	#Mineral Oil	IS 3025 (P-39)	*BDL(**DL-0.5 mg/L)	mg/l	0.5	No Relaxation
21	#Anionic Detergents (as MBAS)	APHA 23rd Edition 2017, 8540C	*BDL(**DL-0.10 mg/L)	mg/l	0.2	1.0

- Note: a) The results listed refer only to the tested samples & applicable parameters  
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Laboratory: Plot No. 24, 25, Narayan Vihar B Block, Jaipur (Raj.) 302035  
 Corp. Off.: Plot No. 82A, Sector- 5, IMT Manesar, Gurugram- 122051  
 MoEF & CC Recognised (ISO 9001 | OHSAS 45001)

## Test Report

Sample Number : VEL/W/2007010003

Report No. : VEL/W/2007010003

S.No.	Test Parameters	Test Method	Results	Units	IS:10500-2012	
					Acceptable Limit	Permissible Limit
22	Zinc (as Zn)	APHA (23rd edition-2017), 3030D, 3113 B	*BDL(**DL-0.2 mg/L)	mg/l	5.0	15.0
23	Copper (as Cu)	APHA 23rd Edition Year 2017 Method No. 3111B	*BDL(**DL-0.02 mg/L)	mg/l	0.05	1.5
24	Manganese (as Mn)	APHA 23rd edition-2017), 3030D, 3111 B	*BDL(**DL-0.05 mg/L)	mg/l	0.1	0.3
25	Selenium (as Se)	APHA (23rd edition-2017) 3114C	*BDL(**DL-0.005 mg/L)	mg/l	0.01	No Relaxation
26	Arsenic (as As)	APHA (23rd edition-2017), 3114C	*BDL(**DL-0.005 mg/L)	mg/l	0.01	0.05
27	#Total Coliform	IS 1622:2009	Absent	MPN/100 ml	Shall not be detectable in any 100 ml sample	-
28	#E. Coli	IS 1622:2009	Absent	MPN/100 ml	Shall not be detectable in any 100 ml sample	-
29	Ammonia	IS-3025 (Part-34)- 1986, Reaff- 2019	*BDL(**DL-0.5 mg/L)	mg/l	0.5	No Relaxation
30	Sulphide	IS 3025 (P-29) :1986 Reaff 2019 Idometric	*BDL(**DL-0.05 mg/L)	mg/l	0.05	No Relaxation
31	#Chloramines as Cl <sub>2</sub>	APHA 4500G	*BDL(**DL-0.5 mg/L)	mg/l	4.0	No relaxation
32	#Barium as Ba	APHA 3111B	*BDL(**DL-0.01 mg/L)	mg/l	0.1	No relaxation
33	Residual Free Chlorine	APHA 4500 Cl-B	*BDL(**DL-0.2 mg/L)	mg/l	0.2	1.0
34	#Fecal Coliform	IS 1622:1981 (Part 2005)	Absent	MPN/100 ml	-	-

\*BDL- Below Detection Limit, \*\*DL-Detection Limit

\*\*End of Report\*\*

  
(Checked By)



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Laboratory: Plot No. 24, 25, Narayan Vihar B Block, Jaipur (Raj.) 302035  
 Corp. Off: Plot No. 82A, Sector- 5, IIT Manesar, Gurugram- 122051  
 MoEF & CC Recognised [ISO 9001 | OHSAS 45001]

## Test Report

Sample Number: VEL/W/2007010004

Name & Address of the Party: M/s Rajpur Energen Limited

Village: Raikheda, Block-Tilwa Dist. Raipur -493225 (CG)

Report No: VEL/W/2007010004

Format No: T B F-01

Party Reference No: NIL

Reporting Date: 06/07/2020

Period of Analysis: 01/07/2020-06/07/2020

Receipt Date: 01/07/2020

Sampling Date: 29/06/2020

Sampling Quantity: 3.0

Sampling Type: Grab

Sample Description: Water Sample

Location: Village - Chidhwa

Sample Collected by: Vardan EnviroLab Team

Preservation: 19 DEGREE

Sampling and Analysis Protocol: IS 10500 2012

S No	Test Parameters	Test Method	Results	Units	IS 10500-2012	
					Acceptable Limit	Permissible Limit
1	pH (at 20°C)	IS 3026(P-11): 1983 Reaff. 2017	7.45		6.5 to 8.5	No Relaxation
2	#Colours	IS 3026- 1983 (P-4) Reaff. 2017	*BDL(**DL 5 Hazen)		0	15
3	Turbidity	IS 3026 (Part 10): 1984, Reaff. 2017	*BDL(**DL 0.1 NTU)	NTU	1	5
4	#Odour	IS 3026 (P-6) : 2010	Agreeable	-	Agreeable	Agreeable
5	#Taste	IS 3026 (P-8): 1984 Reaff. 2017	Agreeable	-	Agreeable	Agreeable
6	Total Hardness (as CaCO <sub>3</sub> )	IS: 3026 (Part 21): 2009, Reaff. 2019	216.24	mg/l	200	600
7	Calcium (as Ca)	IS: 3026 (Part 40): 1991 Reaff. 2019	68.88	mg/l	75	200
8	Alkalinity (as CaCO <sub>3</sub> )	IS: 3026 (Part 23): 1986, Reaff. 2019	187.20	mg/l	200	900
9	Chloride (as Cl)	IS: 3026 (Part 32): 1986, Reaff. 2019	68.94	mg/l	250	1000
10	#Cyanide (as CN)	APHA 23rd Edition 2017, 4500CN O	*BDL(**DL-0.05 mg/L)	mg/l	0.05	No Relaxation
11	Magnesium (as Mg)	IS: 3026 (Part 48): 1994, Reaff. 2019	10.90	mg/l	30	100
12	Total Dissolved Solids	IS 3026 (P-16): 1984 Reaff. 2017	328.20	mg/l	500	2000
13	Sulphate (as SO <sub>4</sub> )	IS: 3026 (Part 24): 1986, Reaff. 2019	33.54	mg/l	200	400
14	Fluoride (as F)	APHA 23rd Edition 2017, 4500FD	0.29	mg/l	1.0	1.5
15	Nitrate (as NO <sub>3</sub> )	IS: 3026 (Part 34): 1988, Reaff. 2019 (Chromotropic Method)	1.20	mg/l	45.0	No Relaxation
16	Iron (as Fe)	IS 3026(P-53): 2003 Reaffirm 2019	0.16	mg/l	0.3	No Relaxation
17	Aluminium (as Al)	IS 3026 (Part-55): 2003, Reaff. 2019	*BDL(**DL-0.03 mg/L)	mg/l	0.03	0.2
18	Boron (as B)	APHA 23rd Edition Year 2017, Method No. 4500B	*BDL(**DL-0.2 mg/L)	mg/l	0.6	1.0
19	Phenolic Compounds (C <sub>6</sub> H <sub>5</sub> OH)	APHA 23rd Edition 2017, 5530C	*BDL(**DL-0.001 mg/L)	mg/l	0.001	0.002
20	#Mineral Oil	IS 3026 (P-39)	*BDL(**DL-0.5 mg/L)	mg/l	0.5	No Relaxation
21	#Anionic Detergents (as #BAS)	APHA 23rd Edition 2017, 5540C	*BDL(**DL-0.10 mg/L)	mg/l	0.2	1.0

- Note: a) The results listed refer only to the tested samples & applicable parameters  
 b) Total liabilities of our lab will be restricted to the invoice amount only  
 c) The Sample will be destroyed after routine use unless otherwise specified  
 d) This report is not to be reproduced wholly or in part and cannot be used as evidence in the court of law.







Laboratory: Plot No. 24, 25, Narayan Vihar B Block, Jaipur (Raj.) 302035  
 Corp. Off.: Plot No. 82A, Sector- 5, IMT Manesar, Gurugram- 122051  
 MoEF & CC Recognised (ISO 9001 | OHSAS 45001)

## Test Report

Sample Number : VEL/W/2007010004

Report No. : VEL/W/2007010004

S.No.	Test Parameters	Test Method	Results	Units	IS:10500-2012	
					Acceptable Limit	Permissible Limit
22	Zinc (as Zn)	APHA (23rd edition-2017), 3030D, 3113 B	*BDL(**DL-0.2 mg/L)	mg/l	5.0	15.0
23	Copper (as Cu)	APHA 23rd Edition Year 2017 Method No. 3111B	*BDL(**DL-0.02 mg/L)	mg/l	0.05	1.5
24	Manganese (as Mn)	APHA 23rd edition-2017), 3030D, 3111 B	*BDL(**DL-0.05 mg/L)	mg/l	0.1	0.3
25	Selenium (as Se)	APHA (23rd edition-2017), 3114C	*BDL(**DL-0.005 mg/L)	mg/l	0.01	No Relaxation
26	Arsenic (as As)	APHA (23rd edition-2017), 3114C	*BDL(**DL-0.005 mg/L)	mg/l	0.01	0.05
27	#Total Coliform	IS 1622:2009	Absent	MPN/10 0 ml	Shall not be detectable in any 100 ml sample	-
28	#E Coli	IS 1622:2009	Absent	MPN/10 0 ml	Shall not be detectable in any 100 ml sample	-
29	Ammonia	IS-3025 (Part-34)- 1988, Reaff: 2019	*BDL(**DL-0.5 mg/L)	mg/l	0.5	No Relaxation
30	Sulphide	IS 3025 (P-29) :1988 Reaff 2019 Idometric	*BDL(**DL-0.05 mg/L)	mg/l	0.05	No Relaxation
31	#Chloramines as CL2	APHA 4500G	*BDL(**DL-0.5 mg/L)	mg/l	4.0	No relaxation
32	#Barium as Ba	APHA 3111B	*BDL(**DL-0.01 mg/L)	mg/l	0.7	No relaxation
33	Residual Free Chlorine	APHA 4500 Cl-B	*BDL(**DL-0.2 mg/L)	mg/l	0.2	1.0
34	#Fecal Coliform	IS 1622,1981 (Ref.2003)	Absent	MPN/10 0ml	-	-

\*BDL-Below Detection Limit, \*\*DL-Detection Limit

\*\*\*End of Report\*\*\*

  
(Checked By)



Note: a) The results listed refer only to the tested samples & applicable parameters  
 b) Total liabilities of our lab will be restricted to the invoice amount only  
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Laboratory: Plot No. 24, 25, Narayan Vihar B Block, Jaipur (Raj.) 302035  
 Corp. Off.: Plot No. 82A, Sector- 5, IMT Manesar, Gurugram- 122051  
 MoEF & CC Recognised | ISO 9001 | OHSAS 45001

## Test Report

Sample Number : VELW/2007010005

Name & Address of the Party : M/s Raipur Energen Limited

Village: Raikheda, Block-Tilda Dist Raipur -493225  
(CG)

Report No. : VELW/2007010005

Format No : 7 B F-01

Party Reference No : NIL

Reporting Date : 06/07/2020

Period of Analysis : 01/07/2020-06/07/2020

Receipt Date : 01/07/2020

Sampling Date : 29/06/2020

Sampling Quantity : 2.0

Sampling Type : Grab

Sample Description : Water Sample

Location : Village - Nr. Field Hostel

Sample Collected by : Vardan EnviroLab Team

Preservation : 25 DEGREE

Sampling and Analysis Protocol : IS 10500 2012

S.No.	Test Parameters	Test Method	Results	Units	IS:10500-2012	
					Acceptable Limit	Permissible Limit
1	pH (at 25°C)	IS 3025(P-11): 1983 Reaff. 2017	7.30		6.5 to 8.5	No Relaxation
2	#Colour	IS 3025: 1983 (P-4) Reaff. 2017	*BDL(**DL 5Hazen)		5	15
3	Turbidity	IS 3025 (Part 10): 1984, Reaff. 2017	*DDI(**DL 0.1NTU)	NTU	1	5
4	#Odour	IS 3025 (P-5) : 2018	Agreeable	-	Agreeable	Agreeable
5	#Taste	IS 3025 (P-5): 1984 Reaff. 2017	Agreeable	-	Agreeable	Agreeable
6	Total Hardness (as CaCO <sub>3</sub> )	IS: 3025 (Part 21): 2009, Reaff. 2019	167.28	mg/l	200	600
7	Calcium (as Ca)	IS: 3025 (Part 40): 1991 Reaff. 2019	62.32	mg/l	75	200
8	Alkalinity (as CaCO <sub>3</sub> )	IS: 3025 (Part 23): 1985, Reaff. 2019	163.50	mg/l	200	600
9	Chloride (as Cl)	IS: 3025 (Part 32): 1988, Reaff. 2019	50.69	mg/l	250	1000
10	#Cyanide (as CN)	APHA 23rd Edition 2017, 4500CN D	*BDL(**DL-0.05 mg/L)	mg/l	0.05	No Relaxation
11	Magnesium (as Mg)	IS: 3025 (Part 48): 1994, Reaff. 2019	8.92	mg/l	30	100
12	Total Dissolved Solids	IS 3025 (P-16): 1984 Reaff. 2017	267.20	mg/l	500	2000
13	Sulphate (as SO <sub>4</sub> )	IS: 3025 (Part 24): 1986, Reaff. 2019	23.87	mg/l	200	400
14	Fluoride (as F)	APHA 23rd Edition 2017, 4500FD	0.33	mg/l	1.0	1.6
15	Nitrate (as NO <sub>3</sub> )	IS: 3025 (Part 34): 1988, Reaff. 2019 (Chromotropic Method)	1.16	mg/l	45.0	No Relaxation
16	Iron (as Fe)	IS 3025(P-53): 2003 Reaffirm 2019	0.17	mg/l	0.3	No Relaxation
17	Aluminium (as Al)	IS 3025 (Part-55): 2003, Reaff. 2019	*BDL(**DL-0.03 mg/L)	mg/l	0.03	0.2
18	Boron (as B)	APHA 23rd Edition Year 2017 Method No. 4500B	*BDL(**DL-0.2 mg/L)	mg/l	0.5	1.0
19	Phenolic Compounds (C <sub>6</sub> H <sub>5</sub> OH)	APHA 23rd Edition 2017, 5530C	*BDL(**DL-0.001 mg/L)	mg/l	0.001	0.002
20	#Mineral Oil	IS 3025 (P-39)	*BDL(**DL-0.6 mg/L)	mg/l	0.5	No Relaxation
21	#Anionic Detergents (as MBAS)	APHA 23rd Edition 2017, 5540C	*BDL(**DL-0.10 mg/L)	mg/l	0.2	1.0

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Laboratory: Plot No. 24, 25, Narayan Vihar B Block, Jaipur (Ra.) 302035  
 Corp. Off.: Plot No. 82A, Sector - 5, IMT Manesar, Gurugram- 122051  
 MoEF & CC Recognised (ISO 9001 | OHSAS 45001)

## Test Report


Sample Number: VEL/W/2007010005

Report No.: VEL/W/2007010005

S.No.	Test Parameters	Test Method	Results	Units	IS 10660-2012	
					Acceptable Limit	Permissible Limit
22	Zinc (as Zn)	APHA (23rd edition-2017), 30300, 3113 B	*BDL(**DL-0.2 mg/L)	mg/l	5.0	15.0
23	Copper (as Cu)	APHA 23rd Edition Year 2017 Method No. 3114B	*BDL(**DL-0.02 mg/L)	mg/l	0.05	1.5
24	Manganese (as Mn)	APHA 23rd edition-2017), 30300, 3111 B	*BDL(**DL-0.05 mg/L)	mg/l	0.1	0.3
25	Selenium (as Se)	APHA (23rd edition 2017), 3114C	*BDL(**DL-0.005 mg/L)	mg/l	0.01	No Relaxation
26	Arsenic (as As)	APHA (23rd edition-2017), 3114C	*BDL(**DL-0.005 mg/L)	mg/l	0.01	0.05
27	#Total Coliform	IS 1622-2009	Absent	MPN/100 ml	Shall not be detectable in any 100 ml sample	-
28	#E.Coli	IS 1622-2009	Absent	MPN/100 ml	Shall not be detectable in any 100 ml sample	-
29	Ammonia	IS-3025 (Part-34)- 1986, Reaff- 2019	*BDL(**DL-0.5 mg/l)	mg/l	0.5	No Relaxation
30	Sulphide	IS 3025 (P-29) : 1986 Reaff 2018 Idometric	*BDL(**DL-0.05 mg/L)	mg/l	0.05	No Relaxation
31	#Chloramines as Cl <sub>2</sub>	APHA 4500G	*BDL(**DL-0.5 mg/L)	mg/l	4.0	No relaxation
32	#Barium as Ba	APHA 3111B	*BDL(**DL-0.01 mg/L)	mg/l	0.7	No relaxation
33	Residual Free Chlorine	APHA 4500 Cl-B	*BDL(**DL-0.2 mg/L)	mg/l	0.2	1.0
34	#Fecal Coliform	IS 1622,1981 (Ref.2003)	Absent	MPN/100ml	-	-

\*BDL-Below Detection Limit, \*\*DL-Detection Limit

\*\*\*End of Report\*\*\*

  
(Checked By)



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#### 4.4 Surface water Quality Analysis



**Figure. No. 6. Plan Showing Surface Water Quality Monitoring Location Map**

Location Code: - SW1. Raikheda Talab

SW2. Bangoli Dam

SW3. Mura Talab

SW4. Chhicholi Talab



# Vardan EnviroLab



Laboratory: Plot No. 24, 25, Narayan Vihar B Block, Jaipur (Raj.) 302035  
 Corp. Off.: Plot No. 82A, Sector- 5, IMT Manesar, Gurugram- 122051  
 MoEF & CC Recognised [ISO 9001 | OHSAS 45001]

## Test Report

Sample Number : VEL/W/2007010006  
 Name & Address of the Party : M/s Raipur Energy Limited  
 Village Raikhada, Block Tilda Dist Raipur -493225 (CG)  
 Name of the Project :  
 Sample Description : SURFACE WATER  
 Location : Bangoli Dam  
 Sample Collected by : Vardan EnviroLab Representative  
 Parameter Required : As Per Work Order  
 Sampling and Analysis Protocol : IS 2296

Report No. : VEL/W/2007010006  
 Format No : 7.8 F-01  
 Party Reference No : NIL  
 Reporting Date : 06/07/2020  
 Period of Analysis : 01/07/2020-06/07/2020  
 Receipt Date : 01/07/2020  
 Sampling Date : 20/06/2020  
 Sampling Quantity :  
 Sampling Type : Grab  
 Preservation : 23 DEGREE

S No.	Test Parameters	Test Method	Results	Units
1	Colour	IS 3025: 1997 (P-4) Reaff.2017	3.0	
2	pH value	IS 3025 (P-11): 1983 Reaff. 2017	7.45	
3	Turbidity	IS 3025 (Part 10): 1984, Reaff. 2017, (Nephelometric Method)	2.0	NTU
4	Total Dissolved Solids	IS 3025 (P-16): 1984 Reaff 2017	164.70	mg/l
5	Chloride (as Cl)	IS: 3025 (Part 32): 1988, Reaff. 2019	44.81	mg/l
6	Sulphate as (SO4)	IS: 3025 (Part 24): 1986, Reaff. 2019 (Turbidity Method)	29.03	mg/l
7	Total Alkalinity (as CaCO3)	IS: 3025 (Part 23): 1986, Reaff. 2019	105.30	mg/l
8	Total Hardness (CaCO3)	IS: 3025 (Part 21): 2009, Reaff. 2019	122.40	mg/l
9	Calcium (as Ca)	IS: 3025 (Part 40): 1991 Reaff. 2019 (EDTA method)	29.43	mg/l
10	Magnesium	IS: 3025 (Part 46): 1994, Reaff. 2019 (EDTA method)	11.90	mg/l
11	Fluoride ( as F)	APHA 23rd Edition 2017, 4500FD	0.24	mg/l
12	Nitrate (as NO3)	IS: 3025 (Part 34): 1986, Reaff. 2019 (Chromotropic Method)	4.78	mg/l
13	Phenolic compounds	APHA 23rd Edition 2017, 5530C	*BDL (**DL 0.001 mg/l)	mg/l
14	Anionic Surface active agents (as MBAS)	APHA 23rd Edition 2017, 5540C	*BDL (**DL 0.02 mg/l)	mg/l
15	Dissolved oxygen	IS : 3025 (Part-38) : 1989, Ref: 2019	6.30	mg/l
16	Biochemical Oxygen Demand (BOD) ( 5 days at 27°C)	IS: 3025 (Part-44): 1993, Ref: 2019	16.35	mg/l
17	Chemical Oxygen Demand (COD)	IS : 3025 (Part 58) : 2006(ef): 2017	49.36	mg/l
18	Residual Free Chlorine	IS:3025(P-28):1986,RA:2019:1986	*BDL (**DL 0.2 mg/l)	mg/l

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 Corp. Off.: Plot No. 82A, Sector- 5, IMT Manesar, Gurugram- 122051  
 MoEF & CC Recognised (ISO 9001 | OHSAS 45001)

## Test Report

Sample Number : VEL/W/2007010000

Report No. : VEL/W/2007010000

S No	Test Parameters	Test Method	Results	Units
18			mg/l)	
19	Iron	IS:3025(P-53):2003,RA.2019.2003	0.22	mg/l
20	Zinc as (Zn)	APHA 3030D,3113B	0.16	mg/l
21	Copper (Cu)	APHA3111B	*BDL(**DL 0.03 mg/l)	mg/l
22	Manganese as Mn	APHA3111B	*BDL(**DL 0.06 mg/l)	mg/l
23	Lead as Pb	APHA3111B	*BDL(**DL 0.13 mg/l)	mg/l
24	Arsenic as As	APHA3111B	*BDL(**DL 0.01 mg/l)	mg/l
25	Cyanide as CN	APHA 4500 CN -D	*BDL(**DL 0.02 mg/l)	BDL(DL 0.02 mg/l)
26	Aluminium as Al	APHA 3111B	*BDL(**DL 0.03 mg/l)	BDL (DL 0.02 mg/l)
27	Boron	APHA 4500 B C	*BDL(**DL 0.1 mg/l)	mg/l
28	Chromium as Cr	APHA 3111B	*BDL(**DL 0.03 mg/l)	mg/l
29	Cadmium as Cd	APHA 3111B	*BDL(**DL 0.06 mg/l)	mg/l
30	Selenium as Se	APHA 3111B	*BDL(**DL 0.01 mg/l)	mg/l
31	Mercury as Hg	APHA 3111B	*BDL(**DL 0.001 mg/l)	mg/l
32	O & G	APHA 4500 PD	*BDL(**DL 0.2 mg/l)	mg/l

\*BDL-Below Detection Limit, \*\*DL-Detection Limit

\*\*\*End of Report\*\*\*

  
(Tested By)



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 Corp. Off.: Plot No. 82A, Sector- 5, IMT Manesar, Gurugram- 122051  
 MoEF & CC Recognised (ISO 9001 | OHSAS 45001)

## Test Report

Sample Number: VFI/AV/2007/210007

Name & Address of the Party: M/s Rajpur Energies Limited  
 Village: Raikhetla Block-Tada Dist. Rajgarh -403225 (CG)

Report No.: VCLW/2007/010007

Format No.: 7.0 P-01

Party Reference No.: NIL

Reporting Date: 08/07/2020

Period of Analysis: 01/07/2020-08/07/2020

Receipt Date: 01/07/2020

Sampling Date: 28/06/2020

Sampling Quantity:

Sampling Type: Grab

Preservation: 23 DEGREES

Name of the Project:

Sample Description: SURFACE WATER  
 Location: Raikhetla (Talab)  
 Sample Collected by: Vardan EnviroLab Representative  
 Parameter Required: As Per Work Order  
 Sampling and Analysis Protocol: IS 3025

S.No.	Test Parameters	Test Method	Results	Units
1	Colour	IS 3025: 1987 (P-4) Reaff 2017	4.0	
2	pH value	IS 3025 (P-11): 1983 Reaff. 2017	7.52	
3	Turbidity	IS: 3025 (Part 10): 1984, Reaff. 2017, (Nephelometric Method)	3.0	NTU
4	Total Dissolved Solids	IS 3025 (P-16): 1984 Reaff 2017	105.00	mg/l
5	Chloride (as Cl)	IS: 3025 (Part 32): 1988, Reaff. 2019	24.33	mg/l
6	Sulphate as (SO4)	IS: 3025 (Part 24): 1986, Reaff. 2019 Turbidity Method	8.00	mg/l
7	Total Alkalinity (as CaCO3)	IS: 3025 (Part 23): 1988, Reaff. 2019	78.00	mg/l
8	Total Hardness (CaCO3)	IS: 3025 (Part 21): 2009, Reaff. 2019	61.20	mg/l
9	Calcium (as Ca)	IS: 3025 (Part 40): 1991 Reaff. 2019 (EDTA method)	17.98	mg/l
10	Magnesium	IS: 3025 (Part 46): 1994, Reaff. 2019 (EDTA method)	3.97	mg/l
11	Fluoride (as F)	APHA 23rd Edition 2017, 4500F0	0.16	mg/l
12	Nitrate (as NO3)	IS: 3025 (Part 34): 1988, Reaff. 2019 (Chromotropic Method)	0.55	mg/l
13	Phenolic compounds	APHA 23rd Edition 2017, 8530C	*BDL (**DL 0.001 mg/l)	mg/l
14	Anionic Surface active agents (as MBAS)	APHA 23rd Edition 2017, 8540C	*BDL (**DL 0.02 mg/l)	mg/l
15	Dissolved oxygen	IS: 3025 (Part-38)   1989, Ref. 2019	8.93	mg/l
16	Biochemical Oxygen Demand (BOD)   3 days at 27°C	IS: 3025 (Part-44): 1983, Ref. 2019	1.63	mg/l
17	Chemical Oxygen Demand (COD)	IS: 3025 (Part 58) - 2006ref. 2017	6.87	mg/l
18	Residual Free Chlorine	IS:3025(P-26):1986,RA-2019-1986	*BDL (**DL 0.2)	mg/l

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Laboratory: Plot No. 24, 25, Narayan Vihar B Block, Jaipur (Raj.) 302035  
 Corp. Off.: Plot No. 82A, Sector- 5, IMT Manesar, Gurugram- 122051  
 MoEF & CC Recognised (ISO 9001 | OHSAS 45001)

## Test Report

Sample Number : VELW/2007010007

Report No. : VELW/2007010007

S.No.	Test Parameters	Test Method	Results	Units
18			mg/l)	
19	Iron	IS:3025(P-53):2003,RA.2019:2003	0.16	mg/l
20	Zinc as Zn	APHA 3030D.3113B	0.11	mg/l
21	Copper (Cu)	APHA3111B	*BDL(**DL 0.03 mg/l)	mg/l
22	Manganese as Mn	APHA3111B	*BDL(**DL 0.06 mg/l)	mg/l
23	Lead as Pb	APHA3111B	*BDL(**DL 0.13 mg/l)	mg/l
24	Arsenic as As	APHA3111B	*BDL(**DL 0.01 mg/l)	mg/l
25	Cyanide as CN	APHA 4500 CN -D	*BDL(**DL 0.02 mg/l)	BDL(DL 0.02 mg/l)
26	Aluminium as Al	APHA 3111B	*BDL(**DL 0.03 mg/l)	BDL (DL 0.02 mg/l)
27	Boron	APHA 4500 B C	*BDL(**DL 0.1 mg/l)	mg/l
28	Chromium as Cr	APHA 3111B	*BDL(**DL 0.03 mg/l)	mg/l
29	Cadmium as Cd	APHA 3111B	*BDL(**DL 0.06 mg/l)	mg/l
30	Selenium as Se	APHA 3111B	*BDL(**DL 0.01 mg/l)	mg/l
31	Mercury as Hg	APHA 3111B	*BDL(**DL 0.001 mg/l)	mg/l
32	O & G	APHA 4500 PD	*BDL(**DL 0.2 mg/l)	mg/l

\*BDL-Below Detection Limit, \*\*DL-Detection Limit

\*\*\*End of Report\*\*\*

  
(Tested By)



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 Corp. Off.: Plot No. 82A, Sector- 5, IMT Manesar, Gurugram- 122051  
 MoEF & CC Recognised [ISO 9001 | OHSAS 45001]

## Test Report

Sample Number : VEL/W/2007010008  
 Name & Address of the Party : M/s Raipur Energen Limited  
 Village: Raehuda, Block: Tilda Dist. Raipur -493225 (CG)  
 Name of the Project :  
 Sample Description : SURFACE WATER  
 Location : Chicholi (Talab)  
 Sample Collected by : Vardan EnviroLab Representative  
 Parameter Required : As Per Work Order  
 Sampling and Analysis Protocol : IS 2296

Report No. : VEL/W/2007010008  
 Format No : T-8 F-01  
 Party Reference No : Nil  
 Reporting Date : 08/07/2020  
 Period of Analysis : 01/07/2020-06/07/2020  
 Receipt Date : 01/07/2020  
 Sampling Date : 28/06/2020  
 Sampling Quantity :  
 Sampling Type : Grab  
 Preservation : 23 DEGREE

S.No.	Test Parameters	Test Method	Results	Units
1	Colour	IS 3025: 1987 (P-4) Reaff.2017	2.0	
2	pH value	IS 3025 (P-11): 1983 Reaff. 2017	7.25	
3	Turbidity	IS 3025 (Part 10): 1984, Reaff. 2017, (Nephelometric Method)	3.0	NTU
4	Total Dissolved Solids	IS 3025 (P-16): 1984 Reaff 2017	174.70	mg/l
5	Chloride (as Cl)	IS: 3025 (Part 32): 1988, Reaff. 2019	48.65	mg/l
6	Sulphate as (SO <sub>4</sub> )	IS: 3025 (Part 24): 1988, Reaff. 2019 Turbidity Method	25.16	mg/l
7	Total Alkalinity (as CaCO <sub>3</sub> )	IS: 3025 (Part 23): 1988, Reaff. 2019	113.10	mg/l
8	Total Hardness (CaCO <sub>3</sub> )	IS: 3025 (Part 21): 2009, Reaff. 2019	134.64	mg/l
9	Calcium (as Ca)	IS: 3025 (Part 40): 1991 Reaff. 2019 (EDTA method)	34.34	mg/l
10	Magnesium	IS: 3025 (Part 46): 1994, Reaff. 2019 (EDTA method)	11.89	mg/l
11	Fluoride (as F)	APHA 23rd Edition 2017, 4500F0	0.31	mg/l
12	Nitrate (as NO <sub>3</sub> )	IS: 3025 (Part 34): 1988, Reaff. 2019 (Chromotropic Method)	5.11	mg/l
13	Phenolic compounds	APHA 23rd Edition 2017, 5530C	*BDL (**DL 0.001 mg/l)	mg/l
14	Anionic Surface active agents (as MBAS)	APHA 23rd Edition 2017, 5540C	*BDL (**DL 0.02 mg/l)	mg/l
15	Dissolved oxygen	IS : 3025 (Part-38) : 1989, Ref: 2019	6.55	mg/l
16	Biochemical Oxygen Demand (BOD) ( 3 days at 27°C)	IS: 3025 (Part-44): 1993, Ref: 2019	17.85	mg/l
17	Chemical Oxygen Demand (COD)	IS : 3025 (Part 58) : 2006ref: 2017	59.25	mg/l
18	Residual Free Chlorine	IS:3025(P-26):1986,RA:2019:1986	*BDL (**DL 0.02 mg/l)	mg/l

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Laboratory: Plot No. 24, 25, Narayan Vihar B Block, Jaipur (Ra) | 302035  
 Corp. Off.: Plot No. 82A, Sector- 5, IMT Manesar, Gurugram- 122051  
 MoEF & CC Recognised (ISO 9001 | OHSA5 45001)

## Test Report

Sample Number : VELAW/2007010008

Report No. : VFI MW/2007010008

S.No.	Test Parameters	Test Method	Results	Units
18			mg/l	
19	Iron	IS:3025(P-53):2003,RA.2019:2003	0.26	mg/l
20	Zinc as (Zn)	APHA 3036D,3113B	0.22	mg/l
21	Copper (Cu)	APHA3111B	*BDL(**DL 0.03 mg/l)	mg/l
22	Manganese as Mn	APHA3111B	*BDL(**DL 0.05 mg/l)	mg/l
23	Lead as Pb	APHA3111B	*BDL(**DL 0.13 mg/l)	mg/l
24	Arsenic as As	APHA3111B	*BDL(**DL 0.01 mg/l)	mg/l
25	Cyanide as CN	APHA 4500 CN -D	*BDL(**DL 0.02 mg/l)	BDL(DL 0.02 mg/l)
26	Aluminium as Al	APHA 3111B	*BDL(**DL 0.03 mg/l)	BDL (DL 0.02 mg/l)
27	Boron	APHA 4500 B C	*BDL(**DL 0.1 mg/l)	mg/l
28	Chromium as Cr	APHA 3111B	*BDL(**DL 0.03 mg/l)	mg/l
29	Cadmium as Cd	APHA 3111B	*BDL(**DL 0.05 mg/l)	mg/l
30	Selenium as Se	APHA 3111B	*BDL(**DL 0.01 mg/l)	mg/l
31	Mercury as Hg	APHA 3111B	*BDL(**DL 0.001 mg/l)	mg/l
32	O & G	APHA 4500 PD	*BDL(**DL 0.2 mg/l)	mg/l

\*BDL Below Detection Limit, \*\*DL-Detection Limit

\*\*\*End of Report\*\*\*

(Tested By)



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# Vardan EnviroLab



Laboratory: Plot No. 24, 25, Narayan Vihar B Block, Jaipur (Raj.) 302035

Corp. Off.: Plot No. 82A, Sector- 5, IMT Manesar, Gurugram- 122051

MoEF & CC Recognised [ISO 9001 | OHSAS 45001]

## Test Report

Sample Number : VELW/2007010009

Name & Address of the Party : M/s Raipur Energen Limited

Village: Raikheda, Block-Tilda Dist. Raipur -493225  
(CG)

Name of the Project :

Sample Description : SURFACE WATER

Location : Mura (Talab)

Sample Collected by : Vardan EnviroLab Representative

Parameter Required : As Per Work Order

Sampling and Analysis Protocol : IS 2296

Report No. : VELW/2007010009

Format No : 7 & F-01

Party Reference No : NIL

Reporting Date : 06/07/2020

Period of Analysis : 01/07/2020-06/07/2020

Receipt Date : 01/07/2020

Dampling Date : 26/06/2020

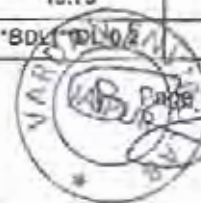
Sampling Quantity :

Sampling Type : Grab

Preservation : 23 DEGREE

S.No.	Test Parameters	Test Method	Results	Units
1	Colour	IS 3026: 1987 (P 4) Reaff.2017	5.0	
2	pH value	IS 3025 (P-11): 1983 Reaff. 2017	7.49	
3	Turbidity	IS 3025 (Part 10): 1984, Reaff. 2017, (Nephelometric Method)	6.0	NTU
4	Total Dissolved Solids	IS 3025 (P-16): 1984 Reaff 2017	150.70	mg/l
5	Chloride (as Cl)	IS: 3025 (Part 32): 1988, Reaff. 2019	24.33	mg/l
6	Sulphate as (SO <sub>4</sub> )	IS: 3025 (Part 24): 1988, Reaff. 2019 Turbidity Method	9.03	mg/l
7	Total Alkalinity (as CaCO <sub>3</sub> )	IS: 3025 (Part 23): 1988, Reaff. 2019	89.70	mg/l
8	Total Hardness (CaCO <sub>3</sub> )	IS: 3025 (Part 21): 2009, Reaff. 2019	93.84	mg/l
9	Calcium (as Ca)	IS: 3025 (Part 40): 1991 Reaff. 2019 (EDTA method)	26.16	mg/l
10	Magnesium	IS: 3025 (Part 46): 1994, Reaff. 2019 (EDTA method)	6.94	mg/l
11	Fluoride ( as F)	APHA 23rd Edition 2017, 4500FD	0.30	mg/l
12	Nitrate (as NO <sub>3</sub> )	IS: 3025 (Part 34): 1988, Reaff. 2019 (Chromotropic Method)	1.56	mg/l
13	Phenolic compounds	APHA 23rd Edition 2017, 5530C	*BDL(**DL 0.001 mg/l)	mg/l
14	Anionic Surface active agents (as MBAS)	APHA 23rd Edition 2017, 5540C	*BDL(**DL 0.02 mg/l)	mg/l
15	Dissolved oxygen	IS : 3025 (Part-38) : 1989, Ref: 2019	5.60	mg/l
16	Biochemical Oxygen Demand (BOD) ( 3 days at 27°C)	IS: 3025 (Part-44): 1993, Ref: 2019	5.23	mg/l
17	Chemical Oxygen Demand (COD)	IS : 3025 (Part 58) : 2006reaf: 2017	18.76	mg/l
18	Residual Free Chlorine	IS:3025(P-26):1986,RA:2019:1986	*BDL(**DL 0.5 mg/l)	mg/l

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# Vardan EnviroLab



Laboratory: Plot No. 24, 25, Narayan Vihar B Block, Jaipur (Raj.) 302035  
 Corp. Off.: Plot No. 82A, Sector- 5, IMT Manesar, Gurugram- 122051  
 MoEF & CC Recognised [ISO 9001 | OHSAS 45001]

## Test Report

Sample Number : VEL/W/2007010009

Report No. : VEL/W/2007010009

S.No.	Test Parameters	Test Method	Results	Units
18			mg/l)	
19	Iron	IS:3025(P-53)-2003,RA.2019:2003	0.30	mg/l
20	Zinc as (Zn)	APHA 3030D,3113B	0.24	mg/l
21	Copper (Cu)	APHA3111B	*BDL(**DL 0.03 mg/l)	mg/l
22	Manganese as Mn	APHA3111B	*BDL(**DL 0.06 mg/l)	mg/l
23	Lead as Pb	APHA3111B	*BDL(**DL 0.13 mg/l)	mg/l
24	Arsenic as As	APHA3111B	*BDL(**DL 0.01 mg/l)	mg/l
25	Cyanide as CN	APHA 4500 CN -D	*BDL(**DL 0.02 mg/l)	BDL(DL 0.02 mg/l)
26	Aluminium as Al	APHA 3111B	*BDL(**DL 0.03 mg/l)	BDL (DL 0.02 mg/l)
27	Boron	APHA 4500 B C	*BDL(**DL 0.1 mg/l)	mg/l
28	Chromium as Cr	APHA 3111B	*BDL(**DL 0.03 mg/l)	mg/l
29	Cadmium as Cd	APHA 3111B	*BDL(**DL 0.06 mg/l)	mg/l
30	Selenium as Se	APHA 3111B	*BDL(**DL 0.01 mg/l)	mg/l
31	Mercury as Hg	APHA 3111B	*BDL(**DL 0.001 mg/l)	mg/l
32	O & G	APHA 4500 PD	*BDL(**DL 0.2 mg/l)	mg/l

\*BDL-Below Detection Limit, \*\*DL-Detection Limit

\*\*\*End of Report\*\*\*

  
 (Tested By)



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#### 4.5 Soil Quality Analysis



**Figure No. 8. Plan Showing Soil Sample Monitoring Location Map**

Location Code: -

S1- Raikheda Village

S2- Mura Village

S3- Gaitara village

S4- Chicholi Village



# Vardan EnviroLab



Laboratory: Plot No. 24, 25, Narayan Vihar B Block, Jaipur (Raj.) 302035  
 Corp. Off.: Plot No. 82A, Sector- 5, IMT Manesar, Gurugram- 122051  
 MuEF & CC Recognised [ISO 9001 | OHSAS 45001]

## Test Report

Sample Number: VEL/SO/2007010001  
 Name & Address of the Party: M/s Raipur Energy Limited  
 Village Raikhera, Block Tikki Dist. Raipur -403220 (CC)  
 Sample Description: SOIL  
 Location: Village Raikhera  
 Sample Collected by: Vardan EnviroLab Representative  
 Parameter Required: Ag. Per Work Order  
 Sampling and Analysis Method: IS 2720, APHA & USDA

Report No.: VEL/SO/2007010001  
 Format No.: 7.8 F-01  
 Party Reference No.: NIL  
 Reporting Date: 06/07/2020  
 Period of Analysis: 01/07/2020-06/07/2020  
 Receipt Date: 01/07/2020  
 Sampling Date: 20/00/2020  
 Sampling Quantity: 2 Kg.  
 Sampling type: Composite  
 Packing Status: Temp. Seal

S.No.	Parameters	Test Method	Results	Units
1	pH (at 25°C)	IS : 2720 (Part 26): 1987, Reaff. 2016	7.04	-
2	Electrical Conductivity	IS 14737: 2000 Ref. 2016	0.121	µS/cm
3	Colour	USDA:1954-Reaffirmed,2010	Grey	-
4	Water holding capacity	USDA:1954-Reaffirmed,2010	33.1	%
5	Bulk density	USDA:1954-Reaffirmed 2014 (Page-96)	1.10	gm/cc
6	Chlorine	USDA:1954-Reaffirmed,2010 Method 13 (Page-96)	72.0	mg/kg
7	Calcium (as Ca)	Method manual of Soil Testing in India, (Department of Ag., and Corporation Ministry of Ag. Govt. of	350.0	mg/kg
8	Sodium (as Na)	USDA:1954-Reaffirmed,2010 Method 10A (Page-96)	168.2	mg/kg
9	Potassium (as K)	Method manual of Soil Testing in India, (Department of Ag., and Corporation Ministry of Ag. Govt. of	266.1	mg/kg
10	Organic Matter	IS 2720 (Part 22) 1972Ref. 2015	0.22	%
11	Magnesium (as Mg)	Method manual of Soil Testing in India, (Department of Ag., and Corporation Ministry of Ag. Govt. of	132.0	mg/kg
12	Available Nitrogen (as N)	IS : 14684,1999 Reaff. 2015	210.4	kg./hec.
13	Phosphorus	Method manual of Soil Testing in India, (Department of Ag., and Corporation Ministry of Ag. Govt. of	48.2	kg./hec.
14	Total Zinc (as Zn)	USEPA 3060 B 1996	62.4	mg/kg
15	Total Manganese (as Mn)	USEPA 3060 B 1996	195.2	mg/kg
16	Total Chromium (as Cr)	USEPA 3060 B 1996	4.32	mg/kg
17	Total Lead (as Pb)	USEPA 3050 B 1996	18.4	mg/kg
18	Total Cadmium (as Cd)	USEPA 3050 B 1996	8.80	mg/kg

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Page No.-1/2



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Corp. Off.: Plot No. 82A, Sector- 5, IMT Manesar, Gurugram- 122051  
MoEF & CC Recognised [ISO 9001 | OHSAS 45001]

## Test Report

Sample Number : VEL/SO/2007010001

Report No. : VEL/SO/2007010001

S.No.	Parameters	Test Method	Results	Units
19	Total Copper (as Cu)	USEPA 3050 B 1996	14.20	mg/kg
20	Soil Texture	IS:2720 (P-4) RA:2006	Silty Clay	-

\*\*\*End of Report\*\*\*

  
(Tested By)



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Laboratory: Plot No. 24, 25, Narayan Vihar B Block, Jaipur (Raj.) 302035  
 Corp. Off.: Plot No. 82A, Sector- 5, IMT Manesar, Gurugram- 122051  
 MoEF & CC Recognised [ISO 9001 | OHSAS 45001]

## Test Report

Sample Number : VEL/SO/2007010002

Name & Address of the Party : M/s Raipur Emerge Limited  
 Village: Raikheda, Block-Teda Dist. Raipur -492225  
 (CG)

Report No. : VEL/SO/2007010002  
 Format No : 7 & F-01  
 Party Reference No : NIL  
 Reporting Date : 06/07/2020  
 Period of Analysis : 01/07/2020-06/07/2020  
 Receipt Date : 01/07/2020  
 Sampling Date : 28/06/2020  
 Sampling Quantity : 2 Kg.  
 Sampling Type : Composite  
 Packing Status : Temp. Seal

Sample Description : SOIL  
 Location : Village Mura  
 Sample Collected by : Vardan EnviroLab Representative  
 Parameter Required : As Per Work Order  
 Sampling and Analysis Protocol : IS 2720, APHA & USDA

S.No.	Parameters	Test Method	Results	Units
1	pH (at 25°C)	IS : 2720 (Part 26): 1997, Reaff. 2016	6.92	-
2	Electrical Conductivity	IS 14767: 2000 Ref. 2016	0.146	mS/cm
3	Colour	USDA:1954-Reaffirmed,2010	Grey	-
4	Water holding capacity	USDA:1954-Reaffirmed,2010	36.1	%
5	Bulk density	USDA:1954-Reaffirmed 2014 (Page-96)	1.38	gm/cc
6	Chloride	USDA:1954-Reaffirmed,2010 Method 13 (Page-96)	66.0	mg/kg
7	Calcium (as Ca)	Method manual of Soil Testing in India, (Department of Ag., and Corporation Ministry of Ag. Govt. of	420.12	mg/kg
8	Sodium (as Na)	USDA:1954-Reaffirmed,2010 Method 10A (Page-96)	170.0	mg/kg
9	Potassium (as K)	Method manual of Soil Testing in India, (Department of Ag., and Corporation Ministry of Ag. Govt. of	272.8	mg/kg
10	Organic Matter	IS 2720 (Part 22) 1972Ref. 2015	0.64	%
11	Magnesium (as Mg)	Method manual of Soil Testing in India, (Department of Ag., and Corporation Ministry of Ag. Govt. of	140.2	mg/kg
12	Available Nitrogen (as N)	IS : 14694,1969 Reaff. 2015	236.1	kg./hec.
13	Phosphorus	Method manual of Soil Testing in India, (Department of Ag., and Corporation Ministry of Ag. Govt. of	52.7	kg./hec.
14	Total Zinc (as Zn)	USEPA 3050 B 1996	68.1	mg/kg
15	Total Manganese (as Mn)	USEPA 3050 B 1996	223.5	mg/kg
16	Total Chromium (as Cr)	USEPA 3050 B:1996	5.57	mg/kg
17	Total Lead (as Pb)	USEPA 3050 B 1996	21.4	mg/kg
18	Total Cadmium (as Cd)	USEPA 3050 B 1996	4.66	mg/kg
19	Total Copper (as Cu)	USEPA 3050 B 1996	14.28	mg/kg

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Corp. Off.: Plot No. 82A, Sector- 5, IMT Manesar, Gurugram- 122051  
MoEF & CC Recognised | ISO 9001 | OHSAS 45001

## Test Report

Sample Number : VEL/50/2007010002

Report No. : VEL/50/2007010002

S.No.	Parameters	Test Method	Results	Units
20	Soil Texture	IS:2720 (P-4) RA:2006	Silty Clay	-

\*\*\*End of Report\*\*\*

  
(Tested By)



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# Vardan EnviroLab



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 Corp. Off.: Plot No. 82A, Sector- 5, IMT Manesar, Gurgaon- 122051  
 MoEF & CC Recognised [ISO 9001 | OHSAS 45001]

## Test Report

Sample Number : VEL/SO/2007010003  
 Name & Address of the Party : M/s Raipur Energen Limited  
 Village: Rakheda, Block-Tilda Dist. Raipur-493225 (GU)  
 Report No. : VEL/SO/2007010003  
 Format No : 7 & F-01  
 Party Reference No : Nil  
 Reporting Date : 00/07/2020  
 Period of Analysis : 01/07/2020-06/07/2020  
 Receipt Date : 01/07/2020  
 Sampling Date : 28/06/2020  
 Sampling Quantity : 2 kg.  
 Sampling Type : Composite  
 Packing Status : Temp Seal

Sample Description : SOIL  
 Location : Village Gaitara  
 Sample Collected by : Vardan EnviroLab Representative  
 Parameter Required : As Per Work Order  
 Sampling and Analysis Protocol : IS 2720, APHA & USDA

S.No.	Parameters	Test Method	Results	Units
1	pH (at 25°C)	IS : 2720 (Part 26): 1997, Reaff. 2016	7.24	-
2	Electrical Conductivity	IS 14767: 2000 Ref. 2016	0.146	mS/cm
3	Colour	USDA:1954-Reaffirmed,2010	Grey	-
4	Water holding capacity	USDA:1954-Reaffirmed,2010	34.7	%
5	Bulk density	USDA:1954-Reaffirmed 2014 (Page-96)	1.26	gm/cc
6	Chloride	USDA:1954-Reaffirmed,2010 Method 13 (Page-98)	61.2	mg/kg
7	Calcium (as Ca)	Method manual of Soil Testing in India, (Department of Ag., and Corporation Ministry of Ag. Govt. of	412.14	mg/kg
8	Sodium (as Na)	USDA:1954-Reaffirmed,2010 Method 10A (Page-96)	164.0	mg/kg
9	Potassium (as K)	Method manual of Soil Testing in India, (Department of Ag., and Corporation Ministry of Ag. Govt. of	278.0	mg/kg
10	Organic Matter	IS 2720 (Part 22) 1972Ref. 2015	0.39	%
11	Magnesium (as Mg)	Method manual of Soil Testing in India, (Department of Ag., and Corporation Ministry of Ag. Govt. of	205.5	mg/kg
12	Available Nitrogen (as N)	IS : 14634,1999 Reaff. 2015	202.14	kg./hec.
13	Phosphorus	Method manual of Soil Testing in India, (Department of Ag., and Corporation Ministry of Ag. Govt. of	49.25	kg./hec.
14	Total Zinc (as Zn)	USEPA 3050 B 1996	54.5	mg/kg
15	Total Manganese (as Mn)	USEPA 3050 B 1996	205.5	mg/kg
16	Total Chromium (as Cr)	USEPA 3050 B:1996	5.35	mg/kg
17	Total Lead (as Pb)	USEPA 3050 B 1996	21.75	mg/kg
18	Total Cadmium (as Cd)	USEPA 3050 B 1996	0.89	mg/kg

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Page No. 1/2



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MoEF & CC Recognised (ISO 9001 | OHSAS 45001)

## Test Report

Sample Number : VEL/S0/2007010003

Report No. : VEL/S0/2007010003

S. No.	Parameters	Test Method	Results	Units
19	Total Copper (as Cu)	USEPA 3050 B 1996	14.16	mg/kg
20	Soil Texture	IS:2720 (P-4) RA:2006	Silty Clay	-

\*\*\*End of Report\*\*\*

(21)  
(Tested By)



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Corp. Off.: Plot No. 82A, Sector- 5, IMT Manesar, Gurugram- 122051

MoEF & CC Recognised (ISO 9001 | OHSAS 45001)

## Test Report

Sample Number : VEL/SO/2007010004

Name & Address of the Party : M/s Rajpur Energen Limited

Village: Dalkheda, Block: Yuda Dist. Raipur-493224 (CG)

Report No. : VEL/SO/2007010004

Format No : 7.8 F-01

Party Reference No : NIL

Reporting Date : 06/07/2020

Period of Analysis : 01/07/2020-06/07/2020

Receipt Date : 01/07/2020

Sampling Date : 28/06/2020

Sampling Quantity : 2 Kg.

Sampling Type : Composite

Packing Status : Temp Seal

Sample Description : SOIL

Location : Village Chicholi

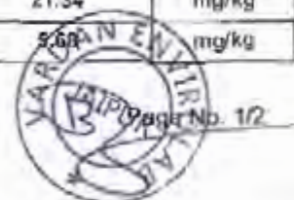
Sample Collected by : Vardan EnviroLab Representative

Parameter Required : As Per Work Order

Sampling and Analysis Protocol : IS 2720, ALPHA & USDA

S No	Parameters	Test Method	Results	Units
1	pH (at 25°C)	IS : 2720 (Part 28) : 1987, Reaff. 2016	6.85	-
2	Electrical Conductivity	IS 14767: 2000 Ref. 2016	0.139	mS/cm
3	Colour	USDA:1954 Reaffirmed,2010	Grey	-
4	Water holding capacity	USDA:1954-Reaffirmed,2010	36.4	%
5	Bulk density	USDA:1954-Reaffirmed 2014 (Page-96)	1.64	gm/cc
6	Chloride	USDA:1954-Reaffirmed,2010 Method 13 (Page-98)	78.4	mg/kg
7	Calcium (as Ca)	Method manual of Soil Testing in India, (Department of Ag., and Corporation Ministry of Ag. Govt. of	386.44	mg/kg
8	Sodium (as Na)	USDA:1954-Reaffirmed,2010 Method 10A (Page-98)	184.0	mg/kg
9	Potassium (as K)	Method manual of Soil Testing in India, (Department of Ag., and Corporation Ministry of Ag. Govt. of	298.0	mg/kg
10	Organic Matter	IS 2720 (Part 22) 1972Ref. 2016	0.45	%
11	Magnesium (as Mg)	Method manual of Soil Testing in India, (Department of Ag., and Corporation Ministry of Ag. Govt. of	168.2	mg/kg
12	Available Nitrogen (as N)	IS : 14684,1999 Reaff. 2015	238.42	kg./hec.
13	Phosphorus	Method manual of Soil Testing in India, (Department of Ag., and Corporation Ministry of Ag. Govt. of	55.1	kg./hec.
14	Total Zinc (as Zn)	USEPA 3050 B 1996	59.7	mg/kg
15	Total Manganese (as Mn)	USEPA 3050 B 1996	232.8	mg/kg
16	Total Chromium (as Cr)	USEPA 3050 B:1996	5.88	mg/kg
17	Total Lead (as Pb)	USEPA 3050 B 1996	21.34	mg/kg
18	Total Cadmium (as Cd)	USEPA 3050 B 1996	5.68	mg/kg

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Laboratory: Plot No. 24, 25, Narayan Vihar B Block, Jaipur (Raj.) 302035

Corp. Off.: Plot No. 82A, Sector- 5, IMT Manesar, Gurugram- 122051

MoEF & CC Recognised (ISO 9001 | OHSAS 45001)

## Test Report

Sample Number : VEL/SO/2007010004

Report No. : VEL/SO/2007010004

S.No.	Parameters	Test Method	Results	Units
19	Total Copper (as Cu)	USEPA 3050 B 1996	14.09	mg/kg
20	Soil Texture	IS:2720 (P-4) RA.2006	Silty Clay	

\*\*\*End of Report\*\*\*

  
(Tested By)



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## 4.6 Effluent Sample Analysis Report



### Locations

1. STP Outlet
2. ETP Outlet



# Vardan EnviroLab

Laboratory: Plot No. 24, 25, Narayan Vihar B Block, Jaipur (Raj.) 302035

Corp. Off.: Plot No. 82A, Sector- 5, IMT Manesar, Gurugram- 122051

MoEF & CC Recognised ISO 9001 | OHSAS 45001

## Test Report

Sample Number:	VEL/REG/LWW/01	Report No.:	VEL/WW/2007010001
Name & Address of the Party:	M/s Raipur Emergen Limited, Village: Raikheha, Block-Tilda, Dist. Raipur - 493225 (C.G.)	Format No.:	5.10 F-01
		Party Reference No.:	NIL
		Reporting Date:	06/07/2020
Sample Description:	WASTE WATER SAMPLE	Period of Analysis:	01/07/2020 to 06/07/2020
Sample Location:	STP Outlet	Receipt Date:	01/07/2020
Sample Collected by:	Vardan EnviroLab Representative	Sampling Date:	28/06/2020
Preservation:	Refrigerated	Sampling Quantity:	2.0 Ltr
Parameter Required:	As per Work Order		
Sampling and Analysis Protocol:	APHA 23 <sup>rd</sup> Edition 2017		

S. No.	Parameter	Test-Method	Result	Unit	*Standards		
					In-Land Surface Water	Public Sewers	Law for Irrigation
1.	pH (at 25 °C)	APHA (22 <sup>nd</sup> Edition)2012, 4500-H <sup>+</sup> B	7.40	--	5.5 to 9.0	5.5 to 9.0	5.5 to 9.0
2.	BOD (3 Days at 27 °C)	IS 3025P-44,1999 (Reaffirmed 2003)	24.0	mg/l	30	250	100
3.	COD	APHA 22 <sup>nd</sup> Edition 2012, 5220 B	125.0	mg/l	250	--	--
4.	Total Suspended Solids	APHA 22 <sup>nd</sup> Edition 2012, 2540 D	18.4	mg/l	100	600	200
5.	Oil & Grease	APHA 22 <sup>nd</sup> Edition 2012, 5520 B	1.0	mg/l	10	20	10

(Checked By)



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# Vardan EnviroLab

Laboratory: Plot No. 24, 25, Narayan Vihar B Block, Jaipur (Raj.) 302035  
 Corp. Off.: Plot No. 82A, Sector- 5, IMT Manesar, Gurugram- 122051  
 MoEF & CC Recognised (ISO 9001 | OHSAS 45001)

## Test Report

Sample Numbers:	VEL/REG/LWW/02	Report No.:	VEL/WW/2007010002
Name & Address of the Party:	M/s Raipur Energen Limited, Village: Raikheeda, Block-Tilda, Dist. Raipur - 493225 (C.G.)	Format No.:	5.10 F-01
		Party Reference No.:	NIL
		Reporting Date:	06/07/2020
Sample Description:	WASTE WATER SAMPLE	Period of Analysis:	01/07/2020 to 06/07/2020
Sample Location:	ETP Outlet	Receipt Date:	01/07/2020
Sample Collected by:	Vardan EnviroLab Representative	Sampling Date:	28/06/2020
Preservation:	Refrigerated	Sampling Quantity:	2.0 Lit
Parameters Required:	As per Work Order		
Sampling and Analysis Protocol:	APHA 23rd Edition 2017		

S. No.	Parameter	Test-Method	Result	Unit	Standards		
					In-Land Surface Water	Public Sewers	Land for Irrigation
1.	pH (at 25 °C)	APHA (23 <sup>rd</sup> Edition) 2012, 4500-H <sup>+</sup> B	7.57	--	5.5 to 9.0	5.5 to 9.0	5.5 to 9.0
2.	BOD (5 Days at 20 °C)	IS 3025:19-44,1999 (Reaffirmed 2003)	17.0	mg/l	20	350	100
3.	COD	APHA 23rd Edition 2012, 5220 B	76.5	mg/l	250	--	--
4.	Total Suspended Solids	APHA 23rd Edition 2012, 2540 D	12.0	mg/l	100	600	200
5.	Oil & Grease	APHA 23 <sup>rd</sup> Edition 2012, 5520 B	1.5	mg/l	10	20	10

  
(Checked By)



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**Project Name:** Raipur Energen Limited

**Formerly GMR Chhattisgarh Energy Ltd. Village: Raikheda, Block- Tilda, Dist.-Raipur (Chhattisgarh)**

**1st Quarterly Environmental Monitoring Report**

#### **4.7 Effluent Sample Analysis Report**

##### Locations

1. TPP (Unit-1)
2. TPP (Unit-2)

## Test Report

Sample Number: VEL/ REGL/ST/01 Report No.: VEL/S/2007010001  
 Name & Address of Party: M/s Raipur Energen Limited, Village: Raikheda, Block-Tilda, Dist. Raipur - 493225 (C.G.) Formal No.: S.I F-01  
 Party Reference No.: NIL Reporting Date: 06/07/2020

Receipt Date: 01/07/2020 Period of Analysis: 01/07/2020-06/07/2020

Sample Description : Stack Emission Monitoring  
 Sample Collected by : Vardan EnviroLab Representative  
 Date of Sampling : 28/06/2020  
 Sampling Location : TPP (Unit-1)  
 Sampling duration (Minutes) : 30  
 Meteorological Condition : Clear Sky  
 Instrument calibration status : DR  
 Height of Stack from ground level (m) : 275 m  
 Diameter of Stack (m) : 7.5 m  
 Ambient Temperature - Ta (°C) : 41.8  
 Temperature of Stack Gases - Ts (°C) : 127  
 Velocity of Stack Gases (m/sec) : 23.2  
 Flow rate of PM (LPM) : 33.0  
 Flow rate of Gas (LPM) : 2.0  
 Sampling condition : Isokinetic  
 Protocol used : IS:11255

### RESULTS

S. No.	Parameters	Results	Units	Test Methods	Limits (As Per CPCB)
1.	Particulate Matter (PM)	43	mg/Nm <sup>3</sup>	IS 11255 (P-1)1985, RA 2014	50
2.	Oxides of Nitrogen (NO <sub>x</sub> )	336.1	mg/Nm <sup>3</sup>	IS 11255 (P-7)1985, RA 2017	—
3.	Sulphur Dioxide (SO <sub>2</sub> )	1005.8	mg/Nm <sup>3</sup>	IS 11255 (P-2) 1985, RA 2014	—
4.	#Total Mercury	ND	mg/Nm <sup>3</sup>	USEPA Method No.29	0.03
5.	Oxygen as O <sub>2</sub>	7.1	%	Gas Analyzer	—
6.	Carbon di-Oxide as CO <sub>2</sub>	7.8	%	Gas Analyzer	—
7.	Carbon Monoxide as CO	8.1	%	Gas Analyzer	—
8.	Hydrogen Sulphide as H <sub>2</sub> S	2.6	mg/Nm <sup>3</sup>	Gas Analyzer	—
9.	Ammonia as NH <sub>3</sub>	9.2	mg/Nm <sup>3</sup>	Gas Analyzer	—
10.	Water Vapor	3.6	%	—	—

Not Covered in NAHL Scope  
 (Checked by)



## Test Report

Sample Number:	VEL/ REGL/ST/02	Report No.:	VEL/5/2007010002
Name & Address of Party:	M/s Raipur Energen Limited, Village: Raikheda, Block-Tilda, Dist. Raipur - 493225 (C.G.)	Format No.:	S.1 F-01
		Party Reference No.:	NIL
		Reporting Date:	06/07/2020
Receipt Date:	01/07/2020	Period of Analysis:	01/07/2020-06/07/2020
Sample Description:	Stack Emission Monitoring		

Sample Collected by	Vardan EnviroLab Representative
Date of Sampling	20/06/2020
Sampling Location	TPP (Unit-2)
Sampling duration (Minutes)	30
Meteorological Condition	Clear Sky
Instrument calibration status	OK
Height of Stack from ground level (m)	275 m
Diameter of Stack (m)	7.5m
Ambient Temperature - Ta (°C)	41.0
Temperature of Stack Gases - Ts (°C)	126
Velocity of Stack Gases (m/sec.)	23.4
Flow rate of PM (LPM)	33.0
Flow rate of Gas (LPM)	2.0
Sampling condition	Isokinetic
Protocol used	IS 11255

### RESULTS

S. No.	Parameters	Results	Units	Test Methods	Limits (As Per CPCB)
1.	Particulate Matter (PM)	39.0	mg/Nm <sup>3</sup>	IS 11255 (P-1) 1985, RA 2014	50
2.	Oxides of Nitrogen (NO <sub>x</sub> )	402.2	mg/Nm <sup>3</sup>	IS 11255 (P-7) 1985, RA 2017	-
3.	Sulphur Dioxide (SO <sub>2</sub> )	898.2	mg/Nm <sup>3</sup>	IS 11255 (P-2) 1985, RA 2014	-
4.	#Total Mercury	ND	mg/Nm <sup>3</sup>	USEPA Method No.29	0.03
5.	Oxygen as O <sub>2</sub>	7.8	%	Gas Analyzer	-
6.	Carbon di-Oxide as CO <sub>2</sub>	7.6	%	Gas Analyzer	-
7.	Carbon Mono Oxide as CO	8.5	%	Gas Analyzer	-
8.	Hydrogen Sulphide as H <sub>2</sub> S	2.3	mg/Nm <sup>3</sup>	Gas Analyzer	-
9.	Ammonia as NH <sub>3</sub>	8.2	mg/Nm <sup>3</sup>	Gas Analyzer	-
10.	Water Vapor	3.4	%		-

Not Certified in NABL Scope.  
(Checked By)



Page 1 of 1

## **Chapter – 5.0 CONCLUSION**

RAIPUR ENERGEN LIMITED., authorities have been taken successful steps in controlling environmental pollution in and around the project. This fact is clear from analytical results of different environmental parameters. A brief conclusion is as follows.

<b>Sr. No.</b>	<b>Environmental Parameters</b>	<b>Conclusion</b>
5.1	Air Environment	After analysis of the samples from five different locations it is observed that both the individuals and average concentration of air pollutants in respect of SO <sub>2</sub> , NO <sub>2</sub> , PM <sub>10</sub> , PM <sub>2.5</sub> , CO and Mercury are well within the prescribed limits of NAAQM standards. People of township and of surrounding villages do not have any problems regarding the air quality and have no grievances because of Thermal Power Plant activities.
5.2	Water Environment	The analytical result of the samples from the ground water of villages, surface water from river, and domestic & industrial effluent after treatment shows that the concentrations of different water parameters are well within prescribed limits and will not cause any adverse impact on human health and on surrounding area. People of surrounding areas express satisfaction about the water quality of That area.
5.3	Noise Environment	The observations taken at four village location during day and night time shows that the noise level are well within prescribed limits of CPCB. Hence there is no possibility of any adverse effect of noise generated due to Thermal Power Plant activities on peoples of Surrounding areas.

All the above details show that Thermal Power Plant of RAIPUR ENERGEN LIMITED. is not causing any adverse impact on the human health and ecological balance.

# **2nd Quarterly Environmental Monitoring Report**



## **Submitted To:**

**M/s Raipur Energen Limited**

***Formerly GMR Chhattisgarh Energy Ltd.***

**Village: Raikheda, Block-Tilda, Dist.-Raipur (Chhattisgarh)**

## **Conducted by:**

**M/s Vardan EnviroLab**

**Plot no. 82A, Sector-5, IMT Manesar, Gurugram (Haryana)**

**(Recognized by MoEF & CC, NABL Government of India)**

## PREFACE

The growing concern for environmental protection and the passing of various environmental legislations have increased the responsibilities of Ministry of Environment, Forests & Climate Change, Pollution Control boards in many folds. Besides enforcing the various environmental legislations MoEF&CC, CPCB & SPCB strive to propagate the necessity awareness regarding the various legal provisions and environmental protection measures in the country.

Electric Power scenario has occupied a significant place in the development program of the country. Development and environment can neither be separated nor ignored. In fact, they are complimentary to each other. These issues have become a concern of the community, particularly the environment impact due to industries in the developing countries.

However, the prerequisite for sustainable development is judicious planning of environmental status, likely impacts of the approach adopted on the environment including inhabitants of the locality, availability of the eco-friendly technology, emerging waste disposal and waste utilization processes, techniques of land reclamation for the restoration of aesthetic beauty and soon.

**M/s Raipur Energy Limited, Formerly GMR Chhattisgarh Energy Ltd. Village: Raikheda, Block-Tilda, Dist.-Raipur (Chhattisgarh), India, has engaged M/S Vardan EnviroLab, Gurugram, (HR) to provide Environmental Services in respect of ambient air quality monitoring, stack emission, noise level monitoring & Sampling and Analysis of ground water quality, surface water quality, treated effluent sewage, effluent water from ETP, and soil for Raipur Energy Limited, Raipur district of Chhattisgarh, as per guidelines of MoEF & CC and CPCB Gazette notification.**

**M/S Vardan EnviroLab, Gurugram, (HR) has deployed entirely its own personnel, facilities and expertise for doing this service. Sampling / Monitoring Stations were identified by the Environmental Officer of Raipur Energy Limited, Raipur. The samples were analyzed partly at site and partly at our MoEF Recognized laboratory situated at Gurugram (HR).**

This report presents the data generated for the period from 16th September 2020 to 18th September 2020, i.e. for **Second quarter** which includes sampling locations, Methodology, testing procedure and compilation for the Environmental parameters i.e. Air, Water, Soil & Noise with a view to evaluate the impact due to the thermal power plant activities.

During the course of our operations for the above task, the staff and management of Raipur Energy Limited, were extremely co-operative. We are grateful to them for their invaluable support and assistance rendered to us during the course of the sampling and monitoring.

Date: 30/9/2020



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## **Chapter - 1.0**

### **INTRODUCTION**

M/s Raipur Energen Limited., a subsidiary of Adani Power, is a power generation company based at Raipur in the State of Chattisgarh. Raipur Energen Limited., has commissioned its Thermal Power Plant 1370 MW (2x685 MW) Unit at Village Raikheda, Block -Tilda, Dist- Raipur, Chhattisgarh (India).

Raipur Energen Limited., is also committed towards the environment and the community it operates in. It has successfully implemented several community welfare schemes in the field of livelihood, infrastructure, community health and education which has so far benefited over 60,000 people from close to 75 villages.



**Figure No.1. Raipur Energen Limited.**



## **Chapter - 2.0**

### **PROJECT PROFILE**

#### **2.1 Topography & Drainage**

Topography of this area is generally undulating. The area is drained by Raikheda Talab approximately 2.5 km. away from plant in SW direction and Bangoli dam approximately 2 km. away from plant in SW direction. Mura Talab approximately 5 km. away from plant in South direction. Chhicholi Talab approximately 2 km. away from plant in East direction.

#### **2.2 Location**

Plant is bounded by Northern Latitudes of 21° 26' 23" to 21° 27' 48" and Eastern Longitude of 81° 50'34.6" to 81° 52'08.5". This area falls in the survey of India toposheet no. 64 G/14, 64 G/15 in parts(1:50000 Scale) The location of the Plant area is shown in **Fig. No. 2**

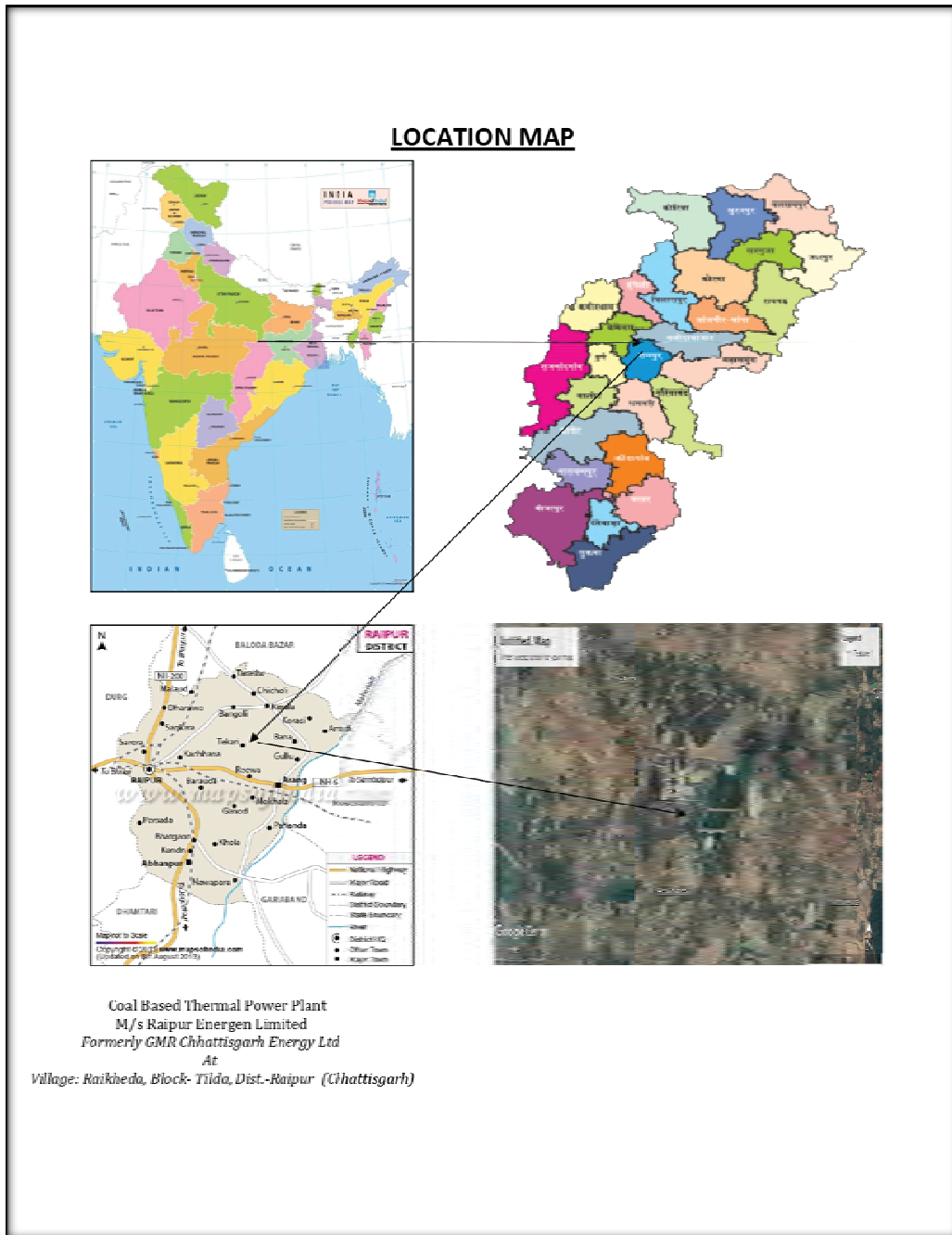
#### **2.3 Climate**

The climate of the area is Sub-tropical type. It is in the zone of humid tropic climate where temperature and humidity of air are very high. The temperature varies from the minimum - maximum temperature range between 29.5°C - 49 °C in summer, and 8°C - 25 °C in winter. The humidity varies from 35% to 82%. The annual average rainfall in the area is about 1300 mm.

#### **2.4 Communication**

The nearest railway station is Tilda, which is at a distance of ~14 Km towards West direction. The area is well connected with S.H. No. 9. Nearest Airport is Raipur ~32 km in SW direction. Nearest village is Raikheda ~ 1.5 km. in South direction and nearest town is Raipur ~31 km. in SW direction.

### 2.5 Location Map



**Figure No.2. Location Map**

## **Chapter – 3.0**

### **SCOPE OF STUDY AND METHODOLOGY**

#### **3.1 Scope of Study**

The scope of study includes Environmental Services in respect of ambient air quality monitoring, noise level monitoring & Sampling and Analysis of ground water quality, surface water quality, treated effluent sewage, effluent water from ETP and soil.

#### **3.2 Methodology**

As mentioned in the scope of work covering the various Environmental components monitoring and sampling and its analysis was carried out on the basis of guidelines of Ministry of Environment Forest & Climate Control of Government of India & Chattisgarh State Pollution Control Board. Sampling procedure method reference and Analysis procedure method reference are mentioned in monitoring reports.

##### **3.2.1 Ambient Air Quality Monitoring**

The ambient air quality has been carried out at various sources of air pollution surrounding and in the Plant. The prime objective of the ambient air quality monitoring is to assess the existing air quality of the area.

The ambient air quality monitoring was carried out for 24 hours at each station. At all stations SO<sub>2</sub>, NO<sub>2</sub>, PM<sub>10</sub>, PM<sub>2.5</sub>, CO and Mercury were monitored. All the samples collected were analyzed for quantitative analysis of various pollutants.

The ambient air quality sampling locations were identified by the Environmental Officer of Raipur Energen Limited.

##### **3.2.2 Water Environment**

The ground water samples, surface water samples were collected from selected locations in two liter sterilized plastic cans. These samples were analyzed as per IS 10500:2012. The domestic effluent and Industrial effluent samples were collected and analyzed for parameters: pH, Total suspended solids, Biochemical Oxygen Demand, Chemical Oxygen Demand and Oil & Grease.

### **3.2.3 Noise Environment**

Sound level meter was used to know the sound levels generated due to plant activities at different locations. The measurements were taken for Equivalent sound level over a time period for day and night which is expressed in dB(A).

### **3.2.4 Soil**

The Soil samples were collected from selected locations. These samples were analyzed for Physico-Chemical parameters including heavy metals.

## Chapter – 4.0

### SAMPLING LOCATION MAP AND ANALYSIS REPORTS

#### 4.1 Ambient Air Quality Monitoring



**Figure No.3. Plan Showing Ambient Air Quality Location Map**

Location Code: -

- A1- Raikheda Village
- A2- Mura Village
- A3- Gaitara Gate Village
- A4- Chicholi Village



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 Corp. Off.: Plot No. 82A, Sector- 5, IMT Manesar, Gurugram- 122051  
 MoEF & CC Recognised | ISO 9001 | OHSAS 45001

## Test Report

Sample Number : VEL/RAIPUR/01  
 Name & Address of the Party : M/s Raipur Energy Limited  
 Formerly GMR Chhattisgarh Energy Ltd Village  
 Raikheda, Block - Tilda, Dist. Raipur Chhattisgarh

Report No. : VEL/A/2009220001/A  
 Format No : 7.8 F-01  
 Party Reference No : NIL  
 Reporting Date : 30/09/2020  
 Period of Analysis : 22/09/2020-30/09/2020  
 Receipt Date : 22/09/2020

Sample Description : AMBIENT AIR

General Information

Sampling Location : Village - Raikheda  
 Sample Collected by : VEL Team  
 Sampling Equipment used : RDS/FPS  
 Instrument Code : VEL/RDS/23/FPS/24  
 Instrument Calibration Status : Calibrated  
 Latitude : -  
 Longitude : -  
 Meteorological condition during monitoring : Clear Sky  
 Date of Monitoring : 16/09/2020 To 17/09/2020  
 Time of Monitoring : 09.30 TO 09.30 Hrs.  
 Ambient Temperature (°C) : Min. 23° Max 30°  
 Surrounding Activity : Human, Vehicular & Other Activity  
 Scope of Monitoring : Regulatory Requirement  
 Sampling & Analysis Protocol : IS 5182  
 Sampling Duration : 24 Hrs.  
 Parameter Required : As Per Work Order

S.No.	Parameters	Test Method	Results	Units	Limit as per CPCB
1	Particulate Matter (as PM -10)	IS:5182 (P- 23)-2006, RA. 2017	79.55	µg/m <sup>3</sup>	100
2	Particulate Matter (as PM - 2.5)	IS:5182 (P- 24)-2001, RA. 2017	37.66	µg/m <sup>3</sup>	60
3	Nitrogen Dioxides (as NO2)	IS:5182 (P- 6)-2006 RA. 2017	24.60	µg/m <sup>3</sup>	80
4	Sulphur Dioxide (as SO2)	IS:5182 (P- 2)-2001, RA. 2017	12.48	µg/m <sup>3</sup>	80
5	Ozone (as O3)	IS 5182 (P-9):1974 RA. 2014	10.76	µg/m <sup>3</sup>	180.0

BDL - Below Detection Limit \*\* DL Detection Limit

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Corp. Off: Plot No. 82A, Sector- 5, IMT Manesar, Gurugram- 122051

MoEF & CC Recognised [ISO 9001 | DHSAS 45001]

## Test Report

Sample Number : VEL/RAIPUR/01

Name & Address of the Party : M/s Raipur Energy Limited

Formerly GMR Chhattisgarh Energy Ltd. Village:  
Raikhed, Block - Tada, Dist. Raipur Chhattisgarh

Report No : VELA/2009220001/B

Formal No : 7 B F-01

Party Reference No : NIL

Reporting Date : 30/09/2020

Period of Analysis : 22/09/2020-30/09/2020

Receipt Date : 22/09/2020

Sample Description

AMBIENT AIR

### General Information

Sampling Location : Village - Raikhed

Sample Collected by : VEL Team

Sampling Equipment used : RDS/FPS

Instrument Code : VEL/RDS/23/FPS/24

Instrument Calibration Status : Calibrated

Latitude :

Longitude :

Meteorological condition during monitoring : Clear Sky

Date of Monitoring : 16/09/2020 To 17/09/2020

Time of Monitoring : 09:30 TO 09:30 Hrs

Ambient Temperature (°C) : Min. 23° Max. 30°

Surrounding Activity : Human, Vehicular & Other Activity

Scope of Monitoring : Regulatory Requirement

Sampling & Analysis Protocol : IS 5182

Sampling Duration : 24 Hrs

Parameter Required : As Per Work Order

S No.	Parameters	Test Method	Results	Units	Limit as per CPCB
1	Suspended Particulate Matter	IS:5182 (P- 4) :1999 RA.2014	152.69	µg/m <sup>3</sup>	600
2	Mercury (Hg)	Methods of air sampling and analysis, 3rd ed., 1988, Method No 217	BDL (**DL 1.0 µg/m <sup>3</sup> )	µg/m <sup>3</sup>	-

BDL - Below Detection Limit \*\* DL Detection Limit

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 Corp. Off.: Plot No. 82A, Sector- 5, IMT Manesar, Gurugram- 121051  
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## Test Report

Sample Number: VEL/RAIPUR/02  
 Name & Address of the Party: M/s Raipur Energy Limited  
 Formerly GMR Chhattisgarh Energy Ltd. Village Raikheda, Block Tilda Dist Raipur Chhattisgarh

Report No: VEL/A/2009220002/A  
 Form No: 7 & F-01  
 Party Reference No: NIL  
 Reporting Date: 30/09/2020  
 Period of Analysis: 22/09/2020-30/09/2020  
 Receipt Date: 22/09/2020

Sample Description: AMBIENT AIR

General Information  
 Sampling Location: Village - Mura  
 Sample Collected by: VEL Team  
 Sampling Equipment used: RDS/FPS  
 Instrument Code: VEL/RDS/25/FPS/29  
 Instrument Calibration Status: Calibrated  
 Latitude: -  
 Longitude: -  
 Meteorological condition during monitoring: Clear Sky  
 Date of Monitoring: 16/09/2020 To 17/09/2020  
 Time of Monitoring: 10:30 TO 16:30 Hrs.  
 Ambient Temperature (°C): Min: 23° Max: 30°  
 Surrounding Activity: Human, Vehicular & Other Activity  
 Scope of Monitoring: Regulatory Requirement  
 Sampling & Analysis Protocol: IS: 5182  
 Sampling Duration: 24 Hrs  
 Parameter Required: AS Per Work Order

S.No.	Parameters	Test Method	Results	Units	Limit as per CPCB
1	Particulate Matter (as PM -10)	IS:5182 (P- 23)-2006,RA. 2017	72.78	µg/m <sup>3</sup>	100
2	Particulate Matter (as PM - 2.5)	IS:5182 (P- 24)-2001, RA. 2017	36.14	µg/m <sup>3</sup>	60
3	Nitrogen Dioxide (as NO2)	IS:5182 (P- 6)-2006 RA. 2017	19.53	µg/m <sup>3</sup>	50
4	Sulphur Dioxide (as SO2)	IS:5182 (P- 2)-2001, RA. 2017	19.79	µg/m <sup>3</sup>	80
5	Ozone (as O3)	IS 5182 (P-8):1978 RA.2014	8.28	µg/m <sup>3</sup>	180.0

BDL - Below Detection Limit \*\* DL - Detection Limit

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MoEF & CC Recognised [ISO 9001] [OHSAS 45001]

## Test Report

Sample Number : VELRAIPUR02

Name & Address of the Party : M/s Raipur Energy Limited

Formerly GMR Chhatীগढ़ Energy Ltd. Village  
Raikheda, Block: Tilda, Dist: Raipur Chhatীগढ़

Report No. : VEL/A/2009270002/0

Format No. : 7.8 F-01

Party Reference No. : NIL

Reporting Date : 20/09/2020

Period of Analysis : 22/08/2020-30/09/2020

Receipt Date : 22/09/2020

Sample Description : AMBIENT AIR

### General Information

Sampling Location	: Village - Mura
Sample Collected by	: VEL Team
Sampling Equipment used	: RDS/FPS
Instrument Code	: VELRDS/25/FPS/29
Instrument Calibration Status	: Calibrated
Latitude	: -
Longitude	: -
Meteorological condition during monitoring	: Clear Sky
Date of Monitoring	: 16/09/2020 To 17/09/2020
Time of Monitoring	: 10:30 TO 10:30 Hrs
Ambient Temperature (°C)	: Min 23° Max 30°
Surrounding Activity	: Human, Vehicular & Other Activity
Scope of Monitoring	: Regulatory Requirement
Sampling & Analysis Protocol	: IS 5182
Sampling Duration	: 24 Hrs
Parameter Required	: AS Per Work Order

S.No.	Parameters	Test Method	Results	Units	Limit as per CPCB
1	Suspended Particulate Matter	IS:5182 (P- 4) :1999 RA.2014	172.63	µg/m <sup>3</sup>	600
2	Mercury (Hg)	Methods of air sampling and analysis, 3rd ed., 1988, Method No.317	BOL (**DL 1.0 ng/m <sup>3</sup> )	µg/m <sup>3</sup>	-

BOL - Below Detection Limit \*\* DL - Detection Limit

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## Test Report

Sample Number : VEL/RAIPUR/03

Name & Address of the Party : M/s Raipur Energy Limited  
 Formerly GMR Chhattisgarh Energy Ltd. Village  
 Raikhada Block - Tada, Dist. Raipur Chhattisgarh

Report No. : VEL/A/2009220063/A  
 Format No. : 7.8 P.01  
 Party Reference No. : NIL  
 Reporting Date : 30/09/2020  
 Period of Analysis : 22/09/2020-30/09/2020  
 Receipt Date : 22/09/2020

Sample Description : AMBIENT AIR

### General Information

Sampling Location : Village - Gajtra Gata  
 Sample Collected by : VEL Team  
 Sampling Equipment used : RDS/FPS  
 Instrument Code : VEL/RDS/23/FPS/24  
 Instrument Calibration Status : Calibrated  
 Latitude :  
 Longitude :  
 Meteorological condition during monitoring : Clear Sky  
 Date of Monitoring : 17/09/2020 To 18/09/2020  
 Time of Monitoring : 10:30 TO 10:30 Hrs  
 Ambient Temperature (°C) : Min 24° Max 31°  
 Surrounding Activity : Human, Vehicular & Other Activity  
 Scope of Monitoring : Regulatory Requirement  
 Sampling & Analysis Protocol : IS-5182  
 Sampling Duration : 24 Hrs  
 Parameter Required : As Per Work Order

S.No.	Parameters	Test Method	Results	Units	Limit as per CPCB
1	Particulate Matter (as PM 10)	IS:5182 (P- 23)-2006, RA. 2017	75.06	µg/m <sup>3</sup>	100
2	Particulate Matter (as PM 2.5)	IS:5182 (P- 24)-2001, RA. 2017	38.84	µg/m <sup>3</sup>	50
3	Nitrogen Dioxides (as NO2)	IS:5182 (P- 8)-2006 RA.2017	22.53	µg/m <sup>3</sup>	50
4	Sulphur Dioxide (as SO2)	IS:5182 (P- 2)-2001, RA. 2017	12.01	µg/m <sup>3</sup>	50
5	Ozone (as O3)	IS 5182 (P-9):1974 RA.2014	8.93	µg/m <sup>3</sup>	100.0

BDL - Below Detection Limit \*\* DL Detection Limit

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 Corp. Off.: Plot No. 82A, Sector- 5, IMT Manesar, Gurugram- 122051  
 MoEF & CC Recognised | ISO 9001 | OHSAS 45001

## Test Report

Sample Number : VEL/RAIPUR/03

Name & Address of the Party : Mrs Rajur Energy Limited  
 Formerly OMR Chhatargarh Energy Ltd. Village  
 Raikhera. Block - Tada. Dist. Raipur Chhatargarh

Report No : VEL/A/2008220003/B

Format No : 7 & F-01

Party Reference No : NIL

Reporting Date : 30/09/2020

Period of Analysis : 22/09/2020-30/09/2020

Receipt Date : 22/09/2020

Sample Description : AMBIENT AIR

General Information  
 Sampling Location : Village - Galkera Gate  
 Sample Collected by : VEL Team  
 Sampling Equipment used : RDS/FPS  
 Instrument Code : VEL/RDS/23/FPS/24  
 Instrument Calibration Status : Calibrated  
 Latitude : -  
 Longitude : -  
 Meteorological condition during monitoring : Clear Sky  
 Date of Monitoring : 17/09/2020 To 18/09/2020  
 Time of Monitoring : 10:30 TO 10:30 Hrs.  
 Ambient Temperature (°C) : Min 24° Max 31°  
 Surrounding Activity : Human, Vehicular & Other Activity  
 Scope of Monitoring : Regulatory Requirement  
 Sampling & Analysis Protocol : IS - 5182  
 Sampling Duration : 24 Hrs.  
 Parameter Required : As Per Work Order

S No.	Parameters	Test Method	Results	Units	Limit as per CPCB
1	Suspended Particulate Matter	IS-5182 (P- 4) : 1998 RA 2014	175.57	µg/m <sup>3</sup>	600
2	Mercury (Hg)	Methods of air sampling and analysis, 3rd ed., 1988, Method No.317	BDL [MDL: 0 ng/m <sup>3</sup> ]	µg/m <sup>3</sup>	-

BDL - Below Detection Limit \*\* DL, Detection Limit

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- All disputes are subjected to Jaipur jurisdiction



## Test Report

Sample Number: VEL/RAIPUR/04  
 Name & Address of the Party: M/s Rajou Energy Limited  
 Formerly GMF Chhatrapati Energy Ltd Village  
 Rameshp. Block - Tapsi Dist. Rajou Chhatrapati

Report No: VELIA/2009/210001/A  
 Format No: T & F-01  
 Party Reference No: NIL  
 Reporting Date: 30/09/2020  
 Period of Analysis: 22/09/2020-30/09/2020  
 Receipt Date: 22/09/2020

Sample Description: AMBIENT AIR

General Information:  
 Sampling Location: Village - Chicholi/Chatanra Chok  
 Sample Collected by: VEL Team  
 Sampling Equipment used: RDS/FPS  
 Instrument Code: VELRDS/20/FPS/29  
 Instrument Calibration Status: Calibrated  
 Latitude: -  
 Longitude: -  
 Meteorological condition during monitoring: Clear Sky  
 Date of Monitoring: 17/09/2020 To 18/09/2020  
 Time of Monitoring: 11:30 TO 11:30 Hrs  
 Ambient Temperature (°C): Min 24° Max 31°  
 Surrounding Activity: Human, Vehicular & Other Activity  
 Scope of Monitoring: Regulatory Requirement  
 Sampling & Analysis Protocol: IS-5182  
 Sampling Duration: 24 Hrs  
 Parameter Required: As Per Work Order

S.No	Parameters	Test Method	Results	Units	Limit as per CPCB
1	Particulate Matter (as PM -10)	IS:5182 (P- 13)-2009, RA, 2017	83.88	µg/m <sup>3</sup>	100
2	Particulate Matter (as PM - 2.5)	IS:5182 (P- 24)-2001, RA, 2017	38.69	µg/m <sup>3</sup>	60
3	Nitrogen Dioxide (as NO2)	IS:5182 (P- 6)-2006 RA,2017	21.79	µg/m <sup>3</sup>	50
4	Sulphur Dioxide (as SO2)	IS:5182 (P- 2)-2001, RA, 2017	10.68	µg/m <sup>3</sup>	50
5	Ozone (as O3)	IS:5182 (P-8)-1974 RA,2014	10.76	µg/m <sup>3</sup>	180.0

BDL - Below Detection Limit \*\* DL Detection Limit

\*\*\*End of Report\*\*\*

  
 (Chief Dy)



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- All disputes are subjected to Jaipur jurisdiction



Laboratory: Plot No. 24, 25, Narayan Vihar B Block, Jaipur (Raj.) 302035  
 Corp. Off.: Plot No. B2A, Sector- 5, IMT Manesar, Gurugram- 122051  
 MoEF & CC Recognised [ISO 9001 | OHSAS 45001]

## Test Report

Sample Number : VELRAIPUR04  
 Name & Address of the Party : M/s Raipur Energy Limited  
 Formerly GMR Chhattisgarh Energy Ltd. Village  
 Rajkeda, Block - Tilda, Dist. Raipur Chhattisgarh

Report No : VELIA/2009220004/B  
 Format No : T & F-04  
 Party Reference No : NIL  
 Reporting Date : 30/09/2020  
 Period of Analysis : 22/09/2020-30/09/2020  
 Receipt Date : 22/09/2020

Sample Description : AMBIENT AIR

### General Information

Sampling Location : Village - Chichol/ Chalamura Chok.  
 Sample Collected by : VEL Team  
 Sampling Equipment used : RDS/PPS  
 Instrument Code : VELRDS/25/PPS/19  
 Instrument Calibration Status : Calibrated  
 Latitude : -  
 Longitude : -  
 Meteorological condition during monitoring : Clear Sky  
 Date of Monitoring : 17/09/2020 To 18/09/2020  
 Time of Monitoring : 11.30 TO 11.30 Hrs.  
 Ambient Temperature (°C) : Min. 24° Max 31°  
 Surrounding Activity : Human, Vehicular & Other Activity  
 Scope of Monitoring : Regulatory Requirement  
 Sampling & Analysis Protocol : IS 5182  
 Sampling Duration : 24 Hrs.  
 Parameter Required : As Per Work Order

S.No.	Parameters	Test Method	Results	Units	Limit as per CPCB
1	Suspended Particulate Matter	IS:5182 (P-4) :1999 RA, 2014	260.12	µg/m <sup>3</sup>	600
2	Mercury (Hg)	Methods of air sampling and analysis, 3rd ed., 1988, Method No 317	BDL (*DL1.0 ngm <sup>3</sup> )	µg/m <sup>3</sup>	-

BDL - Below Detection Limit \* DL - Detection Limit

---End of Report---

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### 4.2 Noise Level Monitoring



**Figure No.4. Plan Showing Noise Level Monitoring Location Map**

#### **Ambient Noise Level Monitoring Locations**

- Location Code: -
- N1- Admin Building
  - N2- Field Hostel
  - N3- Gate-1 Main gate
  - N4- Gate-2 Gaitara Gate
  - N5- Gate-3 Bhatapara
  - N6- Gate-4 Mura Colony
  - N7- Gate-5 Labour Colony
  - N8- Near OHC



Laboratory: Plot No. 24, 25, Narayan Vihar B Block, Jaipur (Raj.) 302035  
 Corp. Off: Plot No. 82A, Sector- 5, IMT Manesar, Gurugram- 122051  
 MoEF & CC Recognised (ISO 9001 | OHSAS 45001)

## Test Report

Sample Number : VEL/AN/01  
 Name & Address of the Party : M/s Rajput Energy Limited  
 Formerly GMR Chhatlisgarh Energy Ltd. Village  
 Raikhed, Block - TWJa, Dist. Raipur Chhatlisgarh

Report No. : VEL/N/2009220004A  
 Format No : 7.8 F-01  
 Party Reference No : NIL  
 Reporting Date : 01/10/2020  
 Receipt Date : 22/09/2020  
 Sampling Duration : 24 Hrs  
 Sample Collected by : VEL Team  
 Instrument : Calibrated  
 Calibration Status :

Sample Description : Ambient Noise  
 Scope of Monitoring : Regulatory Requirement  
 Protocol Used : IS 9989, IS 9876  
 Instrument Used : SLM

### General Information

Sampling Location : Admin Building  
 Instrument Code : VEL/JAI/SLM/07  
 Meteorological condition during monitoring : Clear Sky  
 Date of Monitoring : 16/09/2020 To 17/09/2020  
 Time of Monitoring : 06:00 TO 06:00 P.M.  
 Ambient Temperature (°C) : Min. 22° Max 30°  
 Surrounding Activity : Human, Vehicular & Other Activity  
 Parameter Required : As Per Work Order

S.No.	Test Parameters	Protocol	Test Result dB (A)	
			Day Time	Night Time
1	L max	IS: 9989-1981, IS 9876: 1981	67.3	52.9
2	L min	IS: 9989-1981, IS 9876: 1981	46.5	40.3
3	L <sub>eq</sub>	IS: 9989-1981, IS 9876: 1981	57.36	46.84

Category of Zones	L <sub>eq</sub> in dB(A)	
	Day	Night
Industrial	75	70
Commercial	65	55
Residential	55	45
Silence Zone	50	40

1. Day Time is from 6.00 AM to 10.00 PM.  
 2. Night Time is reckoned between 10.00 PM to 6.00 AM  
 3. Silence Zone is defined as an area up to 100m around premises of Hospitals, Educational institutions and Courts. Use of vehicle horn, loudspeaker and bursting of crackers is banned in these zones.  
 Note: Mixed categories of areas be declared as one of the four above mentioned categories by the competent Authority and the corresponding standards shall apply.

\*\*\*End of Report\*\*\*

(Checked By)



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- All disputes are subjected to Jaipur jurisdiction.



Laboratory: Plot No. 24, 25, Narayan Vihar B Block, Jaipur (Ra.) 302035

Corp. Off.: Plot No. B2A, Sector- 5, IMT Manesar, Gurugram- 122051

MoEF & CC Recognised (ISO 9001 | OHSAS 45001)

## Test Report

Sample Number: VEL/AM02

Name & Address of the Party: M/s Raipur Energy Limited  
Formerly GMR Chhattisgarh Energy Ltd. Village:  
Raksheda, Block: Tilda, Dist: Raipur Chhattisgarh

Report No.: VEL/IN2009220002/A

Format No.: 7.8.F-01

Party Reference No.: NIL

Reporting Date: 09/10/2020

Receipt Date: 22/09/2020

Sampling Duration: 24 Hrs

Sample Collected by: VEL Team

Instrument: Calibrated

Calibration Status:

Sample Description: Ambient Noise  
Scope of Monitoring: Regulatory Requirement  
Protocol Used: IS 9889, IS 9876  
Instrument Used: SLM

### General Information

Sampling Location: Field Hostel  
Instrument Code: VEL/JMK(S)MK/01  
Meteorological condition during monitoring: Clear Sky  
Date of Monitoring: 16/09/2020 To 17/09/2020  
Time of Monitoring: 06:00 TO 06:00 Hrs  
Ambient Temperature (°C): Min: 23° Max: 30°  
Surrounding Activity: Human, Vehicular & Other Activity  
Parameter Required: As Per Work Order

S.No.	Test Parameters	Protocol	Test Result dB (A)	
			Day Time	Night Time
1	L <sub>max</sub>	IS: 9889-1981, IS 9876: 1981	67.5	50.1
2	L <sub>min</sub>	IS: 9889-1981, IS 9876: 1981	43.9	35.2
3	Leq	IS: 9889-1981, IS 9876: 1981	53.41	43.71

Category of Zones	Leq in dB(A)	
	Day	Night
Industrial	75	70
Commercial	65	55
Residential	55	45
Silence Zone	50	40

- Day Time is from 6:00 AM to 10:00 PM
  - Night Time is reckoned between 10:00 PM to 6:00 AM
  - Silence Zone is defined as an area up to 100m around premises of Hospitals, Educational Institutions and Courts. Use of vehicle horn, loudspeaker and bursting of crackers is banned in these zones.
- Note: Mixed categories of areas be declared as one of the four above mentioned categories by the competent Authority and the corresponding standards shall apply.

\*\*\*End of Report\*\*\*

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Laboratory Plot No. 24, 25, Narayan Vihar B Block, Jaipur (Raj.) 302035  
 Corp. Off. Plot No. 82A, Sector- 5, IMT Manesar, Gurugram- 122051  
 MoEF & CC Recognised | ISO 9001 | OHSAS 45001

## Test Report

Sample Number: VEL/AN/03  
 Name & Address of the Party: W's Raipur Energy Limited  
 Formerly GMR Chhattisgarh Energy Ltd. Village  
 Raikhada, Block - Tilda, Dist. Raipur Chhattisgarh

Report No: VEL/M/2009220003/A  
 Formal No: 7-6-F-01  
 Party Reference No: NIL  
 Reporting Date: 01/10/2020  
 Receipt Date: 22/09/2020  
 Sampling Duration: 24 Hrs  
 Sample Collected by: VEL Team  
 Instrument: Calibrated  
 Calibration Status:

Sample Description: Ambient Noise  
 Scope of Monitoring: Regulatory Requirement  
 Protocol Used: IS 9889, IS 9876  
 Instrument Used: SLM

### General Information

Sampling Location: Gate 1 Main Gate  
 Instrument Code: VEL/AN/SLM/03  
 Meteorological condition during monitoring: Clear Sky  
 Date of Monitoring: 18/09/2020 To 17/09/2020  
 Time of Monitoring: 08:00 TO 08:00 hrs  
 Ambient Temperature (°C): Min -23° Max 30°  
 Surrounding Activity: Human, Vehicular & Other Activity  
 Parameter Required: As Per Work Order

S.No.	Test Parameters	Protocol	Test Result dB (A)	
			Day Time	Night Time
1	L <sub>max</sub>	IS: 9889-1981, IS 9876: 1981	71.8	56.4
2	L <sub>min</sub>	IS: 9889-1981, IS 9876: 1981	46.8	42.2
3	L <sub>eq</sub>	IS: 9889-1981, IS 9876: 1981	59.62	46.75

Category of Zones	Leq in dB(A)	
	Day	Night
Industrial	75	70
Commercial	65	55
Residential	55	45
Silence Zone	50	40

- Day Time is from 6:00 AM to 10:00 PM.
  - Night Time is reckoned between 10:00 PM to 6:00 AM.
  - Silence Zone is defined as an area up to 100m around premises of Hospitals, Educational Institutions and Courts. Use of vehicle horn, loudspeaker and bursting of crackers is banned in these zones.
- Note: Mixed categories of areas be declared as one of the four above mentioned categories by the competent Authority and the corresponding standards shall apply.

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- All disputes are subjected to Jaipur jurisdiction.



## Test Report

Sample Number/ VEL/AM04  
 Name & Address of the Party : M/s Raipur Energy Limited  
 Formerly GMR Chhattisgarh Energy Ltd. Village  
 Raikheda Block - Tada, Dist. Raipur Chhattisgarh

Report No. VEL/N/2009220004/A  
 Format No. : 7.8 F-01  
 Party Reference No. : NIL  
 Reporting Date : 01/10/2020  
 Receipt Date : 22/09/2020  
 Sampling Duration : 24 Hrs  
 Sample Collected by : VEL Team  
 Instrument : Calibrated  
 Calibration Status

Sample Description : Ambient Noise  
 Scope of Monitoring : Regulatory Requirement  
 Protocol Used : IS 9889, IS 9876  
 Instrument Used : SLM

### General Information

Sampling Location : Gate 2 Gafara Gate  
 Instrument Code : VEL/IAU/SLM04  
 Meteorological condition during monitoring : Clear Sky  
 Date of Monitoring : 16/09/2020 To 17/09/2020  
 Time of Monitoring : 06.00 TO 06.00 Hrs.  
 Ambient Temperature (°C) : Min, 23° Max 30°  
 Surrounding Activity : Human, Vehicular & Other Activity  
 Parameter Required : As Per Work Order

S.No.	Test Parameters	Protocol	Test Result dB (A)	
			Day Time	Night Time
1	L max	IS: 9889-1981, IS 9876- 1981	69.5	51.6
2	L min	IS: 9889-1981, IS 9876- 1981	44.9	40.2
3	Leq	IS: 9889-1981, IS 9876- 1981	56.89	43.79

Category of Zones	Leq in dB(A)	
	Day	Night
Industrial	75	70
Commercial	65	55
Residential	55	45
Silence Zone	50	40

- Day Time is from 6.00 AM to 10.00 PM
  - Night Time is reckoned between 10.00 PM to 6.00 AM.
  - Silence Zone is defined as an area up to 100m around premises of Hospitals, Educational Institutions and Courts. Use of vehicle horn, loudspeaker and bursting of crackers is banned in these zones.
- Note: Mixed categories of areas be declared as one of the four above mentioned categories by the competent Authority and the corresponding standards shall apply.

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## Test Report

Sample Number : VEL/AN/05  
 Name & Address of the Party : M/s Raipur Energy Limited  
 Formerly GMR Chhattisgarh Energy Ltd Village  
 Raikheda, Block - Tilda, Dist. Raipur Chhattisgarh

Report No. : VEL/N/20/9220005/A  
 Formal No. : 78 F-01  
 Party Reference No. : NIL  
 Reporting Date : 01/10/2020  
 Receipt Date : 22/09/2020  
 Sampling Duration : 24 Hrs  
 Sample Collected by : VEL Team  
 Instrument : Calibrated  
 Calibration Status :

Sample Description : Ambient Noise  
 Scope of Monitoring : Regulatory Requirement  
 Protocol Used : IS 9989, IS 9876  
 Instrument Used : SLM

### General Information

Sampling Location : Gate 3 Bhatapora  
 Instrument Code : VEL/JAI/SLM/07  
 Meteorological condition during monitoring : Clear Sky  
 Date of Monitoring : 17/09/2020 To 18/09/2020  
 Time of Monitoring : 06:00 TO 06:00 Hrs.  
 Ambient Temperature (°C) : Min. 24° Max 31°  
 Surrounding Activity : Human, Vehicular & Other Activity  
 Parameter Required : As Per Work Order

S. No.	Test Parameters	Protocol	Test Result dB (A)	
			Day Time	Night Time
1	L max	IS: 9989-1981, IS 9876: 1981	72.3	50.7
2	L min	IS: 9989-1981, IS 9876: 1981	43.3	38.4
3	Leq	IS: 9989-1981, IS 9876: 1981	56.31	43.51

Category of Zones	Leq in dB(A)	
	Day	Night
Industrial	75	70
Commercial	65	55
Residential	55	45
Silence Zone	50	40

1. Day Time is from 6:00 AM to 10:00 PM  
 2. Night Time is reckoned between 10:00 PM to 6:00 AM  
 3. Silence Zone is defined as an area up to 100m around premises of Hospitals, Educational Institutions and Courts. Use of vehicle horn, loudspeaker and bursting of crackers is banned in these zones.  
 Note: Mixed categories of areas be declared as one of the four above mentioned categories by the competent Authority and the corresponding standards shall apply.

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Laboratory: Plot No. 24, 25, Narayan Vihar B Block, Jaipur (Raj.) 302035  
 Corp. Off.: Plot No. 82A, Sector- 5, IMT Manesar, Gurugram- 122051  
 MoEF & CC Recognised [ISO 9001 | OHSAS 45001]

## Test Report

Sample Number : VEL/AN/06  
 Name & Address of the Party : M/s Rajour Energy Limited  
 Formerly GMR Chhatargarh Energy Ltd. Village  
 Raikhera, Block - Tilda, Dist. Raipur Chhatargarh

Report No. : VEL/N/2009220006A  
 Format No. : F B F-01  
 Party Reference No. : NIL  
 Reporting Date : 01/10/2020  
 Receipt Date : 22/09/2020  
 Sampling Duration : 24 Hrs  
 Sample Collected by : VEL Team  
 Instrument : Calibrated  
 Calibration Status :

Sample Description : Ambient Noise  
 Scope of Monitoring : Regulatory Requirement  
 Protocol Used : IS 9889, IS 9876  
 Instrument Used : SLM

### General Information

Sampling Location : Gate 4 Mura Colony  
 Instrument Code : VEL/AN/SLM/D  
 Meteorological condition during monitoring : Clear Sky  
 Date of Monitoring : 17/09/2020 To 18/09/2020  
 Time of Monitoring : 06:00 TO 08:00 Hrs  
 Ambient Temperature (°C) : Min 24° Max 31°  
 Surrounding Activity : Heavy Vehicular & Other Activity  
 Parameter Required : As Per Work Order

S.No.	Test Parameters	Protocol	Test Result dB (A)	
			Day Time	Night Time
1	L max	IS: 9889-1981, IS 9876-1981	69.8	61.6
2	L min	IS: 9889-1981, IS 9876-1981	41.3	37.1
3	Leq	IS: 9889-1981, IS 9876-1981	54.67	44.72

Category of Zones	Leq in dB(A)	
	Day	Night
Industrial	75	70
Commercial	65	55
Residential	55	45
Silence Zone	50	40

1. Day Time is from 6:00 AM to 10:00 PM  
 2. Night Time is reckoned between 10:00 PM to 6:00 AM  
 3. Silence Zone is defined as an area up to 100m around premises of Hospitals, Educational Institutions and Courts. Use of vehicle horn, loudspeaker and bursting of crackers is banned in these zones.  
 Note: Mixed categories of areas be declared as one of the four above mentioned categories by the competent Authority and the corresponding standards shall apply.

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Laboratory: Plot No. 24, 25, Narayan Vihar B Block, Jaipur (Ra.) 302035

Corp. Off.: Plot No. 82A, Sector- 5, IMT Manesar, Gurugram- 122051

MoEF &amp; CC Recognised (ISO 9001 | OHSAS 45001)

## Test Report

Sample Number	VEL/AN/07	Report No.	VEL/N/2009220007/A
Name & Address of the Party	M/s Raipur Energy Limited Formerly GMR Chhattisgarh Energy Ltd. Village Rakhega, Block - Tilda, Dist Raipur Chhattisgarh	Format No.	7.8 F-01
Sample Description	Ambient Noise	Party Reference No.	Nil
Scope of Monitoring	Regulatory Requirement	Reporting Date	01/10/2020
Protocol Used	IS 9889 IS 9876	Receipt Date	22/09/2020
Instrument Used	SLM	Sampling Duration	24 Hrs
		Sample Collected by	VEL Team
		Instrument	Calibrated
		Calibration Status	

### General Information

Sampling Location	Card 3 <sup>rd</sup> level Colony
Instrument Code	VEL/AN/SLM/03
Meteorological condition during monitoring	Clear Sky
Date of Monitoring	17/09/2020 To 18/09/2020
Time of Monitoring	06:00 TO 06:30 Hrs
Ambient Temperature (°C)	Min 24° Max 31°
Surrounding Activity	Human, Vehicular & Other Activity
Parameter Required	As Per Work Order

S.No.	Test Parameters	Protocol	Test Result dB (A)	
			Day Time	Night Time
1	L max	IS: 9889-1981, IS 9876: 1981	65.1	45.8
2	L min	IS: 9889-1981, IS 9876: 1981	42.3	37.4
3	Leq	IS: 9889-1981, IS 9876: 1981	63.33	43.50

Category of Zones	Leq in dB(A)	
	Day	Night
Industrial	75	70
Commercial	65	55
Residential	55	45
Silence Zone	50	40

1. Day Time is from 6:00 AM to 10:00 PM  
 2. Night Time is reckoned between 10:00 PM to 6:00 AM  
 3. Silence Zone is defined as an area up to 100m around premises of Hospitals, Educational Institutions and Courts. Use of vehicle horn, loudspeaker and blasting of crackers is banned in these zones.  
 Note: Mixed categories of areas be declared as one of the four above mentioned categories by the competent Authority and the corresponding standards shall apply.

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- All disputes are subjected to Jaipur jurisdiction.



## Test Report

Sample Number : VEL/JAI/08  
 Name & Address of the Party : Mrs. Rajpur Energy Limited  
 Formerly GMR Chhattingarh Energy Ltd. Village  
 Raikhada, Block - Tikra, Dist. Rajpur Chhattingarh

Report No. : VEL/N/2809220008/A  
 Format No : 7.3 F-01  
 Party Reference No : NIL  
 Reporting Date : 01/10/2020  
 Receipt Date : 22/09/2020  
 Sampling Duration : 24 Hrs  
 Sample Collected by : VEL Team  
 Instrument : - Calibrated  
 Calibration Status

Sample Description : Ambient Noise  
 Scope of Monitoring : Regulatory Requirement  
 Protocol Used : IS 9889, IS 9876  
 Instrument Used : SLM

### General Information

Sampling Location : Near OMC  
 Instrument Code : VEL/JAI/SLM/04  
 Meteorological condition during monitoring : Clear Sky  
 Date of Monitoring : 17/08/2020 To 18/09/2020  
 Time of Monitoring : 06:00 TO 06:00 Hrs.  
 Ambient Temperature (°C) : Min. 24° Max 31°  
 Surrounding Activity : Human, Vehicular & Other Activity  
 Parameter Required : As Per Work Order

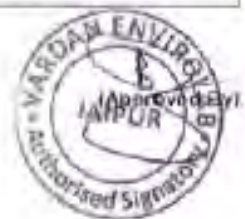
S.No.	Test Parameters	Protocol	Test Result dB (A)	
			Day Time	Night Time
1	L max	IS: 9889-1981, IS 9876-1981	70.6	52.8
2	L min	IS: 9889-1981, IS 9876-1981	43.4	38.1
3	Leq	IS: 9889-1981, IS 9876-1981	53.85	42.25

Category of Zones	Leq in dB(A)	
	Day	Night
Industrial	75	70
Commercial	65	55
Residential	55	45
Silence Zone	50	40

- Day Time is from 6:00 AM to 10:00 PM
  - Night Time is reckoned between 10:00 PM to 6:00 AM
  - Silence Zone is defined as an area up to 100m around premises of Hospitals, Educational Institutions and Courts. Use of vehicle horn, loudspeaker and burning of crackers is banned in these zones.
- Note: Mixed categories of areas be declared as one of the four above mentioned categories by the competent Authority and the corresponding standards shall apply.

\*\*\*End of Report\*\*\*

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- Results refers only to the test sample & applicable Parameters
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- The Liability of the laboratory is limited to the invoiced amount
- All disputes are subjected to Jaipur jurisdiction

### 4.3 Ground water Quality Analysis



**Figure No.5. Plan Showing Ground Water Quality Monitoring Location Map**

Location Code: -

GW1- Piezometer-1 (Near Field Hostel)

GW2- Piezometer-2 (Behind REL Site Office)

GW3- Piezometer-3 (Near Bhatapara to Raikheda Road)

GW4- Piezometer-4 (Beside Fly ash Pond)

GW5- Piezometer-5 (Beside Fly ash Pond no. 2)



Laboratory: Plot No. 24, 25, Narayan Vihar B Block, Jaipur (Raj.) 302035  
 Corp. Off.: Plot No. 82A, Sector- 5, IMT Manesar, Gurugram- 122051  
 MoEF & CC Recognised [ISO 9001 | OHSA 45001]

## Test Report

Sample Number : VEL/GW/01  
 Name & Address of the Party : M/s Raipur Energy Limited  
 Formerly GMR Chhattisgarh Energy Ltd. Village  
 Raikhedra, Block - Tilda, Dist. Raipur Chhattisgarh

Report No. : VEL/W/2000220005/A  
 Format No : T & F-01  
 Party Reference No : NIL  
 Reporting Date : 01/10/2020  
 Period of Analysis : 22/09/2020-01/10/2020  
 Receipt Date : 22/09/2020  
 Sampling Date : 18/09/2020  
 Sampling Quantity : 2 Ltr  
 Sampling Type : Grab

Sample Description : GROUND WATER  
 Location : Piezometer -1 (Near Field Hostel)  
 Sample Collected by : VEL Team  
 Preservation : Suitable Preservation  
 Sampling and Analysis Protocol : IS 10500 :2012

S.No.	Parameters	Protocols	Results	Units	IS:10500-2012	
					Acceptable Limits	Permissible Limits
1	pH	IS 3025 (P-11): 1983 Reaff. 2017	7.23	-	6.5 to 8.5	No Relaxation
2	Total Dissolved Solids	IS 3025 (P-16): 1984 Reaff 2017	282.00	mg/l	500	2000
3	Total Alkalinity (as CaCO <sub>3</sub> )	IS: 3025 (Part 23): 1986, Reaff. 2019	163.52	mg/l	200	600
4	Total Hardness (as CaCO <sub>3</sub> )	IS: 3025 (Part 21): 2008, Reaff. 2019	158.40	mg/l	200	600
5	Nitrate (as NO <sub>3</sub> )	IS: 3025 (Part 34): 1988, Reaff. 2019	1.62	mg/l	45	No Relaxation
6	Chloride (as Cl)	IS: 3025 (Part 32): 1986, Reaff. 2019	62.45	mg/l	250	1000
7	Sulphate (as SO <sub>4</sub> )	IS: 3025 (Part 24): 1986, Reaff. 2019 Turbidity Method	15.03	mg/l	200	400
8	Calcium (as Ca)	IS: 3025 (Part 40): 1991 Reaff. 2019	42.85	mg/l	75	200
9	Magnesium (as Mg)	IS: 3025 (Part 46): 1994, Reaff. 2009 (EDTA method)	12.51	mg/l	30	100
10	Fluorides (as F)	APHA 23rd Edition 2017, 4500 FD	0.28	mg/l	1.0	1.5
11	Total Iron (as Fe)	IS 3025(P-53): 2003 Reaffirm 2019	0.14	mg/l	0.3	No Relaxation
12	Arsenic (as As)	APHA (23rd edition-2017), 3114 C	*BDL(**DL-0.006 mg/l)	mg/l	0.01	0.05
13	Copper (as Cu)	APHA 23rd Edition Year 2017 Method No. 3113B	*BDL(**DL-0.02 mg/l)	mg/l	0.05	1.5
14	Zinc (as Zn)	APHA (23rd edition-2017), 3030D. 3113 B	*BDL(**DL-0.20 mg/l)	mg/l	5.0	15
15	Selenium (as Se)	APHA (23rd edition-2017), 3114C	*BDL(**DL-0.05 mg/l)	mg/l	0.01	No Relaxation
16	Turbidity	IS 3025 (Part 10): 1984, Ref: 2017. (Nephelometric Method)	*BDL(**DL-1.0 NTU)	NTU	1	5
17	Aluminium	IS 3025 (Part-55): 2003, Reaff. 2019	*BDL(**DL-0.03 mg/l)	mg/l	0.03	0.2
18	Manganese (as Mn)	IS: 3025 (Part 46): 1994, Reaff. 2019 (EDTA method)	*BDL(**DL-0.05 mg/l)	mg/l	0.1	0.3
19	Ammonia (as NH <sub>3</sub> )	IS 3025 (Part-34)- 1988, RA. 2019	*BDL(**DL-0.3 mg/l)	mg/l	0.5	No Relaxation

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- All disputes are subjected to Jaipur jurisdiction







## Test Report

Sample Number : VEL/GW/01

Report No. : VEL/W/2009220005/A

S.No	Parameters	Protocols	Results	Units	IS:10500-2012	
					Acceptable Limits	Permissible Limits
20	Boron (as B)	APHA 23/03 Edition Year 2017 Method No. 4500B	*BOL(**DL-0.2 mg/l)	mg/l	0.5	1.0
21	Sulphide	IS: 3025 (Part 29): 1986 RA: 2009 Turbidity Method	*BOL(**DL-0.1 mg/l)	mg/l	200	400
22	Phenolic Compound	APHA 23rd Edition 2017, 5630C	*BOL(**DL-0.1 mg/l)	mg/l	0.001	0.002
23	Free Residual Chlorine	IS: 3025 (Part 28): 1986 RA: 2016	*BOL(**DL-0.2 mg/l)	mg/l	0.2	1

\*BOL-Below Detection Limit, \*\*DL-Detection Limit

\*\*End of Report\*\*

  
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Laboratory: Plot No. 24, 25, Narayan Vihar B Block, Jaipur (Raj.) 302035

Corp. Off.: Plot No. 82A, Sector- 5, IMT Manesar, Gurugram- 122051

MoEF & CC Recognised | ISO 9001 | OHSAS 45001

## Test Report

Sample Number : VEL/GW/01  
 Name & Address of the Party : M/s Raipur Energy Limited  
 Formerly GMR Chhattisgarh Energy Ltd. Village  
 Raikheda, Block - Tilda, Dist. Raipur Chhattisgarh

Sample Description : GROUND WATER  
 Location : Piezometer -1 (Near Field Hostel)  
 Sample Collected by : VEL Team  
 Preservation : Suitable Preservation  
 Sampling and Analysis Protocol : IS 10500-2012

Report No. : VEL/W/2009220005/B  
 Format No : 7 B F-01  
 Party Reference No : NIL  
 Reporting Date : 01/10/2020  
 Period of Analysis : 22/09/2020-01/10/2020  
 Receipt Date : 22/09/2020  
 Sampling Date : 18/09/2020  
 Sampling Quantity : 2 Ltr  
 Sampling Type : Grab

S.No.	Parameters	Protocols	Results	Units	IS:10500-2012	
					Acceptable Limits	Permissible Limits
1	Total Coliform (By MPN Method)	IS:1622	Absent	MPN/100 ml	Shall not be Detectable in any 100 ml sample	NA
2	E-Coli	IS:1622	Absent	per 100 ml	Absent/100 ml	Absent/100 ml
3	Cyanide (as CN)	APHA 23rd Edition 2017, 4500CN D	*BDL(**DL-0.05 mg/l)	mg/l	0.05	No Relaxation
4	Colour	IS 3026: 1983 (P-4) RA, 2017	*BDL(**DL 1.0 Hazen)	Hazen Unit	5	15
5	Odour	IS 3025 (P-5): RA, 2018	Agreeable	Qualitative	Agreeable	Agreeable
6	Taste	IS 3025(P-8):1984 RA, 2017	Agreeable	Qualitative	Agreeable	Agreeable
7	Anionic Surface Active Agent	APHA 23rd Edition 2017, 5540C	*BDL(**DL-0.05 mg/l)	mg/l	0.2	1.0
8	Mineral Oil	IS 3025(P-39)	*BDL(**DL-0.5 mg/l)	mg/l	0.5	No Relaxation
9	Barium as (Ba)	APHA3111B	*BDL(**DL-0.05 mg/l)	mg/l	0.7	No Relaxation
10	Faecal Coliform	IS:1622	Absent	MPN/100 ml	Shall not be Detectable in any 100 ml sample	

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Laboratory: Plot No. 24, 25, Narayan Vihar B Block, Jaipur (Raj.) 302035  
Corp. Off.: Plot No. 82A, Sector- 5, IMT Manesar, Gurugram- 122051  
MoEF & CC Recognised (ISO 9001 | OHSAS 45001)

## Test Report

Sample Number: VEL/GW/01

Report No:

VEL/N/2009220005/9

\*BOL-Below Detection Limit, \*\*DL-Detection Limit

\*\*\*End of Report\*\*\*

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Laboratory: Plot No. 24, 25, Narayan Vihar B Block, Jaipur (Raj.) 302035  
 Corp. Off. Plot No. 82A, Sector- 5, IMT Manesar, Gurugram- 122051  
 MoEF & CC Recognised [ISO 9001 | OHSA 45001]

## Test Report

Sample Number: VEL/GW02

Name & Address of the Party: M/s Raipur Energy Limited  
 Formerly GMF Chittisgarh Energy Ltd. Village  
 Raikhada Block - Tilda, Dist Raipur Chhattisgarh

Report No.: VEL/W/2009220006/A

Format No.: 7.8 F-01

Party Reference No.: NIL

Reporting Date: 01/10/2020

Period of Analysis: 22/09/2020-01/10/2020

Receipt Date: 22/09/2020

Sampling Date: 18/09/2020

Sampling Quantity: 2 Lit

Sampling Type: Grab

Sample Description: GROUND WATER  
 Location: Piezometer -2 (Behind REL Site office)  
 Sample Collected by: VEL Team  
 Preservation: Suitable Preservation  
 Sampling and Analysis Protocol: IS 10500-2012

S.No.	Parameters	Protocols	Results	Units	IS:10500-2012	
					Acceptable Limits	Permissible Limits
1	pH	IS 3025 (P-11): 1983 Reaff. 2017	7.59	-	6.5 to 8.5	No Relaxation
2	Total Dissolved Solids	IS 3025 (P-16): 1984 Reaff 2017	318.00	mg/l	500	2000
3	Total Alkalinity (as CaCO <sub>3</sub> )	IS: 3025 (Part 23): 1986, Reaff. 2019	165.64	mg/l	200	500
4	Total Hardness (as CaCO <sub>3</sub> )	IS: 3025 (Part 21): 2009, Reaff. 2019	305.92	mg/l	200	500
5	Nitrate (as NO <sub>3</sub> )	IS: 3025 (Part 34): 1988, Reaff. 2019	2.10	mg/l	45	No Relaxation
6	Chloride (as Cl)	IS: 3025 (Part 32): 1988, Reaff. 2019	48.57	mg/l	250	1000
7	Sulphate (as SO <sub>4</sub> )	IS: 3025 (Part 24): 1986, Reaff. 2019	16.72	mg/l	200	400
8	Calcium (as Ca)	IS: 3025 (Part 49): 1991 Reaff. 2019	73.01	mg/l	75	200
9	Magnesium (as Mg)	IS: 3025 (Part 46): 1994, Reaff. 2009 (EDTA method)	6.79	mg/l	30	100
10	Fluorides (as F)	APHA 23rd Edition 2017, 4500 FD	0.34	mg/l	1.0	1.5
11	Total Iron (as Fe)	IS 3025(P-53): 2003 Reaffirm 2019	0.16	mg/l	0.3	No Relaxation
12	Arsenic (as As)	APHA (23rd edition-2017), 3114 C	*BDL (**DL-0.005 mg/l)	mg/l	0.01	0.05
13	Copper (as Cu)	APHA 23rd Edition Year 2017 Method No. 3111B	*BDL (**DL-0.02 mg/l)	mg/l	0.05	1.5
14	Zinc (as Zn)	APHA (23rd edition-2017), 3030D, 3113 B	*BDL (**DL-0.20 mg/l)	mg/l	5.0	15
15	Selenium (as Se)	APHA (23rd edition-2017), 3114C	*BDL (**DL-0.05 mg/l)	mg/l	0.01	No Relaxation
16	Turbidity	IS 3025 (Part 10): 1984, Ref: 2017, (Nephelometric Method)	*BDL (**DL-1.0 NTU)	NTU	1	5
17	Aluminium	IS 3025 (Part-55): 2003, Reaff. 2019	*BDL (**DL-0.03 mg/l)	mg/l	0.03	0.2
18	Manganese (as Mn)	IS: 3025 (Part 46): 1994, Reaff. 2019 (EDTA method)	*BDL (**DL-0.05 mg/l)	mg/l	0.1	0.1
19	Ammonia (as NH <sub>3</sub> )	IS-3025 (Part-34)- 1988, RA. 2019	*BDL (**DL-0.3 mg/l)	mg/l	0.5	No Relaxation

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## Test Report

Sample Number: VEL/GW/02

Report No.: VEL/W/2009220005JA

S.No.	Parameters	Protocols	Results	Units	IS:10600-2012	
					Acceptable Limits	Permissible Limits
20	Boron (as B)	APHA 23rd Edition Year 2017 Method No. 4500B	*BDL (**DL-0.3 mg/l)	mg/l	0.5	1.0
21	Sulphide	IS: 3025 (Part 26): 1986, RA. 2009 Turbidity Method	*BDL (**DL-0.1 mg/l)	mg/l	200	400
22	Phenolic Compound	APHA 23rd Edition 2017, 5530C	*BDL (**DL-0.1 mg/l)	mg/l	0.001	0.002
23	Free Residual Chlorine	IS: 3025 (Part 26): 1986 RA 2019	*BDL (**DL-0.2 mg/l)	mg/l	0.2	1

\*BDL-Below Detection Limit, \*\*DL-Detection Limit.

\*\*\*End of Report\*\*\*

  
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Laboratory: Plot No. 24, 25, Narayan Vihar B Block, Jaipur (Ra) | 302035  
 Corp. Off.: Plot No. 82A, Sector- 5, IMT Manesar, Gurugram | 122051  
 MoEF & CC Recognised [ISO 9001 | OHSAS 45001]

## Test Report

Sample Number: VEL/GW02  
 Name & Address of the Party: M/s Rajur Energy Limited  
 Formerly GMR Chhattegarh Energy Ltd. Village:  
 Raikheda Block / Tilda, Dist. Rajur Chhattegarh

Report No.: VEL/W/2009220005/B  
 Format No.: 7 & F-01  
 Party Reference No.: ML  
 Reporting Date: 01/10/2020  
 Period of Analysis: 22/09/2020-01/10/2020  
 Receipt Date: 22/09/2020  
 Sampling Date: 18/09/2020  
 Sampling Quantity: 2 Ltr  
 Sampling Type: Grab

Sample Description: GROUND WATER  
 Location: Piezometer -2 (Behind REL Site office)  
 Sample Collected by: VEL Team  
 Preservation: Suitable Preservation  
 Sampling and Analysis Protocol: IS:10500-2012

S.No	Parameters	Protocol	Results	Units	IS:10500-2012	
					Acceptable Limits	Permissible Limits
1	Total Coliform (By MPN Method)	IS:1822	Absent	MPN/100 ml	Shall not be Detectable in any 100 ml sample	NA
2	E-Coli	IS:1822	Absent	per 100 ml	Absent/100 ml	Absent/100 ml
3	Cyanide (As CN)	APHA 23rd Edition 2017, 4600CN D	*BDL(**DL-0.05 mg/l)	mg/l	0.05	No Relaxation
4	Colour	IS 3025: 1983 (P-4) RA. 2017	*BDL(**DL 1.0 Hazen)	Hazen Unit	5	15
5	Odour	IS 3025 (P-5): RA. 2010	Agreeable	Qualitative	Agreeable	Agreeable
6	Taste	IS 3025(P-8):1984 RA. 2017	Agreeable	Qualitative	Agreeable	Agreeable
7	Anionic Surface Active Agent	APHA 23rd Edition 2017, 5540C	*BDL(**DL-0.05 mg/l)	mg/l	0.2	1.0
8	Mineral Oil	IS 3025(P-19)	*BDL(**DL-0.5 mg/l)	mg/l	0.5	No Relaxation
9	Barium as (Ba)	APHA2111B	*BDL(**DL-0.05 mg/l)	mg/l	0.7	No Relaxation
10	Faecal Coliform	IS:1822	Absent	MPN/100 ml	Shall not be Detectable in any 100 ml sample	



Page No. 1/2

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Laboratory: Plot No. 24, 25, Narayan Vihar B Block, Jaipur (Raj) 302035  
Corp. Off.: Plot No. 82A, Sector- 5, IMT Manesar, Gurugram- 122051  
MoEF & CC Recognised (ISO 9001 | OHSAS 45001)

## Test Report

Sample Number: VEL/GW/02

Report No.

VELW/200822/006/B

\*BDL-Below Detection Limit \*\*DL-Detection Limit

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## Test Report

Sample Number: VEL/GW/03  
 Name & Address of the Party: M/s Raipur Energy Limited  
 Formerly GMR Chhattisgarh Energy Ltd Village  
 Rakheda, Block - Tilda Dist Raipur Chhattisgarh

Sample Description: GROUND WATER  
 Location: Piezometer -3 (Near Bhaatpara to Rakheda road)  
 Sample Collected by: VEL Team  
 Preservation: Suitable Preservation  
 Sampling and Analysis Protocol: IS: 10500 -2012

Report No.: VEL/MQ006200097A  
 Format No.: 7.3 F-01  
 Party Reference No.: NIL  
 Reporting Date: 01/10/2020  
 Period of Analysis: 22/09/2020-01/10/2020  
 Receipt Date: 22/09/2020  
 Sampling Date: 18/09/2020  
 Sampling Quantity: 2 Lit  
 Sampling Type: GRAB

S No	Parameters	Protocols	Results	Units	IS:10500-2012	
					Acceptable Limits	Permissible Limits
1	pH	IS 3025 (P-11): 1983 Reaff. 2017	7.38	-	6.5 to 8.5	No Relaxation
2	Total Dissolved Solids	IS 3025 (P-15): 1984 Reaff 2017	329.00	mg/l	500	2000
3	Total Alkalinity (as CaCO3)	IS: 3025 (Part 23): 1986, Reaff. 2019	197.96	mg/l	200	600
4	Total Hardness (as CaCO3)	IS: 3025 (Part 21): 2009, Reaff. 2019	205.92	mg/l	200	600
5	Nitrate (as NO3)	IS: 3025 (Part 34): 1988, Reaff. 2019	1.89	mg/l	45	No Relaxation
6	Chloride (as Cl)	IS: 3025 (Part 32): 1988, Reaff. 2019	60.22	mg/l	250	1000
7	Sulphate (as SO4)	IS: 3025 (Part 24): 1986, Reaff. 2019 Turbidity Method	16.22	mg/l	200	400
8	Calcium (as Ca)	IS: 3025 (Part 40): 1991 Reaff. 2019	68.25	mg/l	75	200
9	Magnesium (as Mg)	IS: 3025 (Part 45): 1994, Reaff. 2009 (EDTA method)	9.66	mg/l	30	100
10	Fluorides (as F)	APHA 23rd Edition 2017, 4500 FD	0.21	mg/l	1.0	1.5
11	Total Iron (as Fe)	IS 3025(P-53): 2003 Reaffirm 2019	0.16	mg/l	0.3	No Relaxation
12	Arsenic (as As)	APHA (23rd edition-2017), 3114 C	*BDL/**DL-0.005 mg/l	mg/l	0.01	0.05
13	Copper (as Cu)	APHA 23rd Edition Year 2017 Method No. 3111B	*BDL/**DL-0.02 mg/l	mg/l	0.05	1.5
14	Zinc (as Zn)	APHA (23rd edition-2017), 3030D, 3113 B	*BDL/**DL-0.20 mg/l	mg/l	5.0	15
15	Selenium (as Se)	APHA (23rd edition-2017), 3114C	*BDL/**DL-0.05 mg/l	mg/l	0.01	No Relaxation
16	Turbidity	IS 3025 (Part 10): 1984, Ref. 2017, (Nephelometric Method)	*BDL/**DL 1.0 NTU	NTU	1	5
17	Aluminium	IS 3025 (Part-55): 2003, Reaff. 2019	*BDL/**DL-0.03 mg/l	mg/l	0.03	0.2
18	Manganese (as Mn)	IS: 3025 (Part 46): 1994, Reaff. 2019 (EDTA method)	*BDL/**DL-0.05 mg/l	mg/l	0.1	0.3
19	Ammonia (as NH3)	IS-3025 (Part-34)-1988, RA 2019	*BDL/**DL-0.3 mg/l	mg/l	0.3	No Relaxation

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## Test Report

Sample Number : VEL/GW/03

Report No. : VEL/W/2009220007/A

S.No.	Parameters	Protocols	Results	Units	IS 10500:2012	
					Acceptable Limits	Permissible Limits
20	Boron (as B)	APHA 23rd Edition Year 2017 Method No. 4500B	*BDL(**DL-0.2 mg/l)	mg/l	0.5	1.0
21	Sulphide	IS 3025 (Part 2B): 1986, RA 2009 Turbidity Method	*BDL(**DL-0.1 mg/l)	mg/l	200	400
22	Phenolic Compound	APHA 23rd Edition 2017, 5630C	*BDL(**DL-0.1 mg/l)	mg/l	0.001	0.002
23	Free Residual Chlorine	IS 3025 (Part 2B): 1986 RA 2009	*BDL(**DL-0.2 mg/l)	mg/l	0.2	1

\*BDL-Below Detection Limit, \*\*DL-Detection Limit

\*\*\*End of Report\*\*\*

  
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Laboratory: Plot No. 24, 25, Narayan Vihar B Block, Jaipur (Raj.) 302035  
 Corp. Off.: Plot No. 82A, Sector- 5, IMT Manesar, Gurugram- 122051  
 MoEF & CC Recognised | ISO 9001 | OHSAS 45001

## Test Report

Sample Number : VEL/GW/03  
 Name & Address of the Party : M/s Rajpur Energy Limited  
 Formerly GMR Chhattisgarh Energy Ltd. Village  
 Raikheda, Block - Tikta, Dist. Rajpur Chhattisgarh  
 Sample Description : GROUND WATER  
 Location : Piezometer -3 (Near Bhaatpara to Raikheda road)  
 Sample Collected by : VEL Team  
 Preservation : Suitable Preservation  
 Sampling and Analysis Protocol : IS 10500-2012

Report No. : VEL/W/2009220007/B  
 Format No. : 7 B F-01  
 Party Reference No. : NIL  
 Reporting Date : 01/10/2020  
 Period of Analysis : 22/09/2020-01/10/2020  
 Receipt Date : 22/09/2020  
 Sampling Date : 18/09/2020  
 Sampling Quantity : 2 Ltr  
 Sampling Type : Grab

S.No	Parameters	Protocols	Results	Units	IS:10500-2012	
					Acceptable Limits	Permissible Limits
1	Total Coliform (By MPN Method)	IS-1622	Absent	MPN/100 ml	Shall not be Detectable in any 100 ml sample	NA
2	E-Coli	IS-1622	Absent	per 100 ml	Absent/100 ml	Absent/100 ml
3	Cyanide (as CN)	APHA 23rd Edition 2017, 4500CN D	*BDL (**DL-0.05 mg/l)	mg/l	0.05	No Relaxation
4	Colour	IS 3025: 1983 (P-4) RA.. 2017	*BDL (**DL 1.0 Hazen)	Hazen Unit	5	15
5	Odour	IS 3025 (P-5): RA. 2018	Agreeable	Qualitative	Agreeable	Agreeable
6	Taste	IS 3025(P-8): 1984 RA. 2017	Agreeable	Qualitative	Agreeable	Agreeable
7	Anionic Surface Active Agent	APHA 23rd Edition 2017, 5540C	*BDL (**DL-0.05 mg/l)	mg/l	0.2	1.0
8	Mineral Oil	IS 3025(P-39)	*BDL (**DL-0.5 mg/l)	mg/l	0.5	No Relaxation
9	Barium as (Ba)	APHA3111B	*BDL (**DL 0.05 mg/l)	mg/l	0.7	No Relaxation
10	Faecal Coliform	IS:1622	Absent	MPN/100 ml	Shall not be Detectable in any 100 ml sample	

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Laboratory: Plot No. 24, 25, Narayan Vihar B Block, Jaipur (Ra.) 302035  
Corp. Off : Plot No. 82A, Sector- 5, IMT Manesar, Gurugram- 122051  
MoEF & CC Recognised (ISO 9001 | OHSAS 45001)

## Test Report

Sample Number : VELJW/03

Report No.

VELJW/2008220007/B

\*BDL-Below Detection Limit\*\*DL-Detection Limit

\*\*\*End of Report\*\*\*

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Laboratory: Plot No. 24, 25, Narayan Vihar B Block, Jaipur (Raj.) 302035  
 Corp. Off.: Plot No. 82A, Sector- 5, IMT Manesar, Gurugram- 122051  
 MoEF & CC Recognised (ISO 9001 | OHSAS 45001)

## Test Report

Sample Number : VEL/GW/04  
 Name & Address of the Party : M/s Rajpur Energy Limited  
 Formerly GMR Chhatীগढ़ Energy Ltd Village  
 Raikhera, Block - Tada, Dist. Raipur Chhatীগढ़

Sample Description : GROUND WATER  
 Location : Piezometer -4 (Beside Fly Ash Pond)  
 Sample Collected by : VEL Team  
 Preservation : Suitable Preservation  
 Sampling and Analysis Protocol : IS 10500 -2012

Report No. : VEL/AW/2009220008/A  
 Format No. : T B F-01  
 Party Reference No. : NIL  
 Reporting Date : 01/10/2020  
 Period of Analysis : 22/09/2020-01/10/2020  
 Receipt Date : 22/09/2020  
 Sampling Date : 19/09/2020  
 Sampling Quantity : 2 Ltr  
 Sampling Type : Grab

S. No.	Parameters	Protocol	Results	Units	IS-10500-2012	
					Acceptable Limits	Permissible Limits
1	pH	IS 3025 (P-11): 1984 Reaff. 2017	7.23	-	6.5 to 8.5	No Relaxation
2	Total Dissolved Solids	IS 3025 (P-18): 1984 Reaff. 2017	294.06	mg/l	500	2000
3	Total Alkalinity (as CaCO <sub>3</sub> )	IS: 3025 (Part 23): 1986, Reaff. 2019	173.72	mg/l	300	600
4	Total Hardness (as CaCO <sub>3</sub> )	IS: 3025 (Part 21): 2009, Reaff. 2019	178.20	mg/l	200	600
5	Nitrate (as NO <sub>3</sub> )	IS: 3025 (Part 34): 1988, Reaff. 2019	1.45	mg/l	45	No Relaxation
6	Chloride (as Cl)	IS: 3025 (Part 32): 1988, Reaff. 2019	48.82	mg/l	250	1000
7	Sulphate (as SO <sub>4</sub> )	IS: 3025 (Part 24): 1986, Reaff. 2019 Turbidity Method	18.41	mg/l	200	400
8	Calcium (as Ca)	IS: 3025 (Part 40): 1991 Reaff. 2019	60.31	mg/l	75	200
9	Magnesium (as Mg)	IS: 3025 (Part 46): 1994, Reaff. 2009 (EDTA method)	6.74	mg/l	30	100
10	Fluorides (as F)	APHA 23rd Edition 2017, 4500 F0	0.32	mg/l	1.0	1.5
11	Total Iron (as Fe)	IS 3025(P-53): 2003 Reaffirm 2019	0.16	mg/l	0.3	No Relaxation
12	Arsenic (as As)	APHA (23rd edition-2017), 3114 C	*BDL (**DL-0.005 mg/l)	mg/l	0.01	0.05
13	Copper (as Cu)	APHA 23rd Edition Year 2017 Method No. 2117B	*BDL (**DL-0.02 mg/l)	mg/l	0.05	1.5
14	Zinc (as Zn)	APHA (23rd edition-2017), 3036D, 3113 B	*BDL (**DL-0.20 mg/l)	mg/l	5.0	15
15	Selenium (as Se)	APHA (23rd edition-2017), 3114C	*BDL (**DL-0.05 mg/l)	mg/l	0.01	No Relaxation
16	Turbidity	IS 3025 (Part 16): 1984, Ref. 2017, (Nephelometric Method)	*BDL (**DL 1.0 NTU)	NTU	1	5
17	Aluminium	IS 3025 (Part-95): 2003, Reaff. 2019	*BDL (**DL-0.03 mg/l)	mg/l	0.03	0.2
18	Manganese (as Mn)	IS: 3025 (Part 45): 1994, Reaff. 2019 (EDTA method)	*BDL (**DL-0.05 mg/l)	mg/l	0.1	0.3
19	Ammonia (as NH <sub>3</sub> )	IS-3025 (Part-34)- 1988, RA. 2019	*BDL (**DL-0.3 mg/l)	mg/l	0.5	No Relaxation

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- \* All disputes are subjected to Jaipur Jurisdiction.





## Test Report

Sample Number : VEL/GW/04

Report No. : VEL/W/2009220008/A

S.No.	Parameters	Protocols	Results	Units	IS: 10500-2012	
					Acceptable Limits	Permissible Limits
20	Boron (as B)	APHA 23rd Edition Year 2017 Method No. 4500B	*BDL (**DL-0.2 mg/l)	mg/l	0.5	1.0
21	Sulphide	IS: 3026 (Part 28): 1986, RA: 2009 Turbidity Method	*BDL (**DL-0.1 mg/l)	mg/l	200	400
22	Phenolic Compound	APHA 23rd Edition 2017, 5530C	*BDL (**DL-0.1 mg/l)	mg/l	0.001	0.002
23	Free Residual Chlorine	IS: 3026 (Part 28): 1986 RA 2019	*BDL (**DL-0.2 mg/l)	mg/l	0.2	1

\*BDL-Below Detection Limit, \*\*DL-Detection Limit

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Laboratory: Plot No. 24, 25, Narayan Vihar B Block, Jaipur (Ra.) 302035

Corp. Off.: Plot No. 82A, Sector- 5, IMT Manesar, Gurugram- 122051

MoEF & CC Recognised (ISO 9001 | OHSAS 45001)

## Test Report

Sample Number : VEL/GW/04

Name & Address of the Party : M/s Raipur Energy Limited  
Formerly GMR Chhattisgarh Energy Ltd. Village  
Rakheda, Block - Tilda, Dist. Raipur Chhattisgarh

Report No. : VEL/W/2009220008/B

Format No. : 7.8 F-01

Party Reference No. : NIL

Reporting Date : 01/10/2020

Period of Analysis : 22/09/2020-01/10/2020

Receipt Date : 27/09/2020

Sampling Date : 18/09/2020

Sampling Quantity : 2 Ltr

Sampling Type : Grab

Sample Description : GROUND WATER  
Location : Piezometer -4 (Beside Fly Ash Pond)  
Sample Collected by : VEL Team  
Preservation : Suitable Preservation  
Sampling and Analysis Protocol : IS 10500 -2012

S. No.	Parameters	Protocol	Results	Units	IS-10500-2012	
					Acceptable Limits	Permissible Limits
1	Total Coliform (By MPN Method)	IS:1622	Absent	MPN/100 ml	Shall not be Detectable in any 100 ml sample	NA
2	E-Coli	IS:1622	Absent	per 100 ml	Absent/100 ml	Absent/100 ml
3	Cyanide (as CN)	APHA 23rd Edition 2017, 4500CN D	*BOL/**DL-0.05 mg/l	mg/l	0.05	No Relaxation
4	Colour	IS 3025-1983 (P-4) RA: 2017	*BOL/**DL 1.0 Hazen	Hazen Unit	5	15
5	Odour	IS 3025 (P-5): RA: 2018	Agreeable	Qualitative	Agreeable	Agreeable
6	Taste	IS 3025(P-8):1984 RA: 2017	Agreeable	Qualitative	Agreeable	Agreeable
7	Anionic Surface Active Agent	APHA 23rd Edition 2017, 5540C	*BOL/**DL-0.05 mg/l	mg/l	0.2	1.0
8	Mineral Oil	IS 3025(P-39)	*BOL/**DL-0.5 mg/l	mg/l	0.5	No Relaxation
9	Barium as (Ba)	APHA311B	*BOL/**DL-0.05 mg/l	mg/l	0.7	No Relaxation
10	Faecal Coliform	IS:1622	Absent	MPN/100 ml	Shall not be Detectable in any 100 ml sample	



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Laboratory: Plot No. 24, 25, Narayan Vihar B Block, Jaipur (Raj.) 302035  
Corp. Off.: Plot No. 82A, Sector- 5, IMT Manesar, Gurugram- 122051  
MoEF & CC Recognised (ISO 9001 | OHSAS 45001)

## Test Report

Sample Number VEL/GW/04

Report No

VEL/W/2009220008/B

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Laboratory: Plot No. 24, 25, Narayan Vihar B Block, Jaipur (Raj.) 302035  
 Corp. Off: Plot No. 82A, Sector- 5, IMT Manesar, Gurugram- 122051  
 MoEF & CC Recognised [ISO 9001 | OHSAS 45001]

## Test Report

Sample Number : VFLCW05  
 Name & Address of the Party : M/s Rajput Energy Limited  
 Formerly GMR Chhatrapati Energy Ltd. Village:  
 Rajheda, Block - Tikda, Dist. Rajput Chhatrapati  
 Sample Description : GROUND WATER  
 Location : Piezometer -5 (Beside Bottom Ash Pond no 2)  
 Sample Collected by : V&L Team  
 Preservation : Suitable Preservation  
 Sampling and Analysis Protocol : IS 10500 :2012

Report No. : VFL/W/2009220009/A  
 Format No. : 7.8 F-01  
 Party Reference No. : NIL  
 Reporting Date : 01/10/2020  
 Period of Analysis : 22/09/2020-01/10/2020  
 Receipt Date : 22/09/2020  
 Sampling Date : 18/09/2020  
 Sampling Quantity : 2 Lit  
 Sampling Type : Gnd

S No	Parameters	Protocols	Results	Units	IS:10500-2012	
					Acceptable Limits	Permissible Limits
1	pH	IS 3025 (P-11): 1993 Reaff. 2017	7.42	—	6.5 to 8.5	No Relaxation
2	Total Dissolved Solids	IS 3025 (P-16): 1994 Reaff 2017	332.09	mg/l	500	2000
3	Total Alkalinity (as CaCO <sub>3</sub> )	IS: 3025 (Part 23): 1986, Reaff. 2019	193.52	mg/l	200	600
4	Total Hardness (as CaCO <sub>3</sub> )	IS: 3025 (Part 21): 2009, Reaff. 2019	221.76	mg/l	200	600
5	Nitrate (as NO <sub>3</sub> )	IS: 3025 (Part 34): 1988, Reaff. 2019	1.76	mg/l	48	No Relaxation
6	Chloride (as Cl)	IS: 3025 (Part 32): 1988, Reaff. 2019	73.87	mg/l	250	1000
7	Sulphate (as SO <sub>4</sub> )	IS: 3025 (Part 24): 1996, Reaff. 2019 Turbidity Method	19.93	mg/l	200	400
8	Calcium (as Ca)	IS: 3025 (Part 40): 1991 Reaff. 2019	76.16	mg/l	75	200
9	Magnesium (as Mg)	IS: 3025 (Part 46): 1994, Reaff. 2009 (EDTA method)	7.70	mg/l	30	100
10	Fluorides (as F)	APHA 23rd Edition 2017, 4500 FD	0.29	mg/l	1.0	1.5
11	Total Iron (as Fe)	IS 3025(P-53): 2003 Reaffirm 2019	0.17	mg/l	0.3	No Relaxation
12	Arsenic (as As)	APHA (23rd edition-2017), 3114 C	*BDL(**DL-0.005 mg/l)	mg/l	0.01	0.05
13	Copper (as Cu)	APHA 23rd Edition Year 2017 Method No. 3111B	*BDL(**DL-0.02 mg/l)	mg/l	0.05	1.5
14	Zinc (as Zn)	APHA (23rd edition 2017) 3030D, 3113 B	*BDL(**DL-0.20 mg/l)	mg/l	5.0	15
15	Selenium (as Se)	APHA (23rd edition-2017), 3114C	*BDL(**DL-0.05 mg/l)	mg/l	0.01	No Relaxation
16	Turbidity	IS 3025 (Part 10): 1984, Ref: 2017, (Nephelometric Method)	*BDL(**DL-1.0 NTU)	NTU	1	5
17	Aluminium	IS 3025 (Part-55), 2003, Reaff. 2019	*BDL(**DL-0.03 mg/l)	mg/l	0.03	0.3
18	Manganese (as Mn)	IS: 3025 (Part 46): 1994, Reaff. 2019 (EDTA method)	*BDL(**DL-0.05 mg/l)	mg/l	0.1	0.3
19	Ammonia (as NH <sub>3</sub> )	IS-3025 (Part-34)-1988, RA, 2019	*BDL(**DL-0.3 mg/l)	mg/l	0.5	No Relaxation

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## Test Report

Sample Number: VEL/GW06

Report No:

VEL/W/2009220008/A

S.No.	Parameters	Protocols	Results	Units	IS: 10500-2012	
					Acceptable Limits	Permissible Limits
20	Boron (as B)	APHA 23rd Edition Year 2017 Method No. 4500B	*BDL (**DL 0.2 mg/l)	mg/l	0.5	1.0
21	Sulphide	IS: 3025 (Part 26), 1986, RA: 2009 Turbidity Method	*BDL (**DL 0.1 mg/l)	mg/l	200	600
22	Phenolic Compound	APHA 23rd Edition 2017, 5830C	*BDL (**DL 0.1 mg/l)	mg/l	0.001	0.002
23	Free Residual Chlorine	IS: 3025 (Part 26): 1986 RA 2019	*BDL (**DL 0.2 mg/l)	mg/l	0.2	1

\*BDL-Below Detection Limit, \*\*DL-Detection Limit

\*\*\*End of Report\*\*\*

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Laboratory: Plot No. 24, 25, Narayan Vihar B Block, Jaipur (Raj.) 302035  
 Corp. Off. Plot No. 82A, Sector- 5, IMT Manesar, Gurugram- 122051  
 MoEF & CC Recognised | ISO 9001 | OHSAS 45001

## Test Report

Sample Number : VEL/GW/05  
 Name & Address of the Party : M/s Raour Energy Limited  
 Formerly GMR Chhatlegarh Energy Ltd Village  
 Rakheda, Block - Tada, Dist. Raipur Chhatlegarh

Sample Description : GROUND WATER  
 Location : Piezometer -5 (Beside Bottom Ash Pond no.2)  
 Sample Collected by : VEL Team  
 Preservation : Suitable Preservation  
 Sampling and Analysis Protocol : IS 10500-2012

Report No. : VEL/R/2008220005/B  
 Format No. : 7.8 F.01  
 Party Reference No. : NIL  
 Reporting Date : 01/10/2020  
 Period of Analysis : 22/09/2020-01/10/2020  
 Receipt Date : 22/09/2020  
 Sampling Date : 18/09/2020  
 Sampling Quantity : 2 Ltr  
 Sampling Type : Grab

S No.	Parameters	Protocols	Results	Units	IS:10500-2012	
					Acceptable Limits	Permissible Limits
1	Total Coliform (By MPN Method)	IS:1622	Absent	MPN/100 ml	Shall not be Detectable in any 100 ml sample	NA
2	E-Coli	IS:1622	Absent	per 100 ml	Absent/100 ml	Absent/100 ml
3	Cyanide (as CN)	APHA 23rd Edition 2017, 4500CN D	*BDL(**DL-0.05 mg/l)	mg/l	0.05	No Relaxation
4	Colour	IS 3025: 1982 (P-4) RA, 2017	*BDL(**DL 1.0 Hazen)	Hazen Unit	5	15
5	Odour	IS 3025 (P-5): RA, 2017	Agreeable	Qualitative	Agreeable	Agreeable
6	Taste	IS 3025(P-5):1984 RA, 2017	Agreeable	Qualitative	Agreeable	Agreeable
7	Anionic Surface Active Agent	APHA 23rd Edition 2017, 5840C	*BDL(**DL-0.05 mg/l)	mg/l	0.2	1.0
8	Mineral Oil	IS 3025(F-39)	*BDL(**DL-0.5 mg/l)	mg/l	0.5	No Relaxation
9	Barium as (Ba)	APHA3111B	*BDL(**DL-0.05 mg/l)	mg/l	0.7	No Relaxation
10	Faecal Coliform	IS:1622	Absent	MPN/100 ml	Shall not be Detectable in any 100 ml sample	

*N/A*



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Laboratory: Plot No. 24, 25, Narayan Vihar B Block, Jaipur (Raj.) 302035  
Corp. Off.: Plot No. B2A, Sector- 5, IMT Manesar, Gurugram- 122051  
MoEF & CC Recognised [ISO 9001 | OHSAS 45001]

## Test Report

Sample Number: VEL/GW/05

Report No.

VEL/W/2009220009/B

\*BDL-Below Detection Limit,\*\*DL-Detection Limit

\*\*\*End of Report\*\*\*

  
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#### 4.4 Surface water Quality Analysis



**Figure. No. 6. Plan Showing Surface Water Quality Monitoring Location Map**

Location Code: - SW1. Raikheda Talab

SW2. Bangoli Dam

SW3. Mura Talab

SW4. Chhicholi Talab



## Test Report

Sample Number : VEL/SW/01  
 Name & Address of the Party : M/s Rajput Energy Limited  
 Formerly GMR Chhatীগम Energy Ltd - Village  
 Rakherda Block - Taluka, Dist. Rajput Chhatীগम  
 Name of the Project :  
 Sample Description : SURFACE WATER  
 Location : Raeheda (Talab)  
 Sample Collected by : VEL Team  
 Parameter Required : As Per Work Order  
 Sampling and Analysis Protocol : IS 2296

Report No. : VEL/W/0000000001/A  
 Format No. : 7 & 7-01  
 Party Reference No. : NA  
 Reporting Date : 01/10/2020  
 Period of Analysis : 22/09/2020-01/10/2020  
 Receipt Date : 22/09/2020  
 Sampling Date : 19/09/2020  
 Sampling Quantity : 7 Lit  
 Sampling Type : Grab  
 Preservation : Suitable Preservation

S. No.	Test Parameters	Test Method	Results	Units
1	pH value	IS 3025 (P-11): 1983 Reaff. 2017	7.48	---
2	Turbidity	IS 3025 (Part 10): 1984, Reaff. 2017 (Nephelometric Method)	3.00	NTU
3	Total Dissolved Solids	IS 3025 (P-16): 1984 Reaff. 2017	121.00	mg/l
4	Chloride (as Cl)	IS: 3025 (Part 32): 1980, Reaff. 2019	38.85	mg/l
5	Sulphate as (SO <sub>4</sub> )	IS: 3025 (Part 24): 1986, Reaff. 2019 Turbidity Method	6.08	mg/l
6	Total Alkalinity (as CaCO <sub>3</sub> )	IS: 3025 (Part 23): 1986, Reaff. 2019	90.16	mg/l
7	Total Hardness (CaCO <sub>3</sub> )	IS: 3025 (Part 21): 2009, Reaff. 2019	75.24	mg/l
8	Calcium (as Ca)	IS: 3025 (Part 40): 1991 Reaff. 2019 (EDTA method)	23.81	mg/l
9	Magnesium	IS: 3025 (Part 46): 1994, Reaff. 2019 (EDTA method)	3.85	mg/l
10	Fluoride (as F)	APHA 23rd Edition 2017, 4500FD	0.21	mg/l
11	Nitrate (as NO <sub>3</sub> )	IS: 3025 (Part 34): 1988, Reaff. 2019 (Chromotropic Method)	1.63	mg/l
12	Phenolic compounds	APHA 23rd Edition 2017, 5630G	*BDL (**DL-0.1 mg/l)	mg/l
13	Iron	IS:3025(P-53):2003,RA.2019:2003	0.15	mg/l
14	Zinc as (Zn)	APHA (23rd edition), 3030D,3113D	*BDL (**DL-0.20 mg/l)	mg/l
15	Copper (Cu)	APHA (23rd edition), 3111B	*BDL (**DL-0.02 mg/l)	mg/l
16	Manganese as Mn	APHA3111B	*BDL (**DL-0.05 mg/l)	mg/l
17	Arsenic as As	APHA (23rd edition), 3030D,3114C, 2017	*BDL (**DL-0.005 mg/l)	mg/l

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No. 1/2



## Test Report

Sample Number : VEL/SW/01

Report No. : VEL/W/2009220001/A

S No.	Test Parameters	Test Method	Results	Units
17			mg/l	
18	Boron	APHA (23rd edition) 4500B, 2017	*BDL**DL-0.2 mg/l	mg/l
19	Selenium as Se	APHA (23rd edition) 3114C, 2017	*BDL**DL-0.05 mg/l	mg/l

\*BDL-Below Detection Limit.\*\*DL-Detection Limit.

\*\*\*End of Report\*\*\*

  
 (Checked By)

  
 (Approved By)  
 (Authorized Signatory)

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Laboratory: Plot No. 24, 25, Narayan Vihar B Block, Jaipur (Ra.) 302035  
 Corp. Off : Plot No. 82A, Sector 5, IMT Manesar, Gurugram- 122051  
 MoEF & CC Recognised [ISO 9001 | OHSAS 45001]

## Test Report

Sample Number	VEL/SW/01	Report No.	VEL/W/2009220001/B
Name & Address of the Party	M/s Raipur Energy Limited Formerly GMR Chhattisgarh Energy Ltd. Village Rakheda, Block - Tilda, Dist Raipur Chhattisgarh	Format No.	7 & F-01
Name of the Project		Party Reference No.	NIL
Sample Description	SURFACE WATER	Reporting Date	01/10/2020
Location	Rakheda (Tilda)	Period of Analysis	22/09/2020-01/10/2020
Sample Collected by	VEL Team	Receipt Date	22/09/2020
Parameter Required	As Per Work Order	Sampling Date	15/09/2020
Sampling and Analysis Protocol	IS 2296	Sampling Quantity	3 Lit
		Sampling Type	Grab
		Preservation	Suitable Preservation

S.No.	Test Parameters	Test Method	Results	Units
1	Colour	IS 3025: 1987 (P-4) Reaff. 2017	4.00	Hazen
2	Odour	IS 3025 (P-5) : 2018	Agreeable	-
3	Taste	IS 3025 (P-6):1984 Reaff. 2017	Agreeable	-
4	Anionic Surface active agents (as MBAS)	APHA 23rd Edition 2017, 8840C	*BDL (**DL-0.05 mg/l)	mg/l
5	Fecal Coliform	IS-1622:2009	17.00	MPN/100ml
6	Total Coliform	IS-1622:2009	45.00	MPN/100ml
7	Residual Free Chlorine	IS:3025(P-26):1986,RA:2018-1986	*BDL (**DL-0.2 mg/l)	mg/l
8	E Coli	IS 1622, 1981 (Ref 2003)	Present	MPN/100ml
9	Cyanide as CN	APHA 4500 CN -D	*BDL (**DL-0.05 mg/l)	mg/l
10	Aluminium as Al	IS 3025 (P-55) 2003, RA 2018	*BDL (**DL-0.03 mg/l)	mg/l
11	Mineral Oil	IS 3025 (P-39)	*BDL (**DL-0.5 mg/l)	mg/l
12	Ammonia	IS-3025(P-34):1986,Reaff.2018	1.35	mg/l
13	Sulphide	IS3025(P-29):1986 Reaff 2018	*BDL (**DL-0.1 mg/l)	mg/l
14	Barium (Ba)	APHA 3111B	*BDL (**DL-0.05 mg/l)	mg/l

*(Handwritten signature)*



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Laboratory: Plot No. 24, 25, Narayan Vihar B Block, Jaipur (Ra.) 302035  
Corp. Off.: Plot No. B2A, Sector- 5, IMT Manesar, Gurugram- 122051  
MoEF & CC Recognised (ISO 9001 | DHSAS 45001)

## Test Report

Sample Number: VEL/SW01

Report No.

VEL/W/2009220001/B

\*BDL-Below Detection Limit,\*\*DL-Detection Limit

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## Test Report

Sample Number : VEL/SW/02  
 Name & Address of the Party : M/s Rajpur Energy Limited  
 Formerly GMR Chhatlisgarh Energy Ltd. Village  
 Raikheda, Block - TKDs, Dist. Rajpur Chhatlisgarh  
 Name of the Project :  
 Sample Description : SURFACE WATER  
 Location : Bangoh Dam  
 Sample Collected by : VEL Team  
 Parameter Required : As Per Work Order  
 Sampling and Analysis Protocol : IS 2296

Report No : VELM/2009220002/A  
 Format No : 7 B F-01  
 Party Reference No : NIL  
 Reporting Date : 01/10/2020  
 Period of Analysis : 22/09/2020-01/10/2020  
 Receipt Date : 22/09/2020  
 Sampling Date : 19/09/2020  
 Sampling Quantity : 2 Ltr  
 Sampling Type : Grab  
 Preservation : Suitable Preservation

S No.	Test Parameters	Test Method	Results	Units
1	pH value	IS 3025 (P-11): 1983 Reaff. 2017	7.29	-
2	Turbidity	IS 3025 (Part 10): 1984, Reaff. 2017, (Nephelometric Method)	4.90	NTU
3	Total Dissolved Solids	IS 3025 (P-16): 1984 Reaff. 2017	189.00	mg/l
4	Chloride (as Cl)	IS: 3025 (Part 32): 1986, Reaff. 2019	56.34	mg/l
5	Sulphate as (SO <sub>4</sub> )	IS: 3025 (Part 24): 1986, Reaff. 2019 Turbidity Method	26.18	mg/l
6	Total Alkalinity (as CaCO <sub>3</sub> )	IS: 3025 (Part 23): 1986, Reaff. 2019	117.60	mg/l
7	Total Hardness (CaCO <sub>3</sub> )	IS: 3025 (Part 21): 2009, Reaff. 2019	142.56	mg/l
8	Calcium (as Ca)	IS: 3025 (Part 40): 1991 Reaff. 2019 (EDTA method)	38.09	mg/l
9	Magnesium	IS: 3025 (Part 46): 1994, Reaff. 2019 (EDTA method)	11.55	mg/l
10	Fluoride (as F)	APHA 23rd Edition 2017, 4500FD	0.29	mg/l
11	Nitrate (as NO <sub>3</sub> )	IS: 3025 (Part 34): 1988, Reaff. 2019 (Chromotropic Method)	5.31	mg/l
12	Phenolic compounds	APHA 23rd Edition 2017, 5530C	*BDL (**DL-0.1 mg/l)	mg/l
13	Iron	IS-3025(P-53)-2803,RA 2019-2003	0.21	mg/l
14	Zinc as (Zn)	APHA (23rd edition), 30300.3113B	*BDL (**DL-0.20 mg/l)	mg/l
15	Copper (Cu)	APHA (23rd edition), 3111B	*BDL (**DL-0.02 mg/l)	mg/l
16	Manganese as Mn	APHA3111B	*BDL (**DL-0.05 mg/l)	mg/l
17	Arsenic as As	APHA (23rd edition), 30300.3114C, 2017	*BDL (**DL-0.005 mg/l)	mg/l

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- All disputes are subjected to Jaipur jurisdiction





## Test Report

Sample Number: VEL/SWD2

Report No.: VEL/W/2009220002/A

S.No.	Test Parameters	Test Method	Results	Units
17			mg/l	
18	Boron	APHA (23rd edition) 4600B, 2017	*BDL(**DL-0.2 mg/l)	mg/l
19	Selenium as Se	APHA (23rd edition) 3114C, 2017	*BDL(**DL-0.06 mg/l)	mg/l

\*BDL-Below Detection Limit.\*\*DL-Detection Limit.

\*\*\*End of Report\*\*\*

(Checked By)



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Laboratory: Plot No. 24, 25, Narayan Vihar B Block, Jaipur (Raj) 302035

Corp. Off.: Plot No. 82A, Sector- 5, IMT Manesar, Gurugram 122051

MoEF & CC Recognised ISO 9001 | OHSAS 45001

## Test Report

Sample Number: VEL/SMP02

Name & Address of the Party: M/s. Rajpur Energy Limited  
Formerly GMR Chhatrapati Energy Ltd. Village  
Rakheeda, Block - 1402, Dist. Rajpur Chhatrapati

Name of the Project:

Sample Description: SURFACE WATER

Location: Bangol Dam

Sample Collected by: VEL Team

Parameter Required: As Per Work Order

Sampling and Analysis Protocol: IS 2286

Report No.: VEL/MP/2009226002/B

Format No.: T & F-01

Party Reference No.: NIL

Reporting Date: 01/10/2020

Period of Analysis: 22/09/2020-01/10/2020

Receipt Date: 22/09/2020

Sampling Date: 19/09/2020

Sampling Quantity: 2 Ltr

Sampling Type: Grab

Preservation: Suitable Preservation

S.No.	Test Parameters	Test Method	Results	Units
1	Colour	IS 3025:1987 (P-4) Reaff 2017	3.05	Hzzen
2	Odour	IS 3025 (P-5)   2018	Agreeable	-
3	Taste	IS 3025 (P-8):1986 Reaff. 2017	Agreeable	-
4	Anionic Surface active agents (as MBAS)	APHA 23rd Edition 2017, 5540C	*BDL (**DL: 0.05 mg/l)	mg/l
5	Fecal Coliform	IS-1622:2009	26.00	MPN/100ml
6	Total Coliform	IS-1622:2009	43.00	MPN/100ml
7	Residual Free Chlorine	IS.3025(P-28):1986,RA:2019,1986	*BDL (**DL: 0.2 mg/l)	mg/l
8	E Coli	IS-1622, 1981 (Ref. 2003)	Present	MPN/100ml
9	Cyanide as CN	APHA 4550 CN -D	*BDL (**DL: 0.05 mg/l)	mg/l
10	Aluminium as Al	IS 3025 (P-58) 2003, RA 2019	*BDL (**DL: 0.03 mg/l)	mg/l
11	Mineral Oil	IS 3025 (P-39)	*BDL (**DL: 0.5 mg/l)	mg/l
12	Ammonia	IS-3025(P-34)-1986, Reaff. 2019	2.26	mg/l
13	Sulphide	IS3025(P-29):1986 Reaff 2019	*BDL (**DL: 0.1 mg/l)	mg/l
14	Barium (Ba)	APHA 3111B	*BDL (**DL: 0.05 mg/l)	mg/l



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Laboratory: Plot No. 24, 25, Narayan Vihar B Block, Jaipur (Raj.) 302035

Corp. Off.: Plot No. B2A, Sector- 5, IMT Manesar, Gurugram- 122051

MoEF & CC Recognised (ISO 9001 | OHSAS 45001)

## Test Report

Sample Number : VEL/SW/02

Report No.

: VEL/W/2009220002/B

\*BDL-Below Detection Limit \*\*DL-Detection Limit.

\*\*\*End of Report\*\*\*

  
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Laboratory: Plot No. 24, 25, Narayan Vihar B Block, Jaipur (Raj.) 302035  
 Corp. Off.: Plot No. 82A, Sector- 5, IMT Manesar, Gurugram- 122051  
 MoEF & CC Recognised [ISO 9001 | OHSAS 45001]

## Test Report

Sample Number: VEL/SW/03

Name & Address of the Party : M/s Raipur Energy Limited  
 Formerly GMR Chhattisgarh Energy Ltd. Village  
 Raikheda, Block - Tilda, Dist. Raipur Chhattisgarh

Report No.: VEL/W/2009220003/A

Format No: 7 &amp; F-01

Party Reference No: NIL

Reporting Date: 01/10/2020

Period of Analysis: 22/09/2020-01/10/2020

Receipt Date: 22/09/2020

Sampling Date: 19/09/2020

Sampling Quantity: 2 Lit

Sampling Type: Grab

Preservation: Suitable Preservation

Name of the Project:

Sample Description: SURFACE WATER

Location: Mura Talab

Sample Collected by: VEL Team

Parameter Required: As Per Work Order

Sampling and Analysis Protocol: IS: 2298

S.No.	Test Parameters	Test Method	Results	Units
1	pH value	IS 3025 (P-11): 1983 Reaff. 2017	7.42	-
2	Turbidity	IS 3025 (Part 10): 1984, Reaff. 2017, (Nephelometric Method)	5.00	NTU
3	Total Dissolved Solids	IS 3025 (P-16): 1984 Reaff. 2017	165.00	mg/l
4	Chloride (as Cl)	IS: 3025 (Part 32): 1988, Reaff. 2019	36.91	mg/l
5	Sulphate as (SO4)	IS: 3025 (Part 24): 1988, Reaff. 2019 Turbidity Method	9.46	mg/l
6	Total Alkalinity (as CaCO3)	IS: 3025 (Part 23): 1988, Reaff. 2019	70.56	mg/l
7	Total Hardness (CaCO3)	IS: 3025 (Part 21): 2009, Reaff. 2019	79.20	mg/l
8	Calcium (as Ca)	IS 3025 (Part 40): 1991 Reaff. 2019 (EDTA method)	22.22	mg/l
9	Magnesium	IS: 3025 (Part 46): 1994, Reaff. 2019 (EDTA method)	5.77	mg/l
10	Fluoride ( as F)	APHA 23rd Edition 2017, 4500FD	0.31	mg/l
11	Nitrate (as NO3)	IS: 3025 (Part 34): 1988, Reaff. 2019 (Chromotropic Method)	1.11	mg/l
12	Phenolic compounds	APHA 23rd Edition 2017, 5530C	*BDL**DL-0.1 mg/l)	mg/l
13	Iron	IS:3025(P-53):2003,RA,2019,2007	0.26	mg/l
14	Zinc as (Zn)	APHA (23rd edition), 3030C,3113B	*BDL**DL-0.25 mg/l)	mg/l
15	Copper (Cu)	APHA (23rd edition), 3111B	*BDL**DL-0.02 mg/l)	mg/l
16	Manganese as Mn	APHA3111B	*BDL**DL-0.05 mg/l)	mg/l
17	Arsenic as As	APHA (23rd edition), 3030D,3114C, 2017	*BDL**DL-0.005 mg/l)	mg/l

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## Test Report

Sample Number : VEL/SW03

Report No

: VEL/W/2009220003/A

S.No.	Test Parameters	Test Method	Results	Units
17.			mg/l)	
18	Boron	APHA (23rd edition) 4500B, 2017	*BDL/**DL-0.2 mg/l)	mg/l
19	Selenium as Se	APHA (23rd edition),3114C, 2017	*BDL/**DL-0.05 mg/l)	mg/l

\*BDL-Below Detection Limit,\*\*DL-Detection Limit

\*\*\*End of Report\*\*\*

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Laboratory Plot No. 24, 25, Narayan Vihar B Block, Jaipur (Raj.) 302035  
 Corp. Off. Plot No. 82A, Sector- 5, IMT Manesar, Gurugram- 122051  
 MoEF & CC Recognised (ISO 9001 | OHSAS 45001)

## Test Report

Sample Number : VEL/SW/02

Name & Address of the Party :

M/s Rajpur Energy Limited  
 Formerly GMR Chhattegarh Energy Ltd. Village  
 Rakheda, Block - TADA, Dist. Rajpur Chhattegarh

Report No. : VEL/W/2009220003/B

Format No : 7 & F-01

Party Reference No : NIL

Reporting Date : 01/10/2020

Period of Analysis : 22/09/2020-01/10/2020

Receipt Date : 22/09/2020

Sampling Date : 19/09/2020

Sampling Quantity : 2 Ltr

Sampling Type : Grab

Preservation : Suitable Preservation

Name of the Project :

Sample Description :

SURFACE WATER

Location :

Mara Talab

Sample Collected by :

VEL Team

Parameter Required :

As Per Work Order

Sampling and Analysis Protocol :

IS 2296

S.No.	Test Parameters	Test Method	Results	Units
1	Colour	IS 3025-1987 (P-4) Reaff.2017	4.00	Hazen
2	Odour	IS 3025 (P-5) : 2018	Agreeable	-
3	Taste	IS 3025 (P-6):1984 Reaff. 2017	Agreeable	-
4	Anionic Surface active agents (as MBAS)	APHA 23rd Edition 2017, 5540C	*BDL (**DL-0.05 mg/l)	mg/l
5	Fecal Coliform	IS-1622-2009	22.00	MPN/100ml
6	Total Coliform	IS-1622-2009	34.00	MPN/100ml
7	Residual Free Chlorine	IS:3025(P-26):1986, RA:2019:1386	*BDL (**DL-0.2 mg/l)	mg/l
8	E Coli	IS 1622, 1981 (Ref. 2003)	Present	MPN/100ml
9	Cyanide as CN	APHA 4500 CN -D	*BDL (**DL-0.05 mg/l)	mg/l
10	Aluminium as Al	IS 3025 (P-65) 2003, RA 2019	*BDL (**DL-0.03 mg/l)	mg/l
11	Mineral Oil	IS 3025 (P-39)	*BDL (**DL-0.5 mg/l)	mg/l
12	Ammonia	IS:3025(P-34):1983 Reaff. 2018	1.70	mg/l
13	Sulphide	IS:3025(P-29):1986 Reaff 2019	*BDL (**DL-0.1 mg/l)	mg/l
14	Barium (Ba)	APHA 3711B	*BDL (**DL-0.05 mg/l)	mg/l



Page No. 1/2

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Laboratory: Plot No. 24, 25, Narayan Vihar B Block, Jaipur (Ra.) 302035  
Corp. Off.: Plot No. 82A, Sector- 5, IMT Manesar, Gurugram- 122051  
MoEF & CC Recognised (ISO 9001 | OHSAS 45001)

## Test Report

Sample Number : VEL/SM03

Report No. : VELW/2008220003/B

\*BDL-Below Detection Limit,\*\*DL- Detection Limit

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Laboratory Plot No. 24, 25, Narayan Vihar B Block, Jaipur (Raj.) 302035  
 Corp. Off - Plot No. 82A, Sector- 5, IMT Manesar, Gurugram- 122051  
 MoEF & CC Recognised [ISO 9001 | OHSAS 45001]

## Test Report

Sample Number : VEL/SW/04  
 Name & Address of the Party : M/s Raipur Energy Limited  
 Formerly GMR Chhattisgarh Energy Ltd. Village  
 Rakheda, Block - Tilda, Dist. Raipur Chhattisgarh  
 Name of the Project :  
 Sample Description : SURFACE WATER  
 Location : Chitocholi Talab  
 Sample Collected by : VEL Team  
 Parameter Required : As Per Work Order  
 Sampling and Analysis Protocol : IS 2208

Report No. : VEL/W/2009220004/A  
 Format No : 7.8 F-01  
 Party Reference No : NIL  
 Reporting Date : 04/10/2020  
 Period of Analysis : 23/09/2020-01/10/2020  
 Receipt Date : 22/09/2020  
 Sampling Date : 19/09/2020  
 Sampling Quantity : 2 Ltr  
 Sampling Type : Grab  
 Preservation : Suitable Preservation

S.No.	Test Parameters	Test Method	Results	Units
1	pH value	IS 3025 (P-11): 1983 Reaff. 2017	7.19	-
2	Turbidity	IS 3025 (Part 10): 1984, Reaff. 2017, (Nephelometric Method)	3.00	NTU
3	Total Dissolved Solids	IS 3025 (P-16): 1984 Reaff 2017	191.00	mg/l
4	Chloride (as Cl)	IS: 3025 (Part 32): 1988, Reaff. 2019	60.22	mg/l
5	Sulphate as (SO4)	IS: 3025 (Part 24): 1988, Reaff. 2019 Turbidity Method	27.36	mg/l
6	Total Alkalinity (as CaCO3)	IS: 3025 (Part 23): 1986, Reaff. 2019	121.53	mg/l
7	Total Hardness (CaCO3)	IS: 3025 (Part 21): 2009, Reaff. 2019	150.48	mg/l
8	Calcium (as Ca)	IS: 3025 (Part 40): 1991 Reaff. 2019 (EDTA method)	39.68	mg/l
9	Magnesium	IS: 3025 (Part 48): 1994, Reaff. 2019 (EDTA method)	12.51	mg/l
10	Fluoride ( as F)	APHA 23rd Edition 2017, 4500FD	0.32	mg/l
11	Nitrate (as NO3)	IS- 3025 (Part 24): 1988, Reaff. 2019 (Chromotropic Method)	5.83	mg/l
12	Phenolic compounds	APHA 23rd Edition 2017, 8530C	*BOL (**DL-0.1 mg/l)	mg/l
13	Iron	IS: 3025(P-53) 2003, RA, 2019-2003	0.22	mg/l
14	Zinc as (Zn)	APHA (23rd edition), 3030D, 3113B	*BOL (**DL-0.20 mg/l)	mg/l
15	Copper (Cu)	APHA (23rd edition), 3111B	*BOL (**DL-0.02 mg/l)	mg/l
16	Manganese as Mn	APHA 3111B	*BOL (**DL-0.05 mg/l)	mg/l
17	Arsenic as AS	APHA (23rd edition), 3030D, 3114C, 2017	*BOL (**DL-0.005 mg/l)	mg/l

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## Test Report

Sample Number : VEL/SW/04

Report No : VEL/W/2009220004/A

S No	Test Parameters	Test Method	Results	Units
17			mg/l	
18	Boron	APHA (23rd edition) 4500B, 2017	*BDL(**DL-0.2 mg/l)	mg/l
19	Selenium as Se	APHA (23rd edition),3114C, 2017	*BDL(**DL-0.05 mg/l)	mg/l

\*BDL -Below Detection Limit,\*\*DL-:Detection Limit

\*\*\*End of Report\*\*\*

  
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# Vardan EnviroLab



Laboratory: Plot No. 24, 25, Narayan Vihar B Block, Jaipur (Raj.) 302035  
 Corp. Off.: Plot No. 82A, Sector- 5, IMT Manesar, Gurugram- 122051  
 MoEF & CC Recognised (ISO 9001 | OHSAS 45001)

## Test Report

Sample Number : VEL/SW/04

Name & Address of the Party : M/s Rajpur Energy Limited  
 Formerly GMR Chhatisgarh Energy Ltd. Village:  
 Rajnaga, Block - Tilde, Dist. Rajpur Chhatisgarh

Report No : VEL/W/2009C20004/B

Format No : T B F-01

Party Reference No : NIL

Reporting Date : 01/10/2020

Period of Analysis : 22/09/2020-01/10/2020

Receipt Date : 22/09/2020

Sampling Date : 19/09/2020

Sampling Quantity : 2 Ltr

Sampling Type : Grab

Preservation : Suitable Preservation

Name of the Project :

Sample Description : SURFACE WATER

Location : Chicholi Talab

Sample Collected by : VEL Team

Parameter Required : As Per Work Order

Sampling and Analysis Protocol : IS 7706

S.No.	Test Parameters	Test Method	Results	Units
1	Colour	IS 3025: 1997 (P-4) Reaff.2017	2.00	Hazen
2	Odour	IS 3025 (P-5) : 2018	Agresible	--
3	Taste	IS 3025 (P-8):1984 Reaff. 2017	Agresible	--
4	Anionic Surface active agents (as MBAS)	APHA 23rd Edition 2017, 6540C	*BDL (**DL-0.05 mg/l)	mg/l
5	Fecal Coliform	IS-1622:2009	31.00	MPN/100ml
6	Total Coliform	IS-1622:2009	63.00	MPN/100ml
7	Residual Free Chlorine	IS:3025(P-26): 1986, RA:2019: 1986	*BDL (**DL-0.2 mg/l)	mg/l
8	E Coli	IS 1622, 1981 (Ref. 2003)	Present	MPN/100ml
9	Cyanide as CN	APHA 4500 CN -D	*BDL (**DL-0.05 mg/l)	mg/l
10	Aluminium as A	IS 3025 (P-55) 2003, RA 2019	*BDL (**DL-0.03 mg/l)	mg/l
11	Mineral Oil	IS 3025 (P 36)	*BDL (**DL-0.5 mg/l)	mg/l
12	Ammonia	IS-3025(P-34)-1986, Reaff. 2019	2.71	mg/l
13	Sulphide	IS3025(P-28) 1986 Reaff 2019	*BDL (**DL-0.1 mg/l)	mg/l
14	Barium (Ba)	APHA 3111B	*BDL (**DL-0.05 mg/l)	mg/l



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Laboratory: Plot No. 24, 25, Narayan Vihar B Block, Jaipur (Raj.) 302035

Corp. Off.: Plot No. 82A, Sector- 5, IMT Manesar, Gurugram- 122051

MoEF & CC Recognised (ISO 9001 | OHSAS 45001)

## Test Report

Sample Number : VEL/SW/04

Report No

VEL/W/200922000MIB

\*BDL-Below Detection Limit,\*\*DL-Detection Limit

\*\*\*End of Report\*\*\*

  
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### 4.5 Soil Quality Analysis



**Figure No. 8. Plan Showing Soil Sample Monitoring Location Map**

Location Code: -

S1- Plant Site



Laboratory: Plot No. 24, 25, Narayan Vihar B Block, Jaipur (Ra.) 302035  
 Corp. Off.: Plot No. 82A, Sector- 5, IMT Manesar, Gurugram- 122051  
 MoEF & CC Recognised (ISO 9001 | OHSA 45001)

## Test Certificate

Sample Number :	VEL/S/01	Report No. :	VEL/SO/2019/200001/A
Name & Address of the Party :	M/s Rajpur Energy Limited Formerly GMR Chhattisgarh Energy Ltd. Village Rakheeda, Block - Tapa, Dist. Raipur Chhattisgarh	Format No :	7 & F-01
		Party Reference No :	NIL
		Reporting Date :	28/09/2020
		Period of Analysis :	22/09/2020-28/09/2020
Sample Description :	SOIL	Receipt Date :	22/09/2020
Location :	Plant Site	Sampling Date :	19/09/2020
Sample Collected by :	VEL Team	Sampling Quantity :	2 Kg
Parameter Required :	As Per Work Order	Sampling Type :	Composite
Sampling and Analysis Protocol :	IS 2720, APHA & USDA	Packing Status :	Tamp Sealed

S No.	Parameters	Test Method	Results	Units
1	pH (at 25°C)	IS : 2720 (P- 26): 1987, RA: 2016	7.32	-
2	Electrical Conductivity	IS 14767: 2000 RA:2016	0.146	mS/cm
3	Bulk density	USDA:1994 (Page-86) RA: 2014	1.16	gm/cc
4	Organic Matter	IS 2720 (P-22): 1972 RA: 2015	0.26	%
5	Available Nitrogen (as N)	IS : 14684,1999 RA: 2015	220.5	kg./hec
6	Available Phosphorus	Lab SOP no. VEL/STP/01: 2018	43.8	kg./hec
7	Total Zinc (as Zn)	USEPA 3050 B: 1996	58.5	mg/kg
8	Total Manganese (as Mn)	USEPA 3050	179.2	mg/kg
9	Total Lead (as Pb)	USEPA 3050 B: 1996	16.35	mg/kg
10	Total Cadmium (as Cd)	USEPA 3050	10.22	mg/kg
11	Total Copper (as Cu)	USEPA 3050 B: 1996	12.3	mg/kg

\*\*\*End of Report\*\*\*

  
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Laboratory: Plot No. 24, 25, Narayan Vihar B Block, Jaipur (Raj.) 302035  
 Corp. Off.: Plot No. 82A, Sector- 5, IMT Manesar, Gurugram- 122051  
 MoEF & CC Recognised | ISO 9001 | OHSAS 45001

## Test Certificate

Sample Number	VEL/S/01	Report No.	VEL/50/20092/0001/B
Name & Address of the Party	M/s Raipur Energy Limited Formerly GMR Chhattisgarh Energy Ltd. Village Raikhedā, Block - Tikda, Dist. Raipur Chhattisgarh	Format No.	: 7.5 F-01
Sample Description	: SOIL	Party Reference No.	: Nil
Location	: Plant Site	Reporting Date	: 28/09/2020
Sample Collected by	: VEL Team	Period of Analysis	: 12/09/2020-28/09/2020
Parameter Required	: As Per Work Order	Receipt Date	: 23/09/2020
Sampling and Analysis Protocol	: IS 2720, APHA & USDA	Sampling Date	: 19/09/2020
		Sampling Quantity	: 2 Kg
		Sampling Type	: Composite
		Packing Status	: Temp Sealed

S.No	Parameters	Test Method	Result	Units
1	Colour	USDA:1954-Reaffirmed,2010	Gray	-
2	Water holding capacity	USDA:1954-Reaffirmed,2010	30.81	%
3	Chloride	USDA:1954 Method 13 (Page-38) RA: 2010	77.1	mg/kg
4	Calcium (as Ca)	Lab SOP no. VEL/STP/01: 2018	364.9	mg/kg
5	Sodium (as Na)	USDA:1954 Method 10A (Page-98) RA: 2010	154.84	mg/kg
6	Potassium (as K)	Lab SOP no. VEL/STP/01: 2018	185.1	kg/hec
7	Magnesium (as Mg)	Lab SOP no. VEL/STP/01: 2018	125.1	mg/kg
8	Total Chromium (as Cr)	USEPA 3050 B:1996	5.9	mg/kg
9	Soil Texture	IS:2720 (P-4) RA:2006	Silty Clay	-

\*\*\*End of Report\*\*\*

  
 (Checked By)



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#### 4.6 Effluent Sample Analysis Report



#### Locations

1. STP Outlet
2. ETP Outlet





Laboratory: Plot No. 24, 25, Narayan Vihar B Block, Jaipur (Raj.) 302035  
 Corp. Off: Plot No. 82A, Sector- 5, IMT Manesar, Gurugram- 122051  
 MoEF & CC Recognised (ISO 9001 | OHSAS 45001)

## Test Certificate

Sample Number: VEL/STP/01

Name & Address of the Party: M/s Raipur Energy Limited  
 Formerly GMR Chhatrapati Energy Ltd. Village  
 Rakhadia Block, Taluka, Dist. Raipur Chhatrapati

Report No.: VEL/WWW/2309220001/A

Format No.: 7.8 F-01

Party Reference No.: NIL

Reporting Date: 25/09/2020

Period of Analysis: 23/09/2020-28/09/2020

Receipt Date: 22/09/2020

Sampling Date: 19/09/2020

Sampling Quantity: 7 Ltr

Sampling Type: Grab

Packing Status: Temp Sealed

Sample Description: Waste Water  
 Location: STP Outlet  
 Sample Collected by: VEL Team  
 Parameter Requested: As Per Work Order  
 Sampling and Analysis Protocol: IS 3025

S.No.	Test Parameters	Test Method	Result	Unit	Prescribed Limit
1	pH	IS 3025 (P-11): 1983 RA2017	7.57	-	5.5 - 9.0
2	Total Suspended Solids	IS: 3025 (Part 17): 1984 RA2017	22.0	mg/l	100.0
3	Oil & Grease	IS 3025(P-39): 1991 RA 2019	1.7	mg/l	10.0
4	BOD (3 days @ 27°C )	IS: 3025 (Part-44): 1993, RA: 2019	20.4	mg/l	30.0
5	COD	IS : 3025 (Part 56) : 2006 RA: 2017	119.04	mg/l	250.0

\*\*\*End of Report\*\*\*

  
 (Checked By)



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Laboratory: Plot No. 24, 25, Narayan Vihar B Block, Jaipur (Raj.) 302035  
 Corp. Off.: Plot No. 82A, Sector- 5, IMT Manesar, Gurugram- 122051  
 MoEF & CC Recognised (ISO 9001 | OHSAS 45001)

## Test Certificate

Sample Number : VEL/ETP OUTLET/01

Name & Address of the Party : M/s Rajpur Energy Limited  
 Formerly GMR Chhatীগarh Energy Ltd. Village  
 Rakheda, Block - Tilda, Dist. Rajpur Chhatীগarh

Report No. : VEL/AMR/2009220002-A

Format No. : T B F-01

Party Reference No. : NIL

Reporting Date : 28/09/2020

Period of Analysis : 22/09/2020-28/09/2020

Receipt Date : 22/09/2020

Sampling Date : 19/09/2020

Sampling Quantity : 2 Lit

Sampling Type : Grab

Packing Status : Temp. Sealed

Sample Description : Waste Water  
 Location : ETP Outlet  
 Sample Collected by : VEL Team  
 Parameter Required : As Per Work Order  
 Sampling and Analysis Protocol : IS 3025

S.No.	Test Parameters	Test Method	Result	Unit	Prescribed Limit
1	pH	IS 3025 (P-11): 1983 RA:2017	7.62	-	5.5 - 9.0
2	Total Suspended Solids	IS: 3025 (Part 17): 1984, RA:2017	9.3	mg/l	100.0
3	Oil & Grease	IS 3025(P-39): 1991 RA: 2019	1.9	mg/l	10.0
4	BOD (3 days @ 27°C)	IS: 3025 (Part-44): 1993, RA: 2019	15.6	mg/l	30.0
5	COD	IS : 3025 (Part 58) : 2006 RA: 2017	79.4	mg/l	250.0

\*\*\*End of Report\*\*\*

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**Project Name:** Raipur Energen Limited

**Formerly GMR Chhattisgarh Energy Ltd. Village: Raikheda, Block- Tilda, Dist.-Raipur (Chhattisgarh)**

**2nd Quarterly Environmental Monitoring Report**

#### **4.7 Stack Emission Analysis Report**

Locations

1. TPP (Unit-1)
2. TPP (Unit-2)



## Test Report

Sample Number : VEL/ST01

Name & Address of the Party : M/s Raipur Energy Limited  
 Formerly GMR Chhattisgarh Energy Ltd. Village:  
 Raikhada, Block - Tidy, Dist. Raipur Chhattisgarh

Report No. : VEL/S/2009280001/A

Format No. : 7 & F-01

Party Reference No. : NIL

Reporting Date : 26/09/2020

Period of Analysis : 26/09/2020-30/09/2020

Receipt Date : 26/09/2020

Sample Description : Stack Emission Monitoring

### General Information

Sampling Location : TPP (Unit-1)  
 Sample Collected by : VEL Team  
 Date of Sampling : 24/09/2020  
 Sampling duration (Minutes) : 30 Min (11.12 to 11.42 hrs.)  
 Stack attached to : ESP  
 Make of stack : MS Plate & RCC  
 Diameter of stack(m) : 7.5m  
 Height of stack(m) : 275m  
 Instrument calibration status : Calibrated  
 Meteorological Condition : Clear Sky  
 Ambient Temperature - Ta (°C) : 30  
 Temperature of Stack Gases - Ts (°C) : 130  
 Velocity of Stack Gases (m/sec) : 24.2  
 Flow rate of PM (LPM) : 34  
 Flow rate of Gas (LPM) : 2.0  
 Sampling condition : OK  
 Protocol used :

S.No.	Test Parameters	Test Method	Results	Units	Specifications
1	Particulate Matter (as PM)	IS: 11255 (Part 1): 1985, RA 2014	37.73	mg/Nm <sup>3</sup>	50.0
2	Sulphur Dioxide (as SO <sub>2</sub> )	IS: 11255(P- 2): 1985, RA 2014	1173.01	mg/Nm <sup>3</sup>	-
3	Ammonia (as NH <sub>3</sub> )	IS: 11255 (P-6) : 1999, RA 2014	8.70	mg/Nm <sup>3</sup>	-
4	Hydrogen Sulphide	IS: 11255(Part 4): 2006 RA 2017	2.40	mg/Nm <sup>3</sup>	-
5	Oxide of Nitrogen as NO <sub>2</sub>	IS-11255 P-7, RA 2017	314.41	mg/Nm <sup>3</sup>	-

BDL - Below Detectable Limit \*\* DL Detection Limit

---End of Report---

  
 (Checked By)



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- The Liability of the laboratory is limited to the invoiced amount.
- All disputes are subjected to Jaipur jurisdiction.



Laboratory: Plot No. 24, 25, Narayan Vihar B Block, Jaipur (Raj.) 302035  
 Corp. Off.: Plot No. 82A, Sector-5, IMT Manesar, Gurugram- 122051  
 MoEF & CC Recognised (ISO 9001 | DHSAS 45001)

## Test Report

Sample Number : VEL/ST/01

Name & Address of the Party : M/s Rajpur Energy Limited  
 Formerly GMR Chhatrapati Energy Ltd. Village  
 Raikhera Block - Tada Dist. Rajpur Chhatrapati

Report No. : VEL/S/2009280001r9

Format No : 7 & F-01

Party Reference No : NIL

Reporting Date : 30/09/2020

Period of Analysis : 28/09/2020-30/09/2020

Receipt Date : 28/09/2020

Sample Description : Stack Emission Monitoring

### General information

Sampling Location : TPP (Unit-1)  
 Sample Collected by : VEL Team  
 Date of Sampling : 24/09/2020  
 Sampling duration (Minutes) : 30 Min (11:17 to 11:47 hrs.)  
 Stack attached to : ESP  
 Make of stack : MS Pipe & RCC  
 Diameter of stack(m) : 7.5m  
 Height of stack(m) : 275 m  
 Instrument calibration status : Calibrated  
 Meteorological Condition : Clear Sky  
 Ambient Temperature - Ta (°C) : 30  
 Temperature of Stack Gases - Ts (°C) : 130  
 Velocity of Stack Gases (m/sec.) : 24.2  
 Flow rate of PM (LPM) : 34  
 Flow rate of Gas (LPM) : 20  
 Sampling condition : OK  
 Protocol used :

S No	Test Parameters	Test Method	Results	Units	Specifications
1	Water Vapor	Gas Analyser	3.20	%	-
2	Carbon Monoxide ( as CO )	Co By Analyzer	7.80	mg/Nm <sup>3</sup>	-
3	Carbon Dioxide	IS:13270, Orsat Analysis, RA: 3005	7.50	%	-
4	Oxygen	SOP, SP-128, Issue No.01:2018	6.80	%	-
5	Mercury as Hg	APHA 3rd edition 2017 303A (Page No. 365)	BDL (DL 0.001)	mg/Nm <sup>3</sup>	0.03

BDL - Below Detection Limit \*\* DL Detection Limit

\*\*\*End of Report\*\*\*

  
 (Checked By)



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Laboratory: Plot No. 24, 25, Narayan Vihar B Block, Jaipur (Raj.) 302035  
 Corp. Off. Plot No. 82A, Sector- 5, IMT Manesar, Gurugram- 122051  
 MoEF & CC Recognised (ISO 9001 | OHSAS 45001)

## Test Certificate

Sample Number : VEL/STX/2  
 Name & Address of the Party : M/s Rajour Energy Limited  
 Formerly GMR Chhattisgarh Energy Ltd. Village:  
 Raikheda, Block - Tada, Dist. Raipur Chhattisgarh

Report No. : VELIS/2009280002/A  
 Format No. : 7.8 F-01  
 Party Reference No. : NIL  
 Reporting Date : 30/09/2020  
 Period of Analysis : 28/09/2020-30/09/2020  
 Receipt Date : 28/09/2020

Sample Description : Stack Emission Monitoring

General Information  
 Sampling Location : TPP (Unit 2)  
 Sample Collected by : VEL Team  
 Date of Sampling : 24/09/2020  
 Sampling duration (Minutes) : 30 Min (12:26 to 12:56 hrs)  
 Stack attached to : ESP  
 Make of stack : MS Plate & RCC  
 Diameter of stack(m) : 1.5m  
 Height of stack(m) : 775 m  
 Instrument calibration status : Calibrated  
 Meteorological Condition : Clear Sky  
 Ambient Temperature - Ta (°C) : 31  
 Temperature of Stack Gases - Tg (°C) : 132  
 Velocity of Stack Gases (m/sec) : 22.5  
 Flow rate of PM (LPM) : 33.03  
 Flow rate of Gas (LPM) : 2.0  
 Sampling Condition : OK  
 Protocol used :

S.No.	Test Parameters	Test Method	Results	Units	Specifications
1	Particulate Matter (as PM)	IS: 11255 (Part 1) : 1985, RA 2014	42.06	mg/Nm <sup>3</sup>	58.3
2	Sulphur Dioxide ( as SO <sub>2</sub> )	IS: 11255(P- 2) : 1985, RA 2014	1294.15	mg/Nm <sup>3</sup>	-
3	Ammonia (as NH <sub>3</sub> )	IS: 11255 (P-6) : 1999, RA 2014	7.80	mg/Nm <sup>3</sup>	-
4	Hydrogen Sulphide	IS: 11255(Part 4) : 2006 RA: 2017	2.10	mg/Nm <sup>3</sup>	-
5	Oxide of Nitrogen as NO <sub>2</sub>	IS:11255 P-7, RA 2017	405.13	mg/Nm <sup>3</sup>	-

\*\*\*End of Report\*\*\*

  
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- All disputes are subjected to Jaipur jurisdiction.



Laboratory: Plot No. 24, 25, Narayan Vihar B Block, Jaipur (Ra) 302035  
 Corp. Off.: Plot No. 82A, Sector-5, IMT Manesar, Gurugram-122051  
 MoEF & CC Recognised (ISO 9001 | DHSAS 45001)

## Test Report

Sample Number: VEL/S1702  
 Name & Address of the Party: M/s Rajpur Energy Limited  
 Formerly GMR Chhatbisgarh Energy Ltd. Village  
 Raikhada, Block - Tilda, Dist. Rajpur Chhatbisgarh

Report No: VEL/S/2009260002/B  
 Format No: 7 B F-01  
 Party Reference No: Nil  
 Reporting Date: 30/09/2020  
 Period of Analysis: 28/09/2020-30/09/2020  
 Receipt Date: 28/09/2020

Sample Description: Stack Emission Monitoring

General Information  
 Sampling Location: TPP (Unit-2)  
 Sample Collected by: VEL Team  
 Date of Sampling: 24/09/2020  
 Sampling duration (Minutes): 30 Min (12:28 to 12:58 hrs)  
 Stack attached to: ESP  
 Make of stack: MS Plate & RCC  
 Diameter of stack(m): 7.5m  
 Height of stack(m): 275m  
 Instrument calibration status: Calibrated  
 Meteorological Condition: Clear Sky  
 Ambient Temperature - Ta (°C): 31  
 Temperature of Stack Gases - Tg (°C): 132  
 Velocity of Stack Gases (m/sec.): 23.5  
 Flow rate of PW (LPM): 33.00  
 Flow rate of Gas (LPM): 2.0  
 Sampling condition: OK  
 Protocol used:

S.No	Test Parameters	Test Method	Results	Units	Specifications
1	Water Vapor	Gas Analyzer	3.58	%	-
2	Carbon Monoxide ( as CO )	Co By Analyzer	5.18	mg/Nm <sup>3</sup>	-
3	Carbon Dioxide	IS:13270, Orsat Analysis, RA:2005	7.28	%	-
4	Oxygen	SOP, SP-188, Issue No.01-2018	7.40	%	-
5	Mercury as Hg	APHA 3rd edition 2017, 303A (Page No 365)	BDL(DL 0.005)	mg/Nm <sup>3</sup>	0.03

BDL - Blank Detection Limit \*\* DL - Detection Limit

\*\*\*End of Report\*\*\*

(Checked By)



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## **Chapter – 5.0 CONCLUSION**

RAIPUR ENERGEN LIMITED., authorities have been taken successful steps in controlling environmental pollution in and around the project. This fact is clear from analytical results of different environmental parameters. A brief conclusion is as follows.

<b>Sr. No.</b>	<b>Environmental Parameters</b>	<b>Conclusion</b>
5.1	Air Environment	After analysis of the samples from five different locations it is observed that both the individuals and average concentration of air pollutants in respect of SO <sub>2</sub> , NO <sub>2</sub> , PM <sub>10</sub> , PM <sub>2.5</sub> , CO and Mercury are well within the prescribed limits of NAAQM standards. People of township and of surrounding villages do not have any problems regarding the air quality and have no grievances because of Thermal Power Plant activities.
5.2	Water Environment	The analytical result of the samples from the ground water of villages, surface water from river, and domestic & industrial effluent after treatment shows that the concentrations of different water parameters are well within prescribed limits and will not cause any adverse impact on human health and on surrounding area. People of surrounding areas express satisfaction about the water quality of That area.
5.3	Noise Environment	The observations taken at four village location during day and night time shows that the noise level are well within prescribed limits of CPCB. Hence there is no possibility of any adverse effect of noise generated due to Thermal Power Plant activities on peoples of Surrounding areas.

All the above details show that Thermal Power Plant of RAIPUR ENERGEN LIMITED. is not causing any adverse impact on the human health and ecological balance.



# ANNEXURE -II

Name of Power Utility: Raipur Energen Limited

Name of Thermal Power Plant: Raipur Energen Limited

Installed Capacity (Total): 1370 MW

PERIOD OF REPORT- April 2020 to September 2020

[All Quantities in Million Tonne]

Sl. No.	ASH GENERATION AND UTILIZATION				MODE OF ASH UTILIZATION AND UTILIZATION IN EACH MODE									
	Month	Fly Ash Generation	Fly Ash Utilization	% age Utilization	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 Development	Others
(1)	(2)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)
1	April-2020	0.0768	0.0307	40.00%	0.0002	0.0291	0.0001	0.0000	0.0000	0.0000	0.0014	0.0000	0.0000	0.0000
2	May-2020	0.1480	0.1628	110.02%	0.0018	0.1364	0.0007	0.0000	0.0000	0.0000	0.0239	0.0000	0.0000	0.0000
3	June-2020	0.1223	0.1365	111.57%	0.0079	0.0915	0.0009	0.0000	0.0000	0.0000	0.0362	0.0000	0.0000	0.0000
4	July-2020	0.0997	0.0848	85.06%	0.0034	0.0597	0.0013	0.0000	0.0000	0.0000	0.0203	0.0000	0.0000	0.0000
5	August-2020	0.0900	0.0772	85.85%	0.0028	0.0687	0.0030	0.0000	0.0000	0.0000	0.0028	0.0000	0.0000	0.0000
6	September-2020	0.1226	0.1283	104.68%	0.0036	0.0939	0.0103	0.0000	0.0000	0.0000	0.0206	0.0000	0.0000	0.0000
<b>TOTAL</b>		<b>0.6594</b>	<b>0.6204</b>	<b>94.09%</b>	<b>0.0196</b>	<b>0.4793</b>	<b>0.0162</b>	<b>0.0000</b>	<b>0.0000</b>	<b>0.0000</b>	<b>0.1053</b>	<b>0.0000</b>	<b>0.0000</b>	<b>0.0000</b>

Abbreviations:-

MW-Mega Watt

MT- Million Tonne

# ANNEXURE -III

# Green Belt Development

Plantation on 33% land of 850acres	280acres
Density of plantation	2500 plants/Hectare
Area required per plant	4.0SQM
<b>Total No. of plantation completed</b>	<b>231305</b>
2013-14	58000
2014-15	44112
2015-16	70182
2016-17	10000
2017-18	44754
2018-19	1168
2019-20	1984
Apr'2020-Sept'2020	1105
Survival rate maintained	> 75%

# ANNEXURE -IV

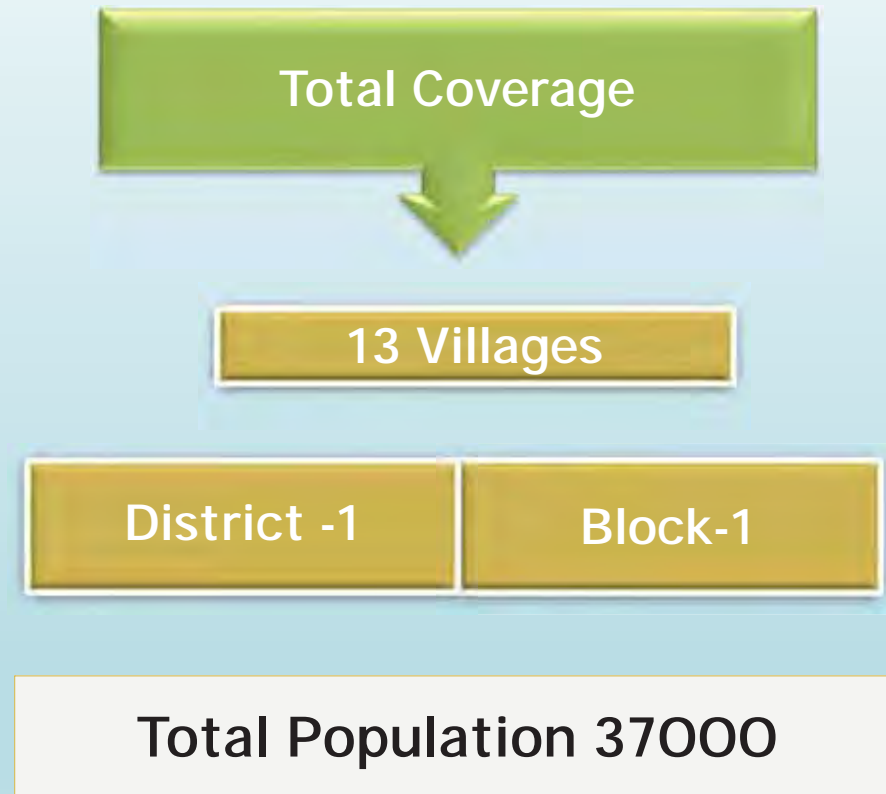


# Adani Foundation

April To September 2020

(Half Yearly Report)

**Site – Raipur Energen Ltd. Raipur (REL)**



(Approved by BOD's on 1<sup>st</sup> OCT

### CSR Philosophy

'Adani Power Limited (APL) has always been committed to cause of social Service and has repeatedly channelized a part of its resources and activities, such that it positively affects the society socially, ethically and also environmentally'.

### CSR Vision

'Improve Quality of Life For all our Communities through Integrated and Sustainable Development'.

### CSR Committee

- Chairperson: Ms. Sushama Oza
- Member : Mr. Rajatkumar Singh
- Member : Mr. Jayadeb Nanda
- Company Secretary : Mr. Deepak Pandya

### CSR OBJECTIVES & PROJECTS:

Adani Group implemented its CSR activities projects through Adani Foundation and Associated organizations such as Adani Research and Education Foundation, Adani Skill Development Centre, etc.

### CSR PROJECTS AS PER THE COMPANIES ACT 2013, SCHEDULE VII

- (i) Primary Education:  
*"Kindled Minds for a **Brighter** future"*
- (ii) Primary Health Care:  
*"Kindled Minds for **Healthy** Life"*
- (iii) Sustainable Livelihood Developments :  
*"Kindled Minds for an **Empowered** Life"*
- (iv) Rural Infrastructure Development:  
*"Kindled Minds for better **Living**"*
- (v) Rural Sports & Sports Training:  
*"Kindled Minds for **Disciplined** Life"*





Navodaya Coaching

Before Covid



After Covid



Prayas -30

Before Covid



After Covid



Digital Literacy Center

Before Covid



After Covid



Apparel Training Center

Before Covid



After Covid



- Achievements of Navodaya Coaching:-
  - I. 6 students have been cracked the Navodaya entrance exam conducted in session of 2019-20.
  - II. 46 students were getting Navodaya Coaching at their house due to Covid pandemic.
  - III. Coaching has been stopped from Aug 20 due to govt. guidelines on the Covid.
  - IV. But to cater the syllabus we have started the video clipping class and till month 60% syllabus has been completed.
  - V. According to the monthly test conducted for the performance of the students the percentiles are as follows.

1. 80-90 %	-	5 students
2. 70-79%	-	9 students
3. 50-69%	-	13 students
4. below 50	-	19 students.
- Achievements of Prayas-30.
  - I. For Selection of the students for Prayas 30 we had conducted entrance exam on 15<sup>th</sup> March 20 and got overwhelming response where 64 students were participated.
  - II. In the Corona era. We have initiated regular online class to prepare for competitive exams.
  - III. At the same time Spoken English and Personality Development Classes are also conducted.
  - IV. Students are improving their communication skill and personality.
  - V. Parents are appreciating the classes and improvements as they can see in their children.

Mobile Health Care Unit

Before Covid



After Covid



Suposhan

Before Covid



After Covid



- The Suposhan Program is initiated here in the month of July 20.
- Survey was being done in the 5 villages for Pregnant & lactating mothers with adolescent Girls.
- Breast feeding week observed through tele counselling from 1<sup>st</sup> to 7<sup>th</sup> Aug 20. Total 118 beneficiaries have been educated for the proper breast feeding.
- Poshan Month observed in Sep 20 where 166 beneficiaries were guided for the nutritional foods.
- During the month Tele counselling done for 21 SAM , cooking demonstration to 19, Kitchen garden seed distribution to 12 & Rangoli competition conducted with grains & cereals 30.

Raw Materials support to SHG groups for various livelihood & Income generation



25000 nose masks stitched by group of women SHG under Income generation Activity



vegetables seed distributed for the development of Suposhan Vatika



Mushroom Spawn distributed to 20 women of 2 groups in Raikheda, & Chicholi



Livestock care vaccination & Health camp conducted Radium stickers pasted to stray cattle



Vanmahotsava Week observed in the form of Nakshtra & Navagrah Vatika.



- Livelihood shops started at hamlets Raikheda & Chicholi on which we have supported financials for raw materials of Dona – Pattal, Utensils Fare Shop & Papad shop.
- 25000 Mask stitched by production center ladies and disseminated to Stake holders & govt. officials.
- International Yoga Day Observed on 21<sup>st</sup> June at the house of beneficiaries in the villages.
- Van Mahotsava Day observed on 6<sup>th</sup> & 7<sup>th</sup> July where 72 sapling planted in the form of Nakshatara Vatika & Navagarha Vatika at the govt. Schools in Tarashiv, Chicholi, Konari & Bhatapara.
- Gau - Jatan Camp conducted at Village Chicholi & Gaitara. 1500 livestock's treated & Vaccinated on the day.
- Seed disseminated to 22 households at Raikheda, Chicholi & Bhatapara.
- 20 Kg Mushroom Spawn disseminated to 20 groups of Bhatapara, Raikheda, Chicholi & Gaurkheda.



Various measures initiated by Adani Foundation-REL to provide relief to the surrounding villages in view of spread of Novel Corona Virus (COVID-19)







- Mask preparation/ distribution
- Distribution of Ration Kits.
- Sanitization work (Chemical medicine was sprayed in 17 villages)
- Financial grant to Nagar Palika Parishad, Tilda.
- Donation of 35 quintal of Daal & 200 quintal Rice worth Rs. 8.00 lacs to Raipur Smart City Ltd. for food support.
- Cotton fabric nose masks sewed at our production center by Women of Saheli Shashakt Silai Samuh (4S) started from 31st March.
- Total 25000 nose masks disseminated in 5 gram panchayats, Bureaucrats with distt. & block administration and to the plant workers till Sep 2020 at REL.
- Chemical sanitization done & continued in 10 surrounding Nagar, Janpad, & Gram Panchayats named Tilda, Kharora, Tulsi, Bartori, Raikheda, Gaitara, Chicholi, Tarashiv, Mohrenga & Murra of Raipur district.
- Testing of body temperature to total 1700 workers & villagers conducted successfully
- Awareness banners of COVID-19 displayed at prominent locations of all 13 villages with
- Team of Mobile Medical Health Care Unit is also providing awareness to the public during the visit.
- Bulk quantity of Ration, Potato Onion & Masala worth Rs. 5.00 lacs given to CEO Janpad Panchayat Tilda for food support to quarantined people at village center for 101 villages.



## अदानी फाउंडेशन-आरएल तथा 8 लाख के अनाज की मदद

### प्रतिदिन नैटक रायपुर

सहित दुनिया के कई देशों में नोबेल  
ना चायरस के प्रसार से लोगों के जीवन को  
भी मुक्तमान हुआ है और परिणाम स्वस्थ विश्व  
सर्व भवस्था पूरी तरह प्रभावित हुई है। साथी

कुल 2000 गोज मास्क जिसमें 14  
5 घाम प्रपंचायतों में, 100 मास्क पुलिस  
खरोरा व तिल्वाको तथा, 500 मास्क सम  
मजदूरों को वितरित किए गए। रायपुर जिला  
आसपास के 10 घाम, जनपद व नगरपंचायतों



रायपुर में रायपुर स्मार्ट सिटी लिमिटेड की  
लाभ रायपुर स्मार्ट सिटी लिमिटेड को  
रायपुर के मार्गदर्शन में दिया गया



### रायपुर : अदानी फाउंडेशन-आरएल की मदद

रायपुर, छत्तीसगढ़ राज्य सहित दुनिया के कई देशों में  
नोबेल प्रोसेस चायरस के प्रसार से लोगों के जीवन को  
भी मुक्तमान हुआ है और परिणाम स्वस्थ विश्व  
सर्व भवस्था पूरी तरह प्रभावित हुई है। रायपुर जिला  
आसपास के 10 घाम, जनपद व नगरपंचायतों

रायपुर, छत्तीसगढ़ राज्य सहित दुनिया के कई देशों में  
नोबेल प्रोसेस चायरस के प्रसार से लोगों के जीवन को  
भी मुक्तमान हुआ है और परिणाम स्वस्थ विश्व  
सर्व भवस्था पूरी तरह प्रभावित हुई है। रायपुर जिला  
आसपास के 10 घाम, जनपद व नगरपंचायतों

## Foundation-REL es, provides relief mate



Foundation one by Adani Foundation in progress at a village.

ed to Raipur Smart  
under the guidance  
Administration Raipur  
assistance, stitching of  
cloth face masks was start-  
the foundation's produc-  
centre by the woman  
Sabli Sashakt Sewing Cen-  
from March 31, a total of 200  
masks out of which 1,400 masks  
were given to 5 gram pancha-  
ats, 100 masks were distrib-  
to the police stations of  
Kharora and Tilda and 500 mask-  
to the workers of the plants along  
with chemical spraying was  
carried out in 10 villages, distric-  
and municipalities across  
Raipur district which inclu-  
villages like Tilda, Khanna  
Bartori, Raikheda  
Chicholi, Tiro Shiva and  
Gant Mura.

### रायखेड़ा विद्यालय में गुरु सम्मान कार्यक्रम



वैकुण्ठ, शास्त्रीय उच्चतर माध्यामिक विद्यालय रायखेड़ा में श्रीमती श्रीमती  
रायखेड़ा के जन्म दिवस का शिवांक दिवस के रूप में मनाया गया। इस  
अवसर पर अदानी फाउंडेशन द्वारा गुरु सम्मान कार्यक्रम का आयोजन  
रायखेड़ा उच्चतर माध्यामिक विद्यालय रायखेड़ा में किया गया। अदानी फाउंडेशन  
लिमिटेड द्वारा रायखेड़ा के गुरु सम्मान में शिवांक दिवस कार्यक्रम के प्रथम विजेताओं  
को अदानी फाउंडेशन रायखेड़ा लिमिटेड द्वारा प्रमाणपत्र प्रदान किया गया।  
कार्यक्रम में किशोरा एका मीनार मेनार, शोभा प्रजापति, शिवांक प्रजापति,  
मनजुला कापानी, प्रदीप सेन, अर्जुन कुमार अम प्रभा प्रजापति, निवेदिता कुमार  
वर्मा स्वास्तीया, विष्णु प्रसाद वर्मा ज्योति कश्यप, निधी अग्रवाल, रोकेनाक  
गोला राव, मिना रावटे, महेंद्र कुमार राधा सहित शिक्षक उपस्थित थे।  
ऑफलाइन ऑर्डिचो भर्षन हेतु सांहन दूसरी चार सम्मानित

आरएल, प्रेरणा पहलानों के द्वारा 15 मंत्रों में स्कूल बंद है। लेकिन शिक्षकों की  
लगत एवं बालकों के बच्चों की उर्ध्व को मिलाए लगे रहा है। रायखेड़ा स्कूल  
नृत्यों के शिक्षक रोचक शान धेनोतन में नृत्य के मोड में पार्थन में पाठकों एवं  
विद्यार्थियों तक ऑडियो प्रोसेस करने हेतु का कृपा समान गारहूओ है। अंधकार  
राज्य से बच्चों को अन्वयत कर्षाओओ (वर्षों में) ध्वीच्छक रूप में पाठोपरी निमार्ण  
के लिए भक्त समान क्रीकसद प्राप्त स्कूल शिक्षा विभाग द्वारा प्रदान किया गया है।

## आत्मोन्नत : रायखेड़ा में स्वरोजगार समूहों के लिए आयोजित की गई एक विशेष बैठक अब महिला समूहों के लिए आगे बढ़ने के सैकड़ों नए रास्ते खुले



आत्मोन्नत : रायखेड़ा में स्वरोजगार समूहों के लिए आयोजित की गई एक विशेष बैठक  
अब महिला समूहों के लिए आगे बढ़ने के सैकड़ों नए रास्ते खुले

रायखेड़ा में स्वरोजगार समूहों के लिए आयोजित की गई एक विशेष बैठक  
अब महिला समूहों के लिए आगे बढ़ने के सैकड़ों नए रास्ते खुले

## महिलाओं को स्वरोजगार कार्यक्रम से जोड़ रहा अदानी फाउंडेशन



महिलाओं को स्वरोजगार कार्यक्रम से जोड़ रहा अदानी फाउंडेशन

महिलाओं को स्वरोजगार कार्यक्रम से जोड़ रहा अदानी फाउंडेशन

## Novel Coronavirus and challenges faced by fellow countrymen. Adani Foundation, the CSR institution of Raipur Energen Limited (REL) has taken several initiative to prevent the spread of the Coronavirus.



Novel Coronavirus and challenges faced by fellow countrymen. Adani Foundation, the CSR institution of Raipur Energen Limited (REL) has taken several initiative to prevent the spread of the Coronavirus. The initiatives include assistance of grains worth Rs 8 lakh which has 35 quintals of pulses and 100 quintals of rice



**Thank You**

# ANNEXURE -V

**HYDROGEOLOGICAL**  
**INVESTIGATION**  
**REPORT**

**IN AND AROUND RAIKHEDA VILLAGE,  
BLOCK- TILDA  
DISTRICT - RAIPUR (C.G.)**

**M/S RAIPUR ENERGEN LIMITED**



**PREPARED BY**

**ENVIBA ENVIRONMENTAL SERVICES**

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## 1. INTRODUCTION

**Adani Power Limited (APL)**, India's largest private sector thermal power producer, announced the completion of acquisition of Raipur Energen Limited, which owns and operates a 1,370 MW (2 X 685 MW) Supercritical power plant at Raikheda village, in Raipur District of Chhattisgarh.

The Raikheda power plant, which utilizes Boiler and Turbine Generator equipment supplied by Doosan Heavy Industries, S. Korea, is situated close to the coal bearing areas of Chhattisgarh. The addition of 1,370 MW capacity, along with the recently concluded acquisition of the 600 MW Korba West Power Co. Ltd., solidifies APL's position as India's largest private sector thermal power producer, with aggregate operating capacities of 12,450 MW and gives it a strong presence in India's leading power generating as well as power consuming regions.

With these developments, APL is now uniquely poised to contribute to the forthcoming growth phase of India's electricity sector, driven by a robust economic growth, as well as an increase in the market size led by reforms under the Government's ambitious "Power For All" vision. APL now has a healthy mix of open capacities as well as capacities tied up in long term PPAs, which provide it long term visibility while allowing it to tap into real growth opportunities. The Adani Group, with its established Pit-to-Plug presence, is confident of leveraging its strengths to achieve its long term goals, and contributing significantly to nation building.

This pre-eminent position of APL will be further consolidated upon completion of the 1,600 MW (2 X 800 MW) Ultra-supercritical power project, which is being constructed in Godda District of Jharkhand for supply of power to Bangladesh, and take the aggregate generation capacity to 14,050 MW.

### **About The Adani Group**

Adani Power (APL), a part of the diversified Adani Group, is the largest private thermal power producer in India. The company has an installed thermal power capacity of 12,450 MW spread across four power plants in Gujarat, Maharashtra, Karnataka and Rajasthan. With the help of a world-class team of experts in every field of power, Adani Power is on course to achieve its growth potential. The company is harnessing technology and innovation to transform India into a power-surplus nation, and provide quality and affordable electricity for all.

## **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, pumping test, chemical analysis of ground and surface water samples from the buffer zone of 10 km radius and particularly downstream side of ash dyke and its impact on the water regime for REL, TPP 2 X 685 NW, Raikheda, Block- Tilda, District-Raipur, Raipur Energen Limited.
2. Survey and hydrological data collection of 30 key wells of 10km 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. Conducting a pump test any existing plant/private bore well along with recuperation test. The pump test is required to find out the aquifer parameters like K,T and S. Interpretation of pump test data by software is included conducting pump test on any open well and its recovery test to find out aquifer parameters.
5. Collection of samples of ground water and few surface samples from the buffer zone and more from the downstream side of ash dyke for determination of 23 constituents and 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 (which are generally present in bottom ash).
6. Preparation of ground water quality report of 10 km radius area of buffer zone based the results of chemical analysis and its different maps showing the different contour maps on important constituents.

7. Hydrological and drainage studies of buffer zone, delineation of micro watersheds, its catchment area, catchment yields, particularly of watershed covering the ash dyke.
8. Preparation of ground water contour map of 10 km radius area showing the Ground water flow direction and hydraulic gradient.
9. Submission of draft report covering the findings of the investigations, original data and recommendations for future monitoring.
10. 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:

1. A detailed Hydrogeological investigation was carried out in & around Plant within 10 km of radius for both Core & Buffer Zone for evaluating the impact of project activity on ground water storage in the area.
2. Collection and collation of supplementary data viz. soils, geology, geomorphology, drainage etc. for interpretation.
3. Establishment of observation stations for water level measurements in different seasons as well as water sample collection for determining the quality aspects.
4. Pumping test data & its interpretation for knowing the hydrogeological parameters, etc.
5. Ground water resources have been estimated based on the norms recommended by GEC'97.
6. 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 Raipur Energen Limited** is a 1,370 MW (2 X 685 MW) Supercritical power plant at Village: Raikheda, Taluka: Tilda, Dist.:Raipur, Chhattisgarh.

The co-ordinates of the Plant are 21°26'23"N - 21°27'48"N latitudes and 81°50'34.6"E to 81°52'08.5"E longitudes. For the present study, an area of 10 km of radius has been demarcated which lies between 21°21'46.77"N - 21°32'34"N latitudes and 81°45'22.87"E to 81°56'58.41"E longitudes and falls under the Survey of India Top sheet No. 64 G/14 and G/15 in parts (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. Tilda Railway station, on Mumbai- Howrah Broad Gauge main line of the South-Eastern-Central Railway is situated around 14 kms westerndirection from plant site. Raipur is nearest Airport and is about 65 km from the study area which is also approachable by road and rail. The block head quarter is Tilda.

### 2.3 DEMOGRAPHY

There are 59 villages within 10 km radius of plant area. The total population as per 2011 Census is **90074** (for 10 km radius buffer zone). Scheduled Caste population of the study area (10km) is 18462 and Scheduled Tribe is 5212, Percentage of literacy is 65%. The workers those actually engaged in occupation are 40921 Main workers are around 15201 while marginal workers are 33952. Rest of the total population, are considered as non-workers. A population detail is presented in table 2.1.

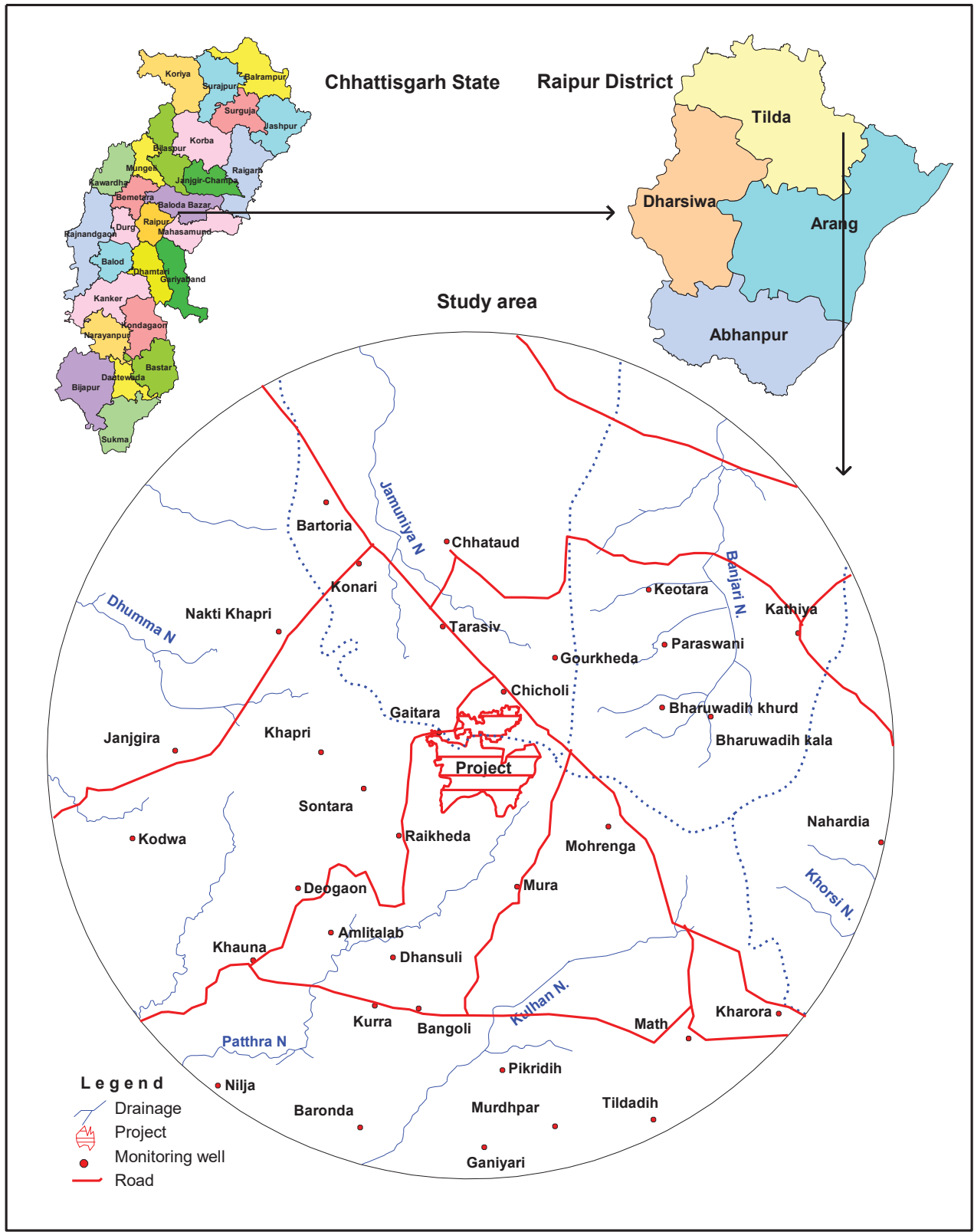
**Table 2.1 Population details as per census 2011**

Name	NoHH	TOT_P	TOT_M	TOT_F	P_SC	M_SC	F_SC	P_ST	M_ST	F_ST
Nilja	463	2476	1250	1226	25	13	12	655	322	333
Mangasa	186	914	469	445	88	47	41	0	0	0
Mauhagaon	256	1255	628	627	893	442	451	8	3	5
Amlitalab	114	528	275	253	313	165	148	0	0	0
Bahesar	343	1694	847	847	593	301	292	25	14	11
Bangoli	438	1898	956	942	192	87	105	123	68	55

Name	NoHH	TOT_P	TOT_M	TOT_F	P_SC	M_SC	F_SC	P_ST	M_ST	F_ST
Baronda	419	2033	994	1039	556	278	278	13	7	6
Bartori	272	1202	606	596	465	227	238	76	41	35
Bartori 2	285	1573	769	804	2	0	2	125	66	59
Bharuwadih Kala	172	825	412	413	118	63	55	152	67	85
BharuwadihKhurd	151	738	373	365	361	185	176	0	0	0
Bhibhauri	290	1446	726	720	72	34	38	69	35	34
Changori	86	407	212	195	407	212	195	0	0	0
ChhachhanPahri	98	463	232	231	237	125	112	0	0	0
Chhadia	320	1518	746	772	548	289	259	0	0	0
Chhapora	240	1187	589	598	339	181	158	0	0	0
Chhataud	461	2219	1070	1149	231	103	128	40	18	22
Chicholi	236	1103	539	564	472	238	234	11	5	6
Deogaon	281	1245	613	632	388	201	187	84	34	50
Deori	294	1376	711	665	86	43	43	0	0	0
Dhansuli 1	254	1241	607	634	310	151	159	13	7	6
Gaitra	199	892	456	436	427	226	201	29	14	15
Ganiyari	393	2045	1022	1023	162	80	82	2	1	1
Gaurkheda	163	853	425	428	77	41	36	24	11	13
Jalso	200	932	478	454	20	11	9	87	44	43
Janjgira	219	1265	614	651	431	198	233	260	132	128
Kathiya 1	493	2410	1203	1207	541	283	258	326	158	168
Keotara	297	1469	758	711	674	352	322	151	77	74
Khamhariya	264	1252	612	640	80	38	42	287	139	148
Khapri	117	597	303	294	7	4	3	7	4	3
KhaultDabri	89	422	202	220	226	112	114	22	11	11
Khauna	786	3745	1894	1851	933	465	468	176	94	82
Khudmudi	200	969	506	463	235	120	115	0	0	0
Kodawa	290	1382	697	685	446	223	223	22	12	10
Konari	154	772	403	369	8	4	4	0	0	0
Kundru	916	4016	2071	1945	411	210	201	205	104	101
Kurra 1	251	1271	628	643	197	99	98	7	4	3
Madhi	506	2530	1231	1299	87	42	45	396	183	213
Math	453	2501	1434	1067	584	320	264	243	126	117
Mohrenga	525	2555	1275	1280	256	118	138	11	6	5
Mudpar 1	245	1189	573	616	192	98	94	0	0	0

Name	NoHH	TOT_P	TOT_M	TOT_F	P_SC	M_SC	F_SC	P_ST	M_ST	F_ST
Mura	531	2359	1188	1171	625	311	314	20	10	10
Nahardih	156	847	424	423	102	54	48	21	13	8
NaktiKhapri	152	735	365	370	368	180	188	0	0	0
NaktiKumhari	249	1215	599	616	175	83	92	47	23	24
Pachari	381	2112	1045	1067	987	501	486	268	133	135
Pachdeori	88	394	188	206	139	65	74	0	0	0
Paraswani	78	427	209	218	35	16	19	15	8	7
PatharaKundi	77	359	188	171	314	167	147	0	0	0
Pikaridih	256	1067	543	524	268	136	132	0	0	0
Raikheda	696	3541	1734	1807	52	25	27	305	139	166
Rajiya	199	906	435	471	277	139	138	20	10	10
Sirwe	232	1172	580	592	153	75	78	277	136	141
Sontara	227	1084	543	541	459	240	219	0	0	0
Tarasiw	322	1460	726	734	64	33	31	0	0	0
TekariParswani	430	1743	901	842	332	166	166	43	24	19
Tildadih	226	1009	532	477	365	188	177	0	0	0
Kharora (NP)	1961	9236	4632	4604	1057	521	536	547	270	277
<b>Total</b>	<b>18680</b>	<b>90074</b>	<b>45241</b>	<b>44833</b>	<b>18462</b>	<b>9329</b>	<b>9133</b>	<b>5212</b>	<b>2573</b>	<b>2639</b>





**Fig 2.1: Location map the Study area**

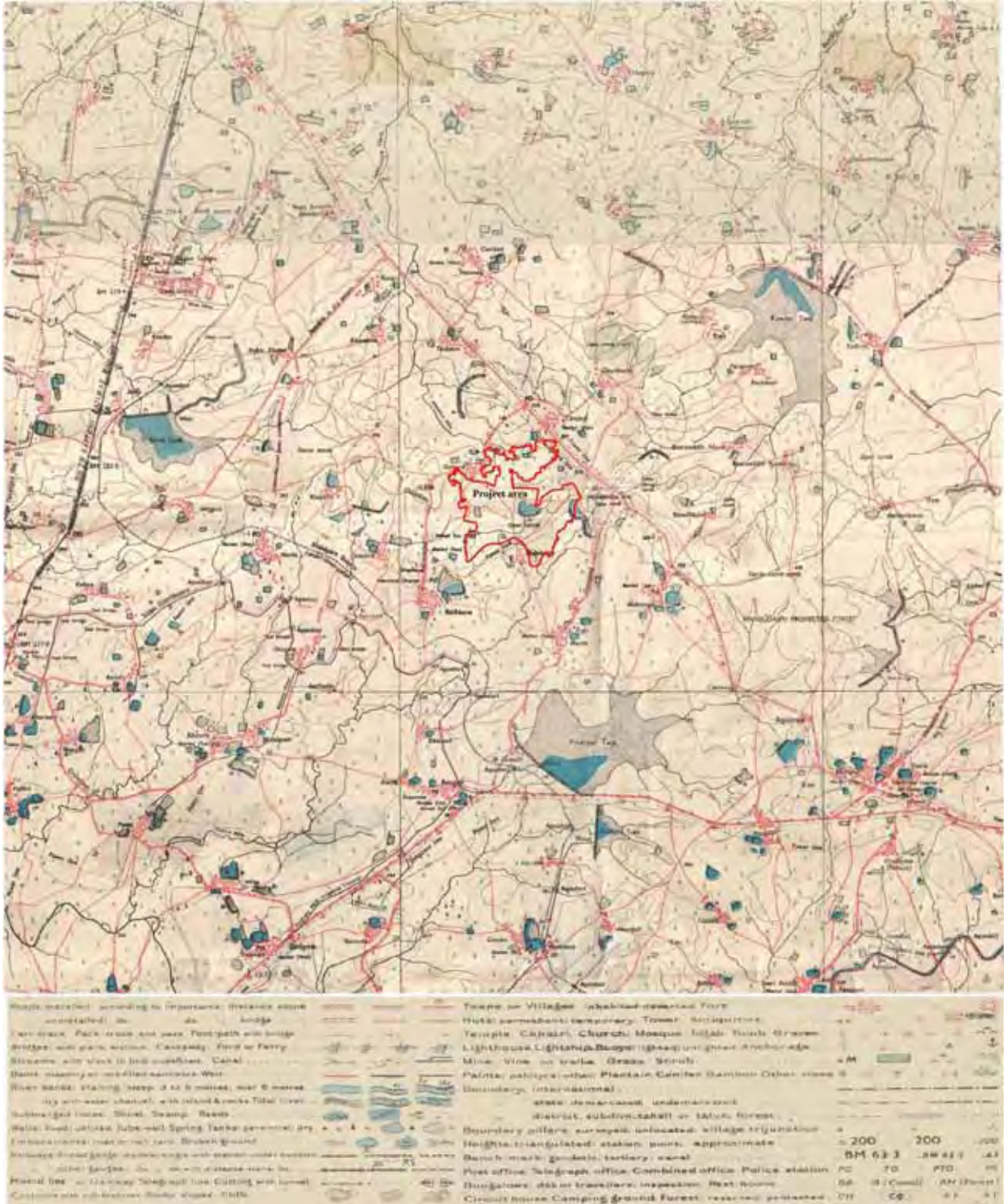


Fig 2.2: Top sheet (1:50000) of the Study area



**Fig 2.3: Satellite of the Study area**

## 2.4 LAND USE

In the study area, nearly 3239 ha is covered by irrigated area, 18626 ha is covered by non-irrigated area. Cultivable waste land area comes around 303 ha while 276 ha area is covered by area not available for cultivation. Details of land use pattern of the study area are presented in **Table 2.2** below and **Fig 2.4**.

**Table 2.2: Land use Pattern of the Study Area (10 km radius from the Project site)**

Sno.	Crop type	Area in Sqkm	Percentage to total area
1	Rabi Crop	15.8699	5.05
2	Kharif Crop	186.264	59.31
3	Double Crop	16.5283	5.26
4	Land Without Scrub	54.3982	17.32
5	Land With Scrub	13.562	4.32
6	Scrub forest	0.793647	0.25
7	Fallows	2.76988	0.88
8	Settlement	3.03294	0.97
9	Water	16.1558	5.14
10	Plant area	4.67	1.49
		<b>314.0447</b>	<b>100.00</b>

*Source: Satellite Imagery*

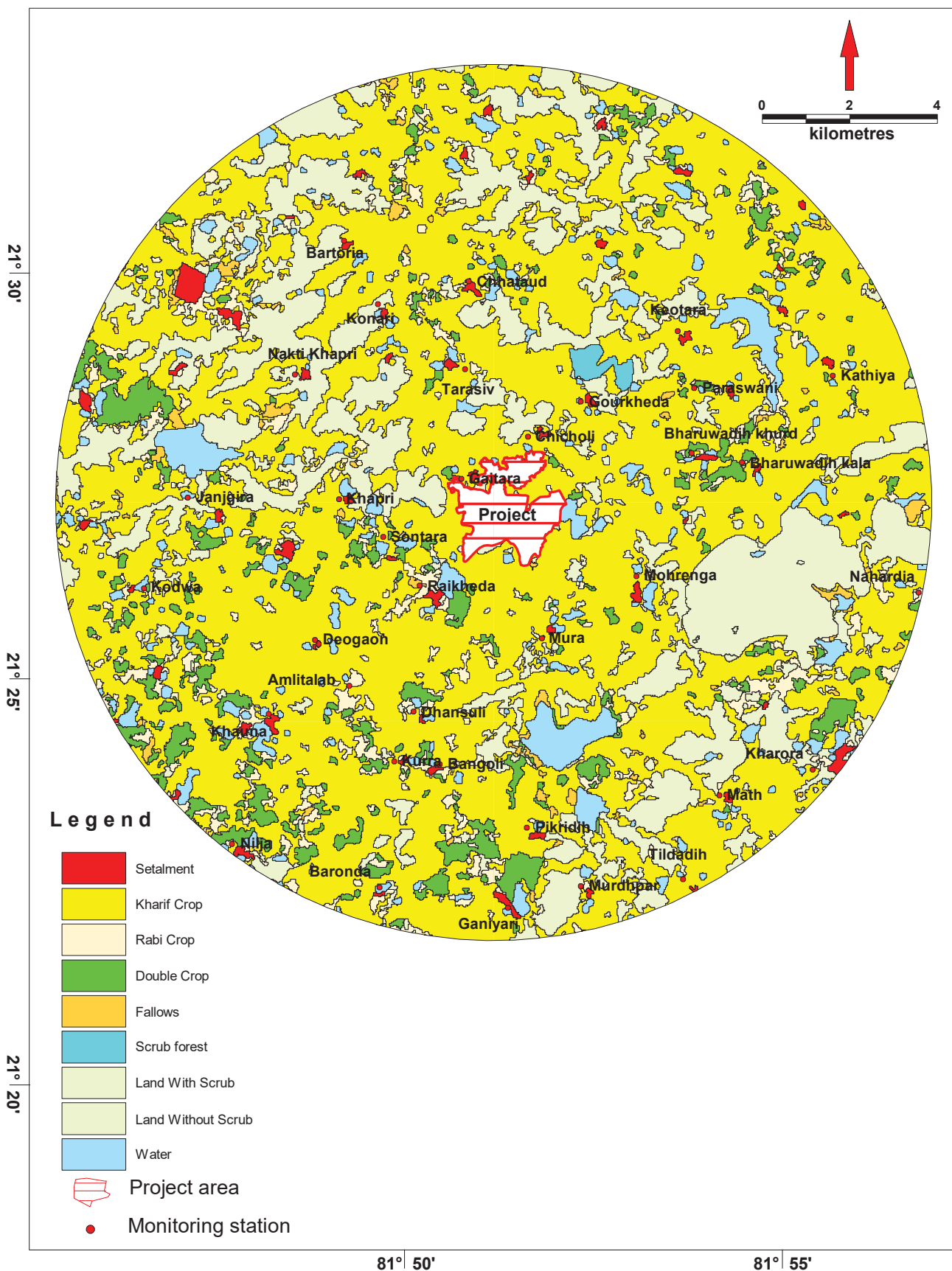


Fig 2.4: Land use map the Study area

## 2.5 CROPPING PATTERN OF THE STUDY AREA

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 10 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, Taramera, 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.	NAME OF CROP	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%. The rainfall increases generally from the north-west to the south-east. 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- 60rainy days in a year. There is only one observatory located in Raipur which is about 65 km away from the study area maintained by Indian Meteorology Department. The monthly average of different parameters of weather for the period 1980 to 2019 is presented in **Table-2.4** below.

**Table-2.4. Climatological data of Observatory station at Raipur, IMD**

Month	Mean Temp.(°C)		Relative Humidity (%)	Wind Velocity (Km/Hr)	Rainfall (mm)	EPT(mm)
	Max	Min				
January	27	13	50	5	6.2	114
February	30.8	16	39	6	12	132
March	35	20	32	6.9	19	185
April	40	26	30	8.4	13	221
May	42	28.2	31.6	10.4	19	258
June	37	26	58	122.1	205	195
July	30	23	80.1	11.8	392	125
August	30	23	80.1	10	358	122
September	31	23.8	75	7	221	125
October	31	26.1	64	6	57	144
November	29	16.1	53	4	7	114
December	27	13.1	52	4.1	3	104
Avg./Total	32.5	21.2	53.7	16.8	1312.2	153

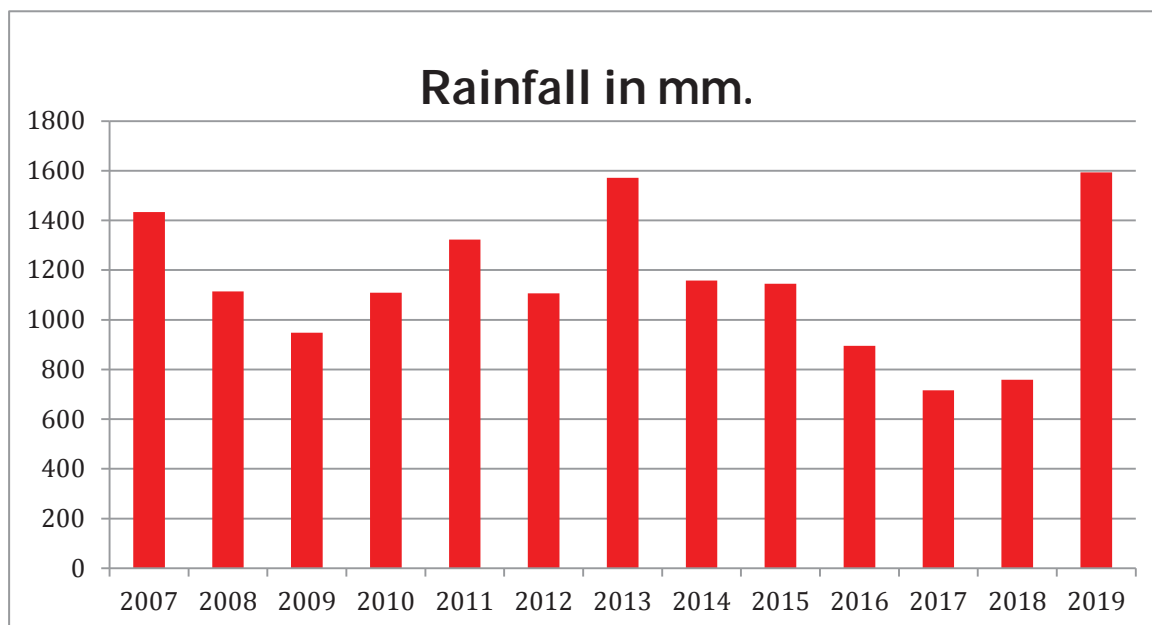
## 2.6.2 Rainfall

During the Year 2007 to 2019 the maximum rainfall recorded 1593.85 mm in the year 2019 and minimum rainfall 716.41 mm had been recorded in the year 2017. Details are as shown in **Table 2.5**. 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 1144.05 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 2.5: Rainfall (mm) data ( 2007-2019) of Raipur District, IMD**

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
2007	0	19.5	0.2	0.2	4.1	525.2	320.1	284.6	238	28.3	14	0	1434.2
2008	6.5	10.1	2.6	1	5.8	262.8	233.1	279.5	289.7	23.4	0	0	1114.5
2009	0	0	0	2.1	4.9	25.8	571.8	246.4	66.4	20.1	10.5	0.3	948.3
2010	3.4	1	0	1.7	5	53.8	462.4	225	273.8	47.7	23.3	12	1109.1
2011	0	3.7	0.3	116.6	8.6	197.7	293.4	363.8	334.6	4.1	0.1	0	1322.9
2012	0	26.1	7.86	0	3.2	154.96	363.87	349.79	184.72	4.1	8.16	3.72	1106.48
2013	0	64.2	4.9	15.3	4.1	283.07	387.08	433.8	289	89.4	0	0	1570.85
2014	0	64.1	24.4	11.9	15.1	53.4	485.9	217.57	240.1	45.4	0	0	1157.87
2015	15.1	6.4	19.26	43.36	9	331.24	273.77	280.18	158.52	2.44	0	5.44	1144.71
2016	0	8.13	13	14.91	10.42	129.77	299.49	132.09	259.49	28.11	0	0	895.41
2017	0	0	0.5	0	17.33	177.71	170	148.37	111.05	91.45	0	0	716.41
2018	0	11.32	1.1	13.16	27.35	128.91	233.48	221.25	64.36	0	0	57.16	758.09
2019	0	64.2	4.9	15.3	4.1	283.07	387.08	433.8	289	89.4	23	0	1593.85
<b>Average</b>													1144.05





## 2.7 SOILS

Two main soil categories are present in the study area namely Ultisols and Vertisols, Soil map mop of the study area is presented in **Fig 2.5**.

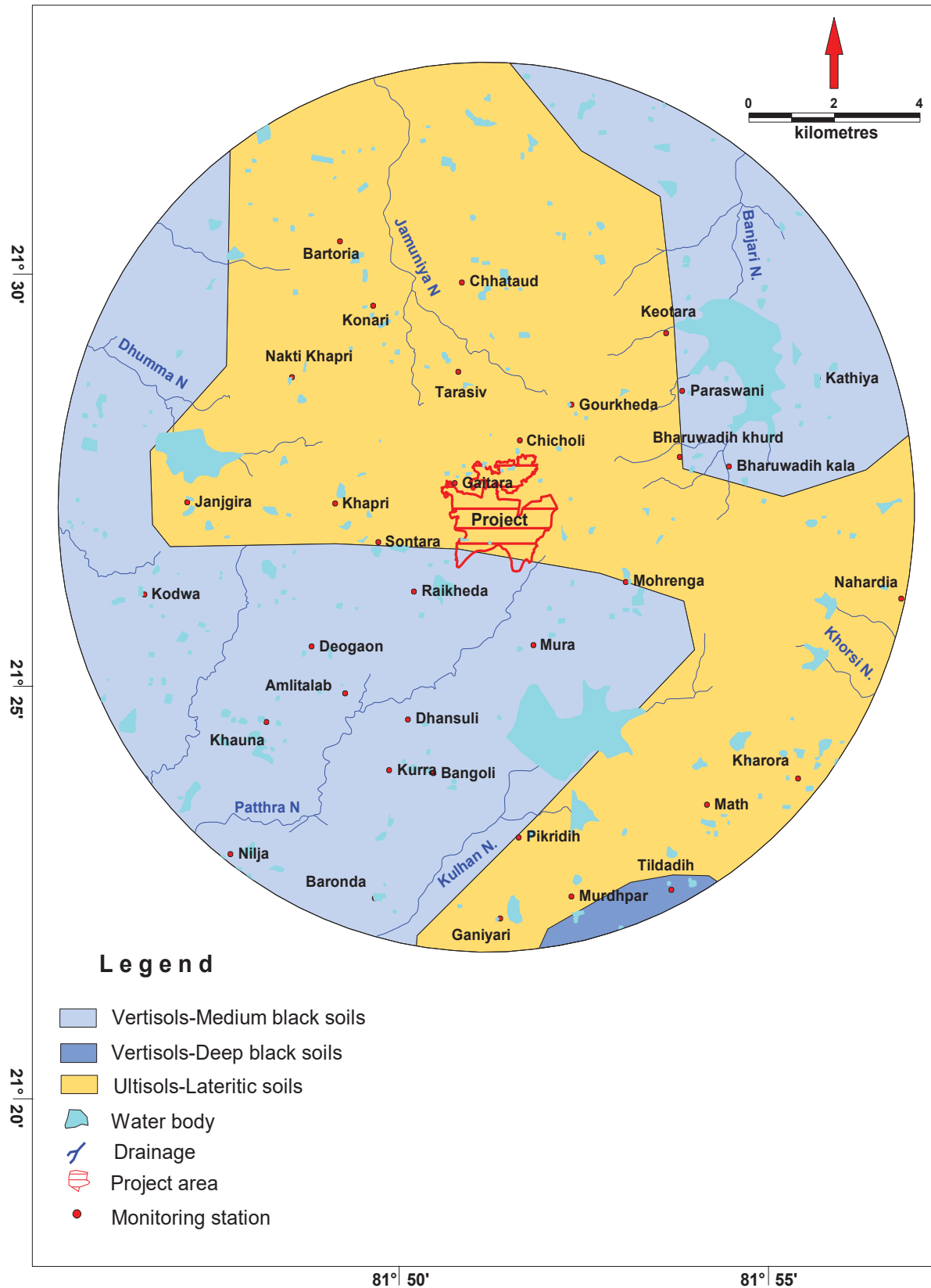
### 2.7.1: Ultisols

The Indian equivalent of this soil found in study area is Lateritic and red yellow soil. It is exposed in south-east-north western part& central part 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.

### 2.7.2 :Vertisols

Indian equivalent of this soil is found in the area namely Medium black soil. They are exposed in north east to south western part of the study area. They are characterized by a high content of expanding and shrinking clay known as montmorillonite. They may also be characterized by salinity and well defined layers of calcium carbonate or gypsum. Vertisols typically form from highly basic rocks such as basalts and are found typically on level or mildly sloping topography in climatic zones that have distinct wet and dry seasons. Depending on the parent material and the climate, they can range from grey or red to the more familiar deep black. Vertisols contain high level of plant nutrients, but, owing to their high clay content, they are not well suited to cultivation

without painstaking management. Vertisols are especially suitable for rice because they are almost impermeable when saturated. Rainfed farming is very difficult because vertisols can be worked only under a very narrow range of moisture conditions as they become very hard when dry and become very sticky when wet. Deep black Soil of Vertisols is found in small patches of southern side of the study area.



**Fig 2.5: Soil map of the Study area**

## **2.8 .DRAINAGE AND GEOMORPHOLOGY**

### **2.8.1 Drainage**

The area is drained by tributaries of Seonath River especially by Banjari River and Khorsi nala. Banjari River is north flowing tributary to Seonath River and flows in the northern while Khorsi nala flows in the east of project area. Thus the project area is in the interfluves zone of Banjari & Khorsi and Kulhan. Seonath River is a perennial river while these three tributaries are ephemeral in nature. 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 2.6**.

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/ pediment & Valleys. The Physiography of the basin is controlled by geological formations namely limestone, shale, and laterite.

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/pediment and valley fill. 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. This is primarily composed of Khorsi and Banjari nala. The geomorphic features in the study area are shown in **Fig 2.7**.

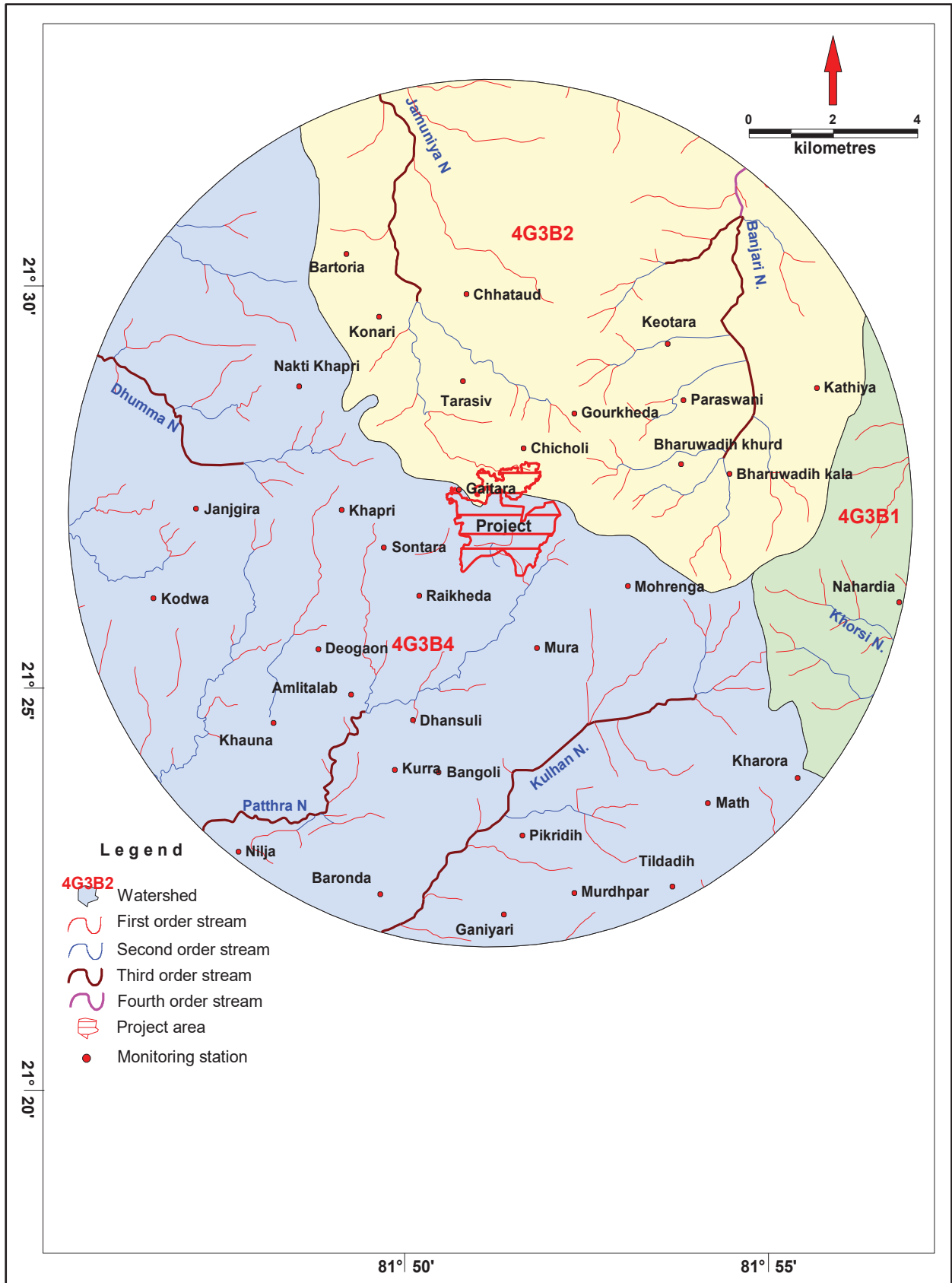
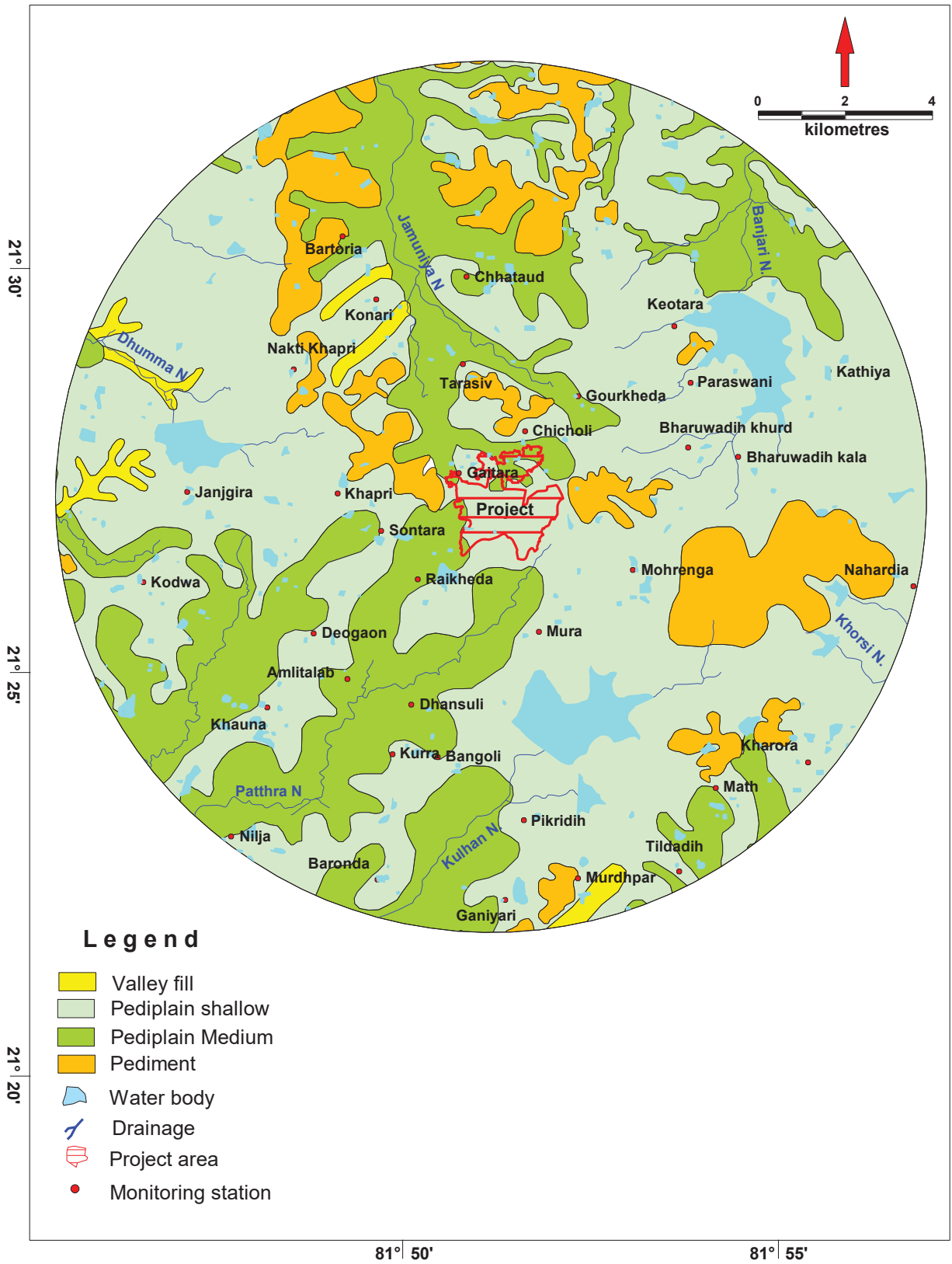


Fig 2.6: Drainage and watershed map of the Study area



**Fig 2.7: Geomorphological map the Study area**

### 3. GEOLOGY

The rocks of the Chhattisgarh super group represented by limestone 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 Raipur 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
			<b>Chandifm</b>	<b>Limestone &amp; Shale</b>
			<b>Gunderdehifm</b>	<b>Shale</b>
			Charmuriafm	Limestone & Shale
		Chandrapur Group	Kanspatharfm	Sandstone, Siltstone Shale & Conglomerate
			Choparadihf	
			Lohardifm	
				Bilari group Sonakhan gr Baya group
ARCHAEAN	Basement crystallines- Granite, gneisses, granulite and Amphibolite			

#### 3.1.1 Basement Crystalline:

The basement crystalline 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 Achaean and the sedimentaries is faulted along the western margin of the basin.

#### 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 unconformably overlies 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.

#### **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 overlies the crystalline basement.

#### **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 carbonates sequence and is conformably overlain by Gunderdehi formation.

**Gunderdehi formation-** dominantly a calcareous argillite purple colored 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 coarse grained dolomitic limestone.

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

**Hirri formation-** conformably overlies the Tarenga formation in south and Pandariaformation(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.



### **3.1.3 Recent to sub-recent:**

#### **3.1.3.1 Laterite:**

In situ 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 limestone and 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 limestone and 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 5 meters and are mostly interconnected. The lithological characters of various formations present in the study area are described as follows:

#### **3.2.1 Soil/Laterite:**

The major part of the area is underlain by alluvial residual soil covers which are loam and sandy loam. Laterites occur as capping associated with limestone and shale. The thickness of overburden varies from 2 to 6 m.

#### **3.2.2 Grey shale:**

Shale is softer in nature and do not outcrop in the area and lies below thin soil cover. It is buff grey in color and calcareous in nature. It splits easily along the bedding planes. They are generally horizontally laid. At places have low dips of 2 to 3 degrees towards North-west.

#### **3.2.3 Dolomite:**

Outcrops of dolomite exhibit typical 'Elephant Skin' weathering. It is dirty yellowish to brown in color. It is compact, hard, and massive. Outcrops of dolomite occur mainly in the western part of

the deposit and form a distinct zone. The dolomite occurs overlying the limestone and varies in thickness from 0.5m to as much as 24.0m.

#### **3.2.4 Limestone:**

Limestone forms the dominant rock type in the area. It is compact, fine grained, massive and chocolate brown to purple grey to grey in color. Analytical data shows that the limestone is thick and quite uniform in quality both laterally and vertically. Thickness of limestone in general is about 30m. Limestone forms a sharp boundary with dolomite occurring in the area. Shaly patches do occur within the limestone but its thickness is quite less.

#### **3.2.5 Magnesium Limestone:**

Limestone in the area is followed by fine grained, massive and compact magnesium limestone having a thickness of about 20m. Exploration data shows that the magnesium limestone occurs at a depth of about 235 amsl.

In order to understand the geological sequence fully well in the project site geological map of study area is **Fig 3.1**.

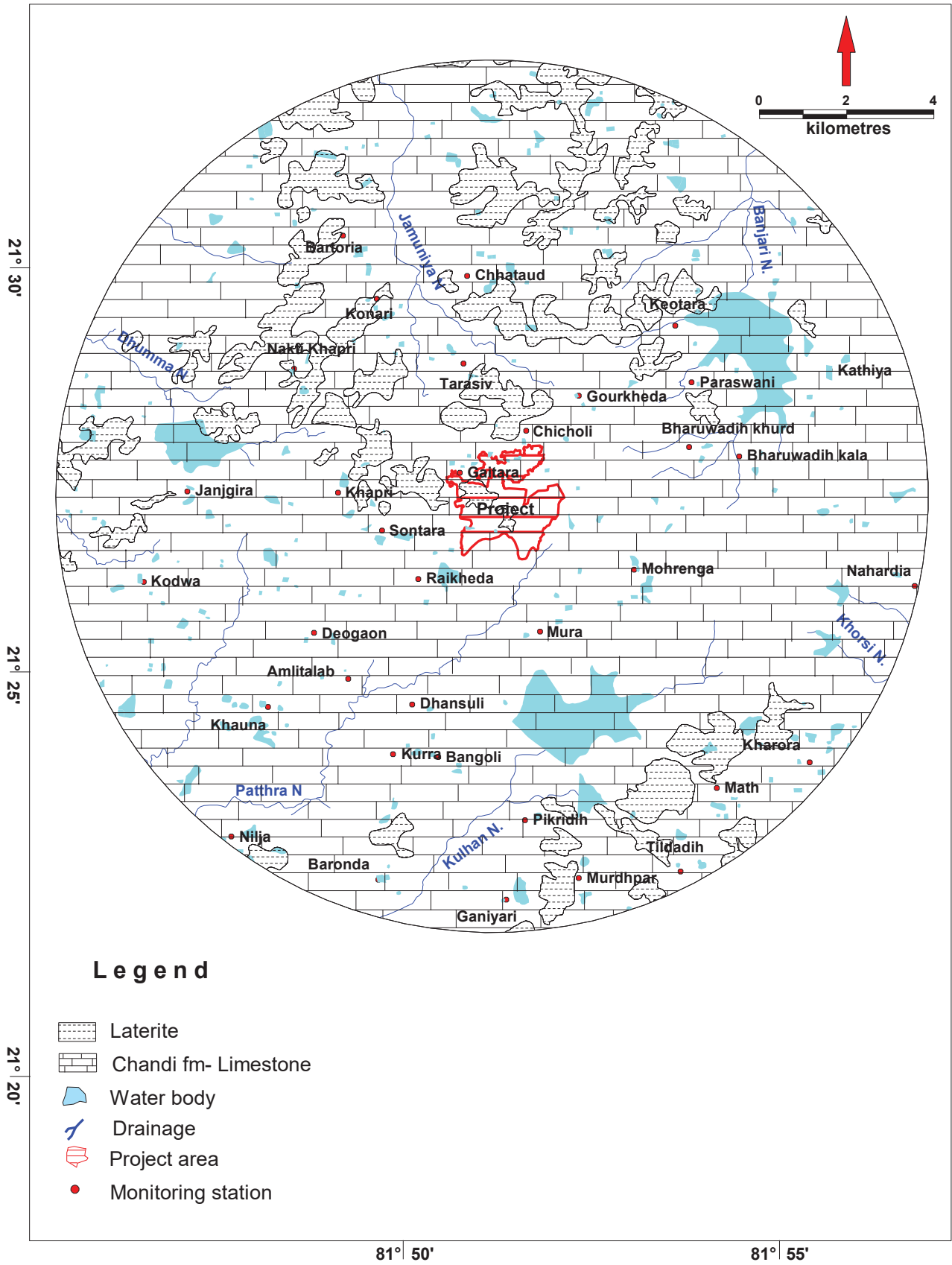


Fig 3.1: Geological map of the Study area

## **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.

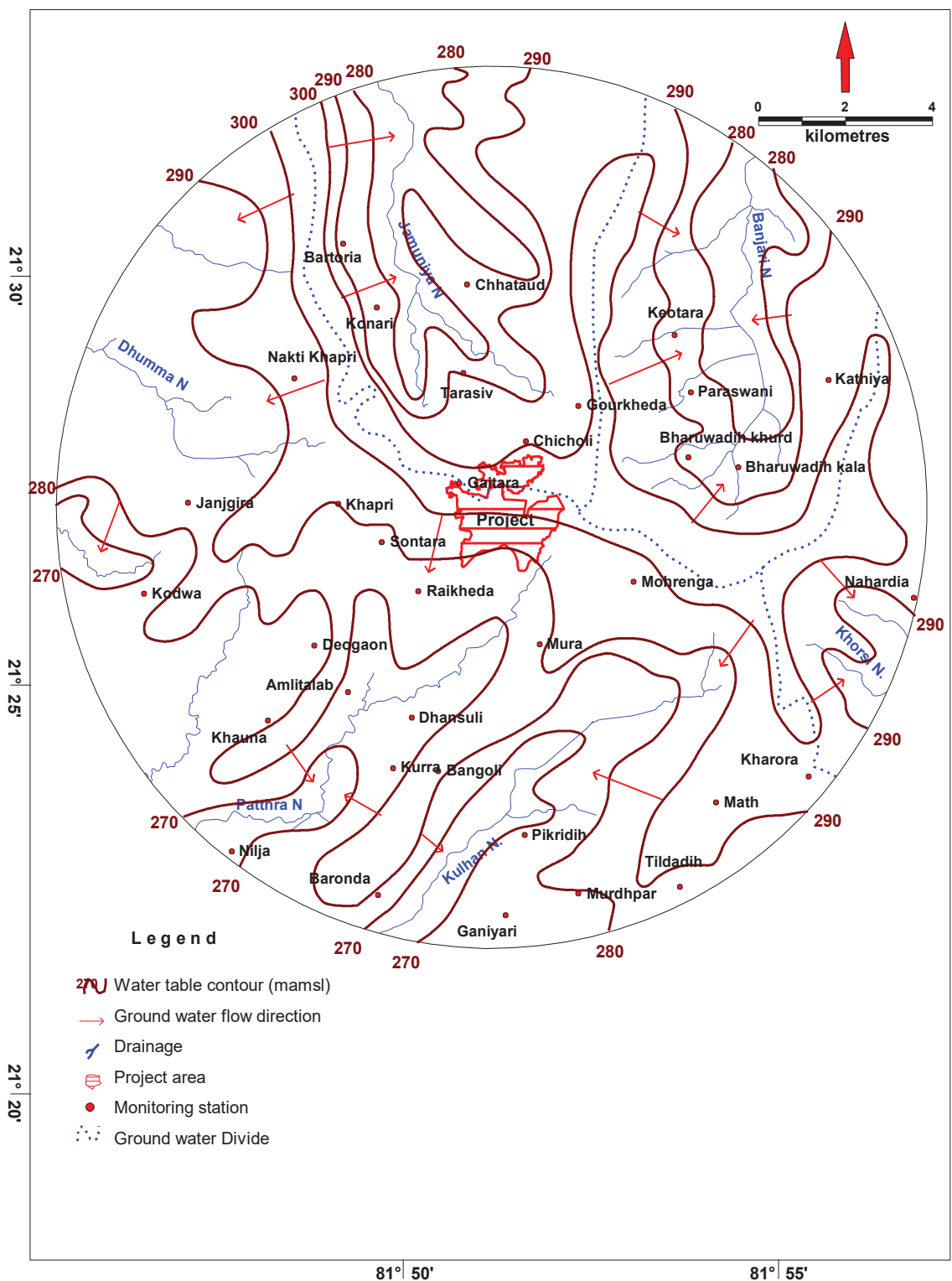
### **4.2 GROUND WATER OCCURRENCE AND AQUIFER SYSTEMS**

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. limestone and shale at depths. The shallow aquifers occur within an average depth of 20m. 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<sup>3</sup>/day. Deeper aquifer in the area mainly formed of Raipur group of rocks constituted of Chandi formation comprising limestone 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 north-west and in southern part of the study area it is in south direction indicating the surface water divide in the central portion of the study area near to project area.

A local variation in flow direction is also observed which indicates the flow towards the mine pit in all directions. The Jamunia and Banjarinala flowing to north over the north-eastern part and Kulhan–Pathranala flowing westerly over western part of the study area are effluent in nature. The water table elevation in the study area ranges between 270 to 300 mamsl indicating more or less the plain terrain. North-western part of the area is having low altitude of water table elevation i.e. 270 mamsl while water table elevation increases to central & is maximum i.e. 300 mamsl. The gradient of water table is variable. In the area the yield ranges between 1 to 5 lps in central & eastern indicating the area is covered by stromatolitic limestone while in major part of the area it is 1 to 3 lps which is covered with shale & flaggy limestone. Hydrogeological map is given at **Fig.4.1 and 4.2.**



**Fig 4.1 Water table contour and ground water flow direction**

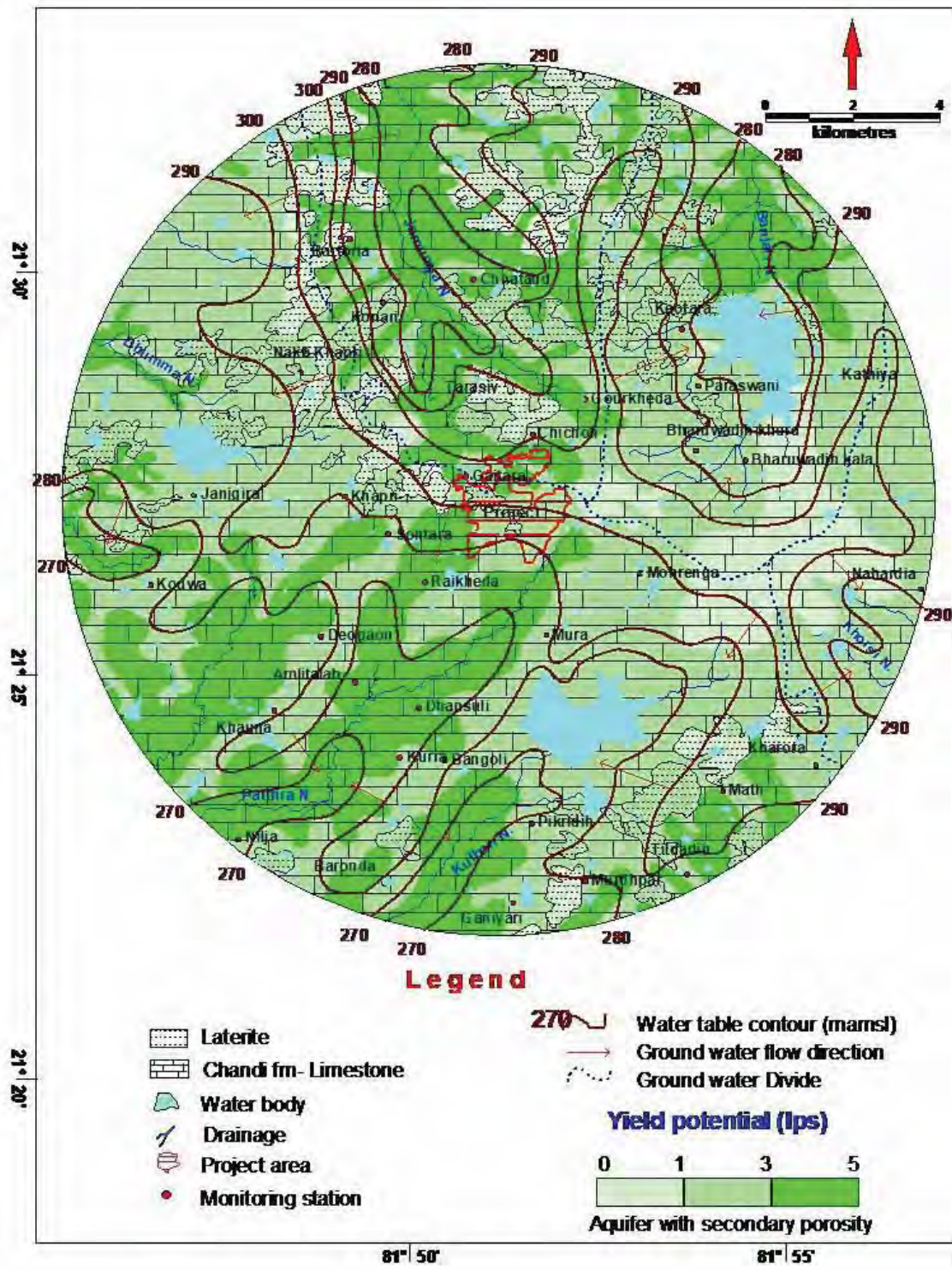


Fig 4.2: Hydrogeological Map of the Study area

#### 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 four times in a year i.e. January May, August 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.











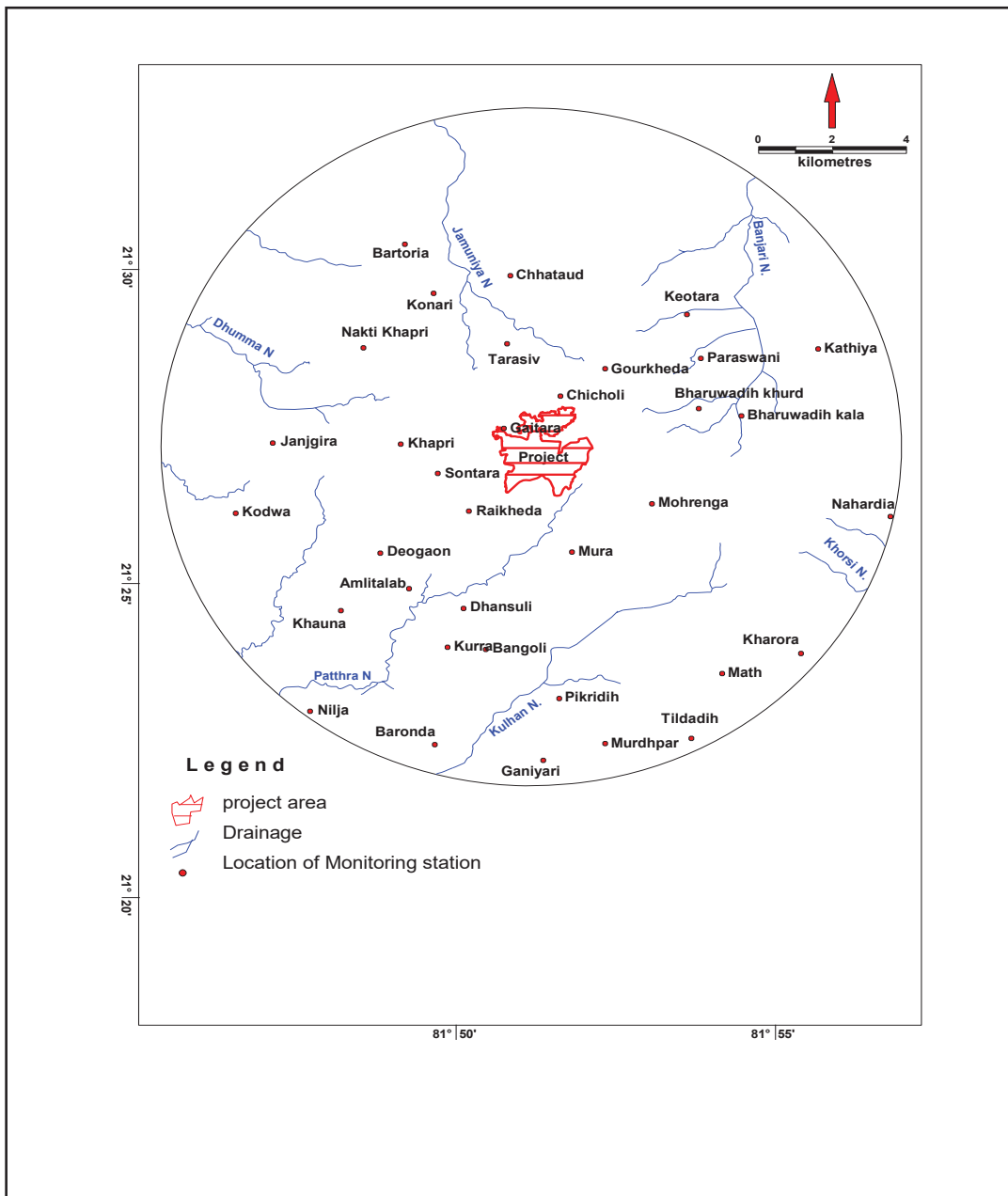
VILLAGE: AMLITALAB  
G.P: DEOGAON  
BLOCK: TILDA  
LOCATION: N 21° 24' 54.85" E 81° 49' 15.97"



**VILLAGE: MURRA**  
**G.P: MURRA**  
**BLOCK: TILDA**  
**LOCATION: N 21° 25' 30.08" E 81° 51' 48.84"**

#### 4.4.1 Distribution of monitoring stations

To study the change in ground water regime in and around study area, total of 35 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**

SI No.	Village	G.P.	Block	RL Of ground level (mamsl)	DIA (m)
1	Nilja	NILJA	DHARSIWA	272	2.9
2	Baronda	BARONDA	TILDA	278	3.7
3	Bangoli	BANGOLI	TILDA	282	2.05
4	Ganiyari	GANIYARI	TILDA	285	2.2
5	Tildadih	TILDADIH	TILDA	291	3.1
6	Math	MATH	TILDA	304	3.2
7	Murdhpar	MUDHPAR	TILDA	292	1.55
8	Pikridih	PIKRIDIH	TILDA	285	1.7
9	Kurra	KURRA	TILDA	278	1.4
10	Dhansuli	DHANSULI	TILDA	276	2.7
11	Mura	MURA	TILDA	292	2.1
12	Gourkheda	CHICHOLI	TILDA	305	2.45
13	Keotara	KEVTARA	TILDA	292	4.25
14	Paraswani	NAKTI KUMHARI	TILDA	295	7.95
15	Bharuwadihkhurd	BHARUWADIH KALA	TILDA	295	2.7
16	Mohrenga	MOHRENGA	TILDA	300	1.85
17	Bharuwadihkala	BHARUWADIH KALA	TILDA	291	2.5
18	Kathiya	KATIYA	TILDA	296	2.4
19	Nahardia	CHHADIYA	TILDA	305	2.7
20	Kharora	KHARORA	TILDA	304	3.9
21	Chicholi	CHICHOLI	TILDA	310	1.85
22	Tarasiv	TARASIW	TILDA	295	2.3
23	Chhataud	CHHATAUD	TILDA	295	2.8

SI No.	Village	G.P.	Block	RL Of ground level (mamsl)	DIA (m)
24	Gaitara	GAITRA	TILDA	300	4.4
25	Raikheda	RAIKHEDA	TILDA	290	4.5
26	Sontara	SONTARA	TILDA	293	3.9
27	Khapri	KHAPRI	TILDA	295	1.75
28	Deogaon	DEVGAON	TILDA	282	2.9
29	Amlitalab	DEVGAON	TILDA	279	5.2
30	Khauna	KHAUNA	TILDA	280	2.25
31	Kodwa	KODWA	TILDA	283	4.5
32	Janjgira	JANJGIRA	TILDA	290	3.8
33	NaktiKhapri	JALSO	TILDA	299	2.7
34	Konari	KHAMRIYA	TILDA	293	2.9
35	Bartoria	BARTORI	TILDA	288	1.7

## **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 time 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 2019, analyzed for every set of measurements and discussed with maps in following sections.

### 5.2.1 Analysis of water levels (2019)

The water level data collected four times during the year 2019 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 2019-20)**

Sl No.	Village	Latitudes	Longitudes	Post monsoon depth to water 2019 level (mbgl)	Pre monsoon depth to water level 2020 (mbgl)	Fluctuation May 2020 Vs Nov 2019 (m)	RL of pre monsoon water level (mamsl)
1	Nilja	21.383	81.795	2.05	5.9	3.85	266.1
2	Baronda	21.374	81.828	1.6	6.05	4.45	271.95
3	Bangoli	21.399	81.841	4.7	9.62	4.92	272.38
4	Ganiyari	21.370	81.856	4.2	12.2	8	272.8
5	Tildadih	21.376	81.895	0.45	5.8	5.35	285.2
6	Math	21.393	81.903	1.65	4.55	2.9	299.45
7	Murdhpar	21.374	81.872	5.8	12.19	6.39	279.81
8	Pikridih	21.386	81.860	0.75	6.09	5.34	278.91
9	Kurra	21.400	81.831	3.89	10.06	6.17	267.94
10	Dhansuli	21.410	81.835	0.75	3.3	2.55	272.7
11	Mura	21.425	81.864	1.2	4.2	3	287.8
12	Gourkheda	21.474	81.872	1.6	5.8	4.2	299.2
13	Keotara	21.488	81.894	2.8	7.62	4.82	284.38
14	Paraswani	21.476	81.897	2.89	8.8	5.91	286.2
15	Bharuwadih khurd	21.463	81.897	5.68	11.4	5.72	283.6

Sl No.	Village	Latitudes	Longitudes	Post monsoon depth to water 2019 level (mbgl)	Pre monsoon depth to water level 2020 (mbgl)	Fluctuation May 2020 Vs Nov 2019 (m)	RL of pre monsoon water level (mamsl)
16	Mohrenga	21.438	81.884	0.7	2.05	1.35	297.95
17	Bharuwadihkala	21.461	81.908	1.7	12.1	10.4	278.9
18	Kathiya	21.479	81.928	2.95	8.45	5.5	287.55
19	Nahardia	21.434	81.947	0.75	5.8	5.05	299.2
20	Kharora	21.398	81.923	0.65	5.9	5.25	298.1
21	Chicholi	21.466	81.861	0.5	6.2	5.7	303.8
22	Tarasiv	21.480	81.847	0.7	4.9	4.2	290.1
23	Chhataud	21.498	81.848	1.9	7.1	5.2	287.9
24	Gaitara	21.458	81.846	1.55	6.3	4.75	293.7
25	Raikheda	21.436	81.837	0.7	2.2	1.5	287.8
26	Sontara	21.446	81.829	0.45	6.5	6.05	286.5
27	Khapri	21.454	81.819	1.2	4.7	3.5	290.3
28	Deogaon	21.425	81.814	0.45	5.7	5.25	276.3
29	Amlitalab	21.415	81.821	1.2	4.4	3.2	274.6
30	Khauna	21.409	81.803	1.98	7.5	5.52	272.5
31	Kodwa	21.435	81.776	2.1	6.2	4.1	276.8
32	Janjgira	21.454	81.786	0.7	8.8	8.1	281.2
33	NaktiKhapri	21.479	81.809	0.9	6.2	5.3	292.8
34	Konari	21.494	81.828	2.98	7.8	4.82	285.2
35	Bartoria	21.507	81.820	1.9	5.89	3.99	282.11

### ***5.2.1.1 Post-monsoon Depth to Water level (November' 2019)***

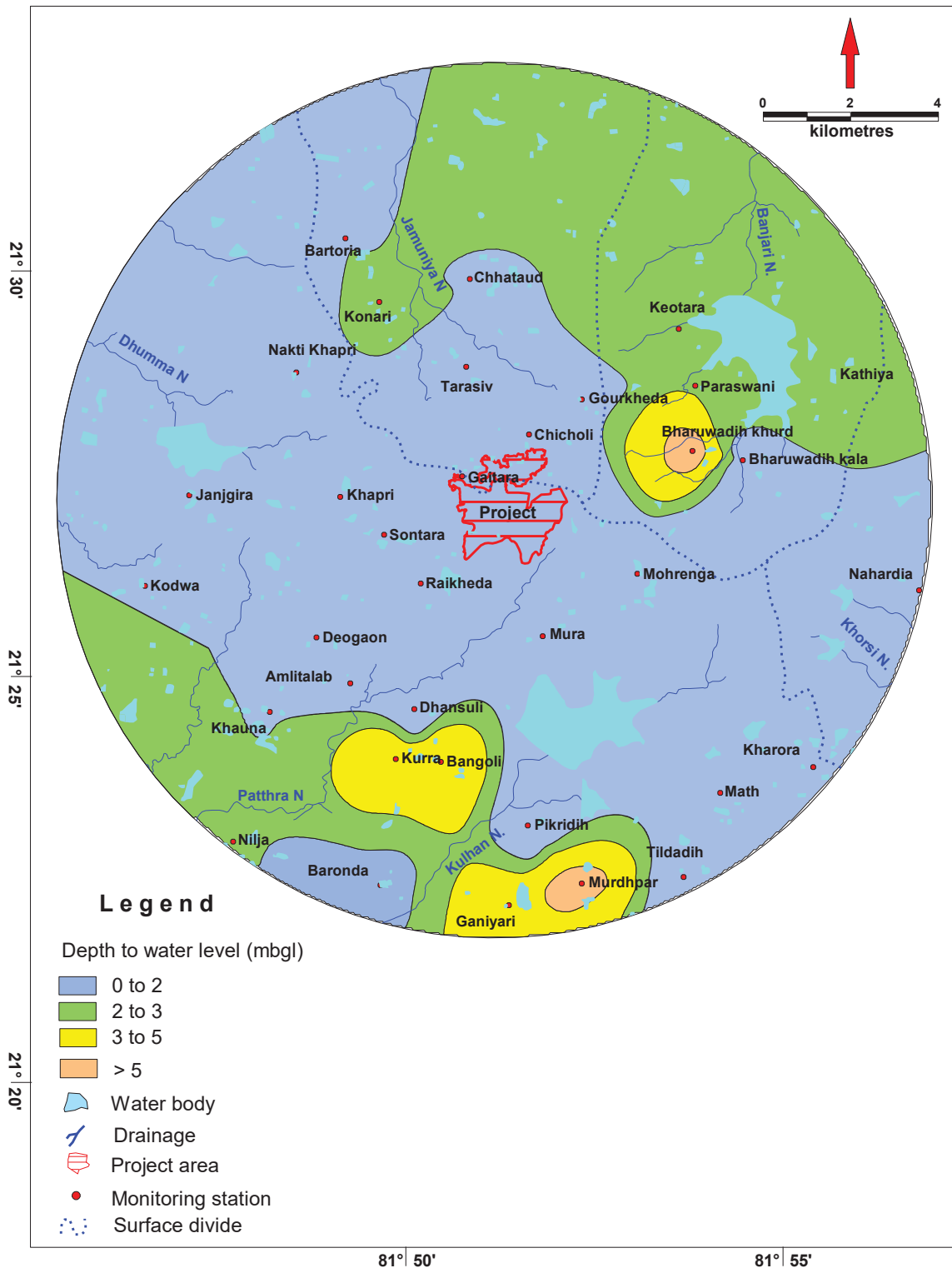
The depth to water level map has been prepared based on ground water monitoring data of Nov 2019. On perusal of the data and map given at Fig.5.1, it is observed that the overall depth to water level remains between 0.45 and 5.8 meters below ground level. The post-monsoon depths to water level range of 3 to 5 mbgl are observed at Kurra, Ganiyari and Bangoli villages. Ground water levels more than 5 mbgl are observed in the villages Bharuwadih khurd of and Murdhpar Water level less than 3 mbgl are observed in the 86 % of the villages and along river courses.

### ***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 2019. From the perusal of Table 5.1, it is observed that the overall depth to water level remains between 2.05 to 12.2 meters below ground level. The pre-monsoon depth to water levels ranges between 5 and 10 mbgl in 63% of the villages. Water levels more than 10 mbgl are observed in the villages namely Kurra, Bharuwadih, Bharuwadihkala, Murdhpar and Ganiyari villages while in mohrenga, Raikheda, Dhansuli, Murra, Deogaon, Amlitalab, MathKhapri and Taraviv showing water level less than 5 mbgl. as shown in Fig 5.2.

### ***5.2.1.3 Seasonal water level fluctuation (Nov.' 2019 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 1.35 to 10.4 meters. Lower range of water level fluctuation is also observed along the river course followed by > 8. 0 to 2, 6 to 8, 2 to 4 & 4 to 6.



**Fig.5.1: Post-monsoon Depth to Water level map (Nov'2019)**

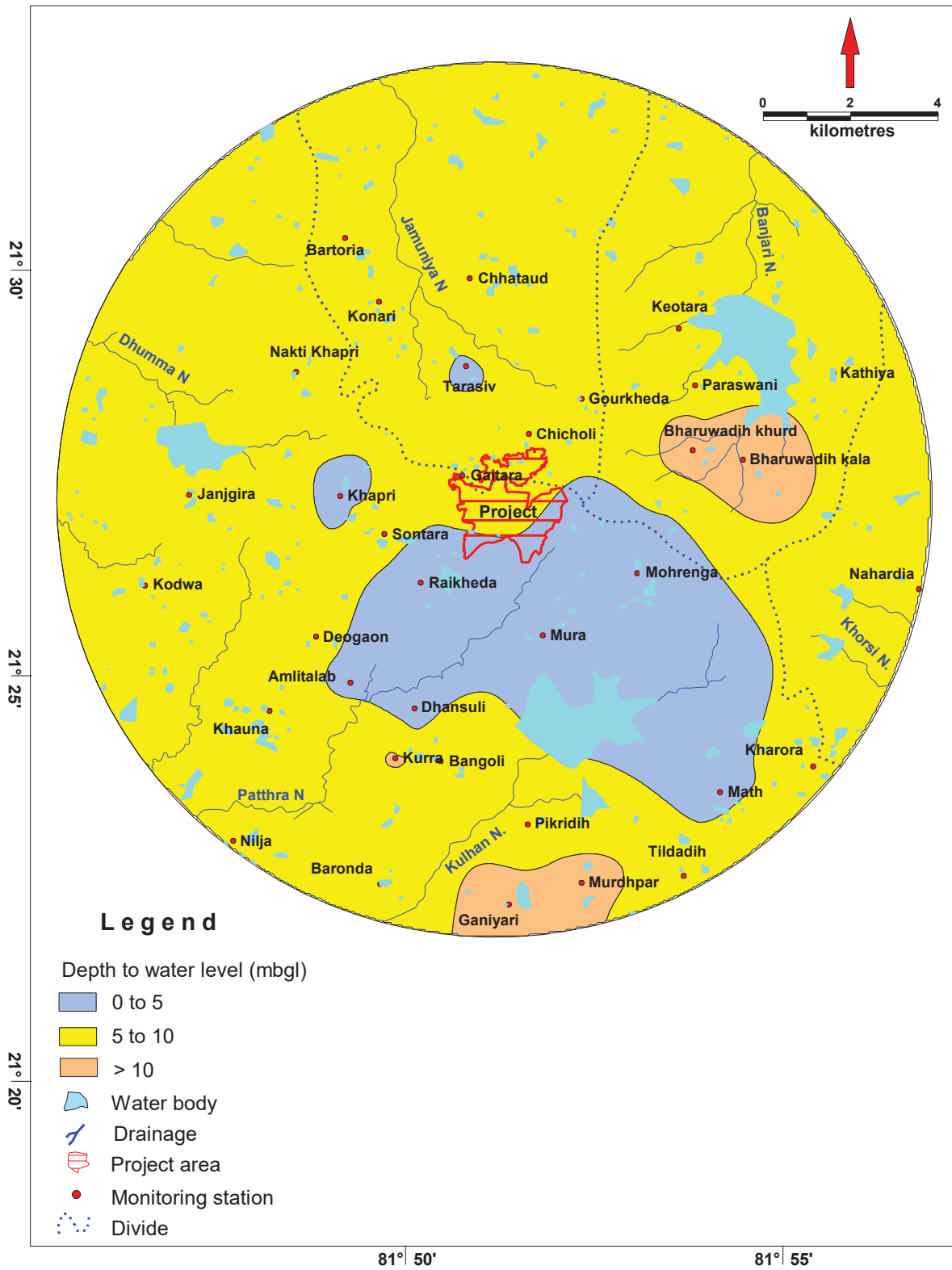
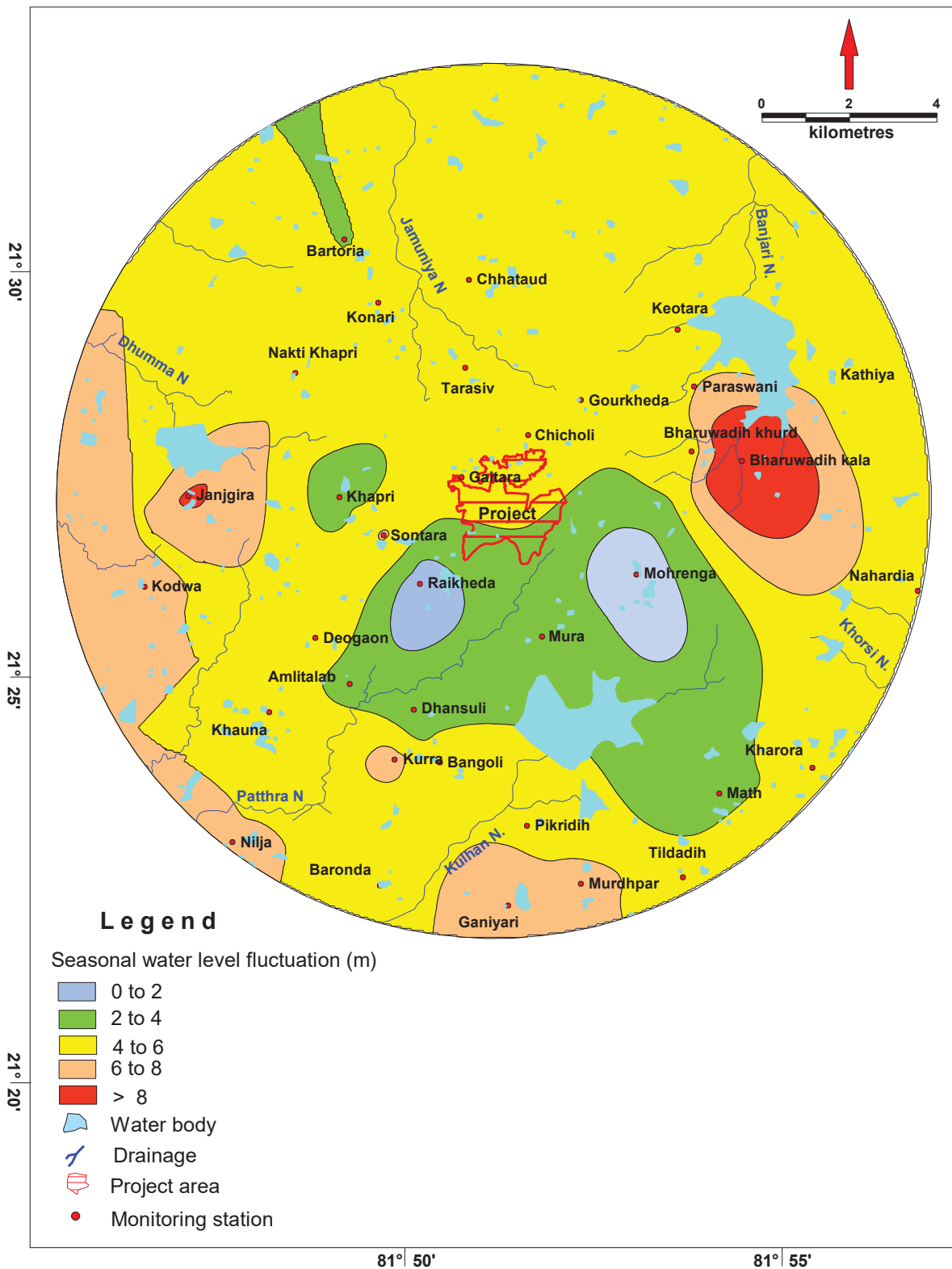


Fig.5.2: Pre-monsoon Depth to Water level map (May'2020)



**Fig 5.3: Seasonal Water Level Fluctuation map (Nov.' 2019 Vs May' 2020)**

### 5.3 AQUIFER PARAMETERS:

The aquifer parameters are essentially required for the estimation of mine seepage as well as planning the ground water withdrawal for open cast mining. Accordingly, pumping test has been carried out for determination of aquifer parameters accurately. The aquifer parameters of study area covered by limestone are described below.

The transmissivity values of phreatic aquifer tapped in open well in general varies from 4 to 8.5 m<sup>2</sup>/day while specific capacity ranges from 15 to 40 lpm/m/day. However for deep aquifer the transmissivity ranges from 15-32 m<sup>2</sup>/day and at places it ranges up to 40m<sup>2</sup>/day. The potential fractures for boreholes up to 100 mbgl depth in the area are recorded at various depths i.e. 40-45, 60-65, 75-80, 90-95 mbgl and are 4 to 5 in numbers.

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 Raikheda village (close to Project). The results and data interpretation is discussed below

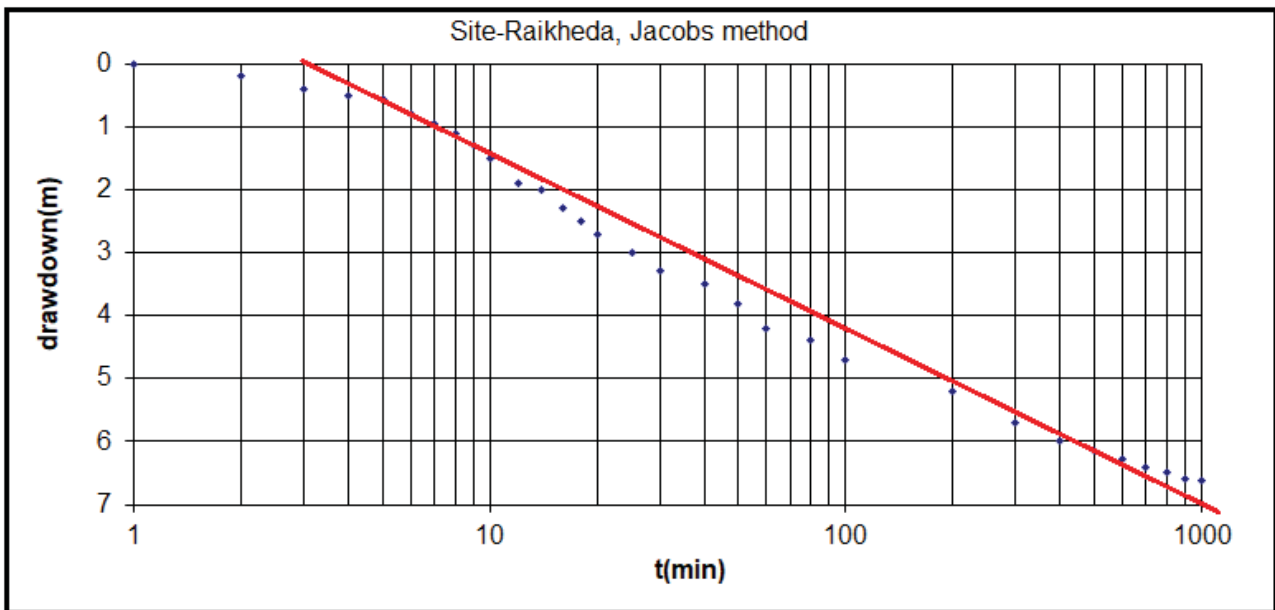
Village	Raikheda
Block	Tilda
District	Raipur
State	Chattisgarh
Date	28/11/2019
Duration of test	1000 minutes
Capacity of pump	5 hp
Distance of OW from pump well	45 m.
Thickness of the aquifer	10
MP(magl)	0.8
SWL(mbmp)	6.5
Discharge(lps)	5

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

$$K = T/b \text{ \&}$$

$$S = 2.25 T t_0/r^2$$

Where,

$T = kD =$  Transmissivity,  $m^2/\text{day}$

$K =$  Permeability

$B =$  Thickness of aquifer

$Q$  = Discharge  $m^3/day$

$r$  = Distance (m) between PW & OW

$\Delta s$  = Slope of straight line per log cycle of time

$S$  = Storage coefficient

$t_0$  = time in days at zero drawdown

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

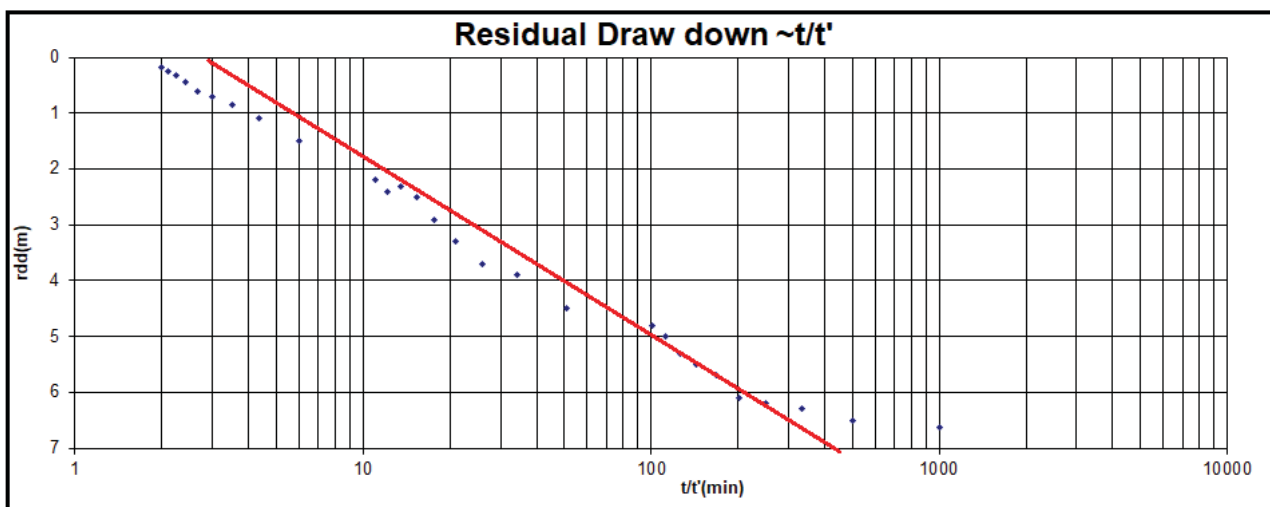
$$T = 30.42 \text{ m}^2/\text{day}, K = 2.3765 \text{ m/day}$$

$$S = 7.041 \times 10^{-5}$$

**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:**

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

$$S = 2.25 T t_0/r^2$$

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

$$T = 30.42 \text{ m}^2/\text{day}, K = 2.3765 \text{ m/day}\&$$

$$S = 7.041 \times 10^{-5}$$

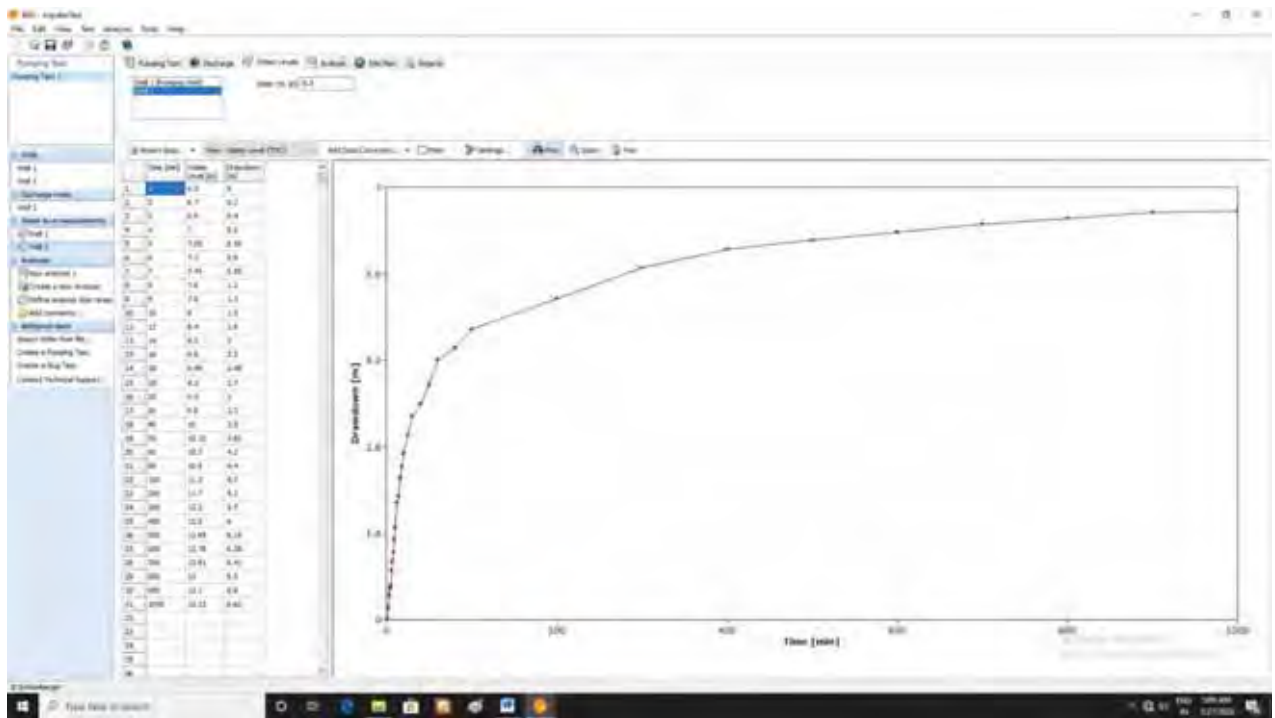
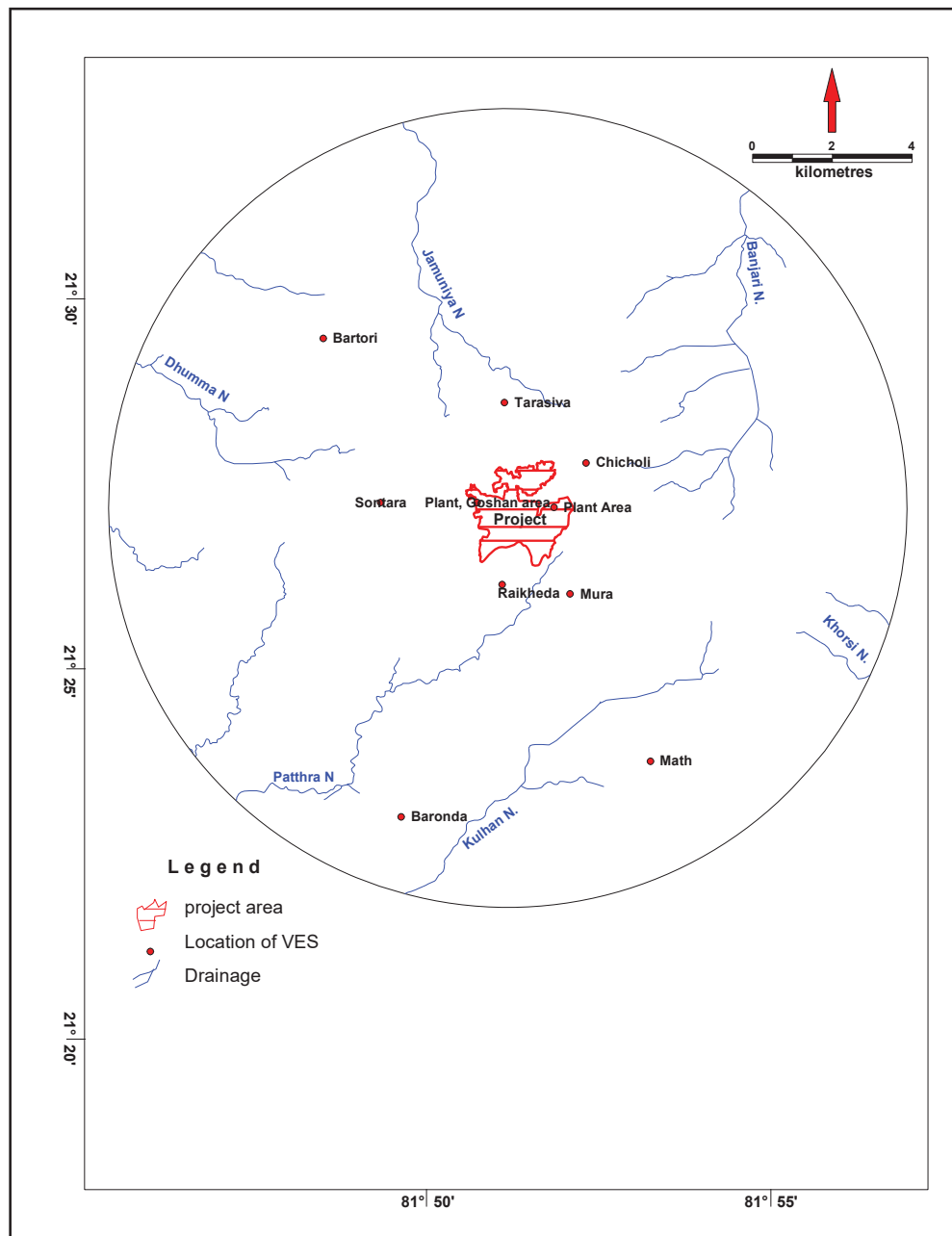


Fig 5.4: Pumping water level data plot in Aquifer test soft ware

## 6. SURFACE GEOPHYSICAL SURVEY

Surface geophysical survey comprised of Ten Vertical Electrical Sounding (VES) have been conducted at ten different locations after S1 during the period 01.07.2020 to 11.07.2020 to know the subsurface condition in parts of Tilda block, Raipur district, Raipur, Chhattisgarh. 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.

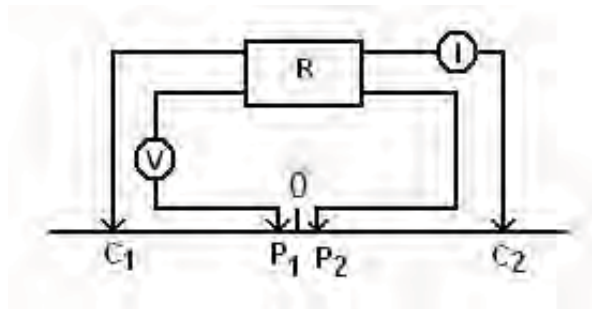
In the electrical resistivity method, a known amount of electrical current ( $I$ ) is sent into the ground through a pair of electrode (called current electrodes) and the potential ( $\delta V$ ) developed because of the resistance offered by the subsurface due to the passage of this current is measured 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 " $\rho_a$ " is computed. Both the parameters, apparent resistivity ' $\rho_a$ ' and the resistance 'R' contain the information on the geoelectric 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 center 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:  $\rho_a = \pi R \left\{ \left( \frac{C_1 C_2}{2} \right)^2 - \left( \frac{P_1 P_2}{2} \right)^2 \right\} / P_1 P_2$  or  $\rho_a = KR$

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

$C_1 C_2$  is current electrode spacing

$P_1 P_2$  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 nine Vertical Electrical Sounding (VES) has been conducted at ten different locations during the period 01.07.2020 to 11.07.2020 to identify the subsurface condition of the study 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- $C_1C_2/2$  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 interpreted results are given in the table 6.3. The field curves of VES are given in Fig 6.3, 6.4, 6.5 ..... 6.12 and the field data of VES are shown in Table 6.1 and 6.2.

### **6.4 Discussion of result**

A total 10 numbers of VES has been carried out at various villages of the study area (Details of locations is given in fig.6.1). Aquameter CRM 500 Resistivity meter has been used for conducting the VES. Schlumberger and half Schlumberger configurations have been used for conducting the VES survey. The maximum current electrode spread for conducting VES was 240m (AB). Location of VES points are given below in fig.-6.1.



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 the resistivity and thickness of different layers are given in table 6.3.

**VES-1:**

It is a HA type curve and it has four layer. The topmost layer having resistivity value of 112  $\Omega$ -m may be laterite whereas the second layer may be weathered limestone with resistivity of 23.5  $\Omega$ -m. The third layer may be fractured limestone with resistivity of 110  $\Omega$ -m while, the last layer may be massive limestone having resistivity of 1405  $\Omega$ -m. The thickness of topmost layer was 1.7 m and the second layer & third layer thickness were 5.4 and 4.8 m respectively.

**VES-2:**

It is also a HA type curve and it has four layer. The topmost layer having resistivity value of 50  $\Omega$ -m may be top soil whereas the second layer may be weathered limestone with resistivity of 10.5  $\Omega$ -m. The third layer may be highly fractured limestone with resistivity of 28  $\Omega$ -m while, the last layer may be massive limestone having resistivity of 235  $\Omega$ -m. The thickness of topmost layer was 1.5 m and the second layer & third layer thickness were 18 and 16 m respectively.

**VES-3:**

It is also a HA type curve and it has four layer. The topmost layer having resistivity value of 215  $\Omega$ -m is lateritic soil whereas the second layer is weathered limestone with resistivity of 30  $\Omega$ -m. The third layer may be fractured limestone with resistivity of 125  $\Omega$ -m while, the last layer may be massive limestone having resistivity of 550  $\Omega$ -m. The thickness of topmost layer is 2.1 m and the second layer & third layer thickness were 14.3 and 10.4 m respectively.

**VES-4:**

It is a QH type curve and it has four layers. The topmost layer having resistivity value of 175  $\Omega$ -m is lateritic soil whereas the second layer is weathered limestone with resistivity of 62  $\Omega$ -m. The third layer may be highly fractured limestone with resistivity of 16.5  $\Omega$ -m while, the last layer may be massive limestone having resistivity of 175  $\Omega$ -m. The thickness of topmost layer is 1.3 m and the second layer & third layer thickness were 5 and 32 m respectively.

**VES-5:**

It is also a QH type curve and it has four layer. The topmost layer having resistivity value of 170  $\Omega$ -m is lateritic soil whereas the second layer is weathered limestone with resistivity of 30  $\Omega$ -m. The third layer may be highly fractured limestone with resistivity of 14  $\Omega$ -m while, the last layer may be massive limestone having resistivity of 165  $\Omega$ -m. The thickness of topmost layer is 1.5 m and the second layer & third layer thickness were 4 and 16.5 m respectively.

**VES-6:**

It is also a QH type curve and it has four layers. The topmost layer having resistivity value of 105  $\Omega$ -m is lateritic soil whereas the second layer is weathered limestone with resistivity of 23  $\Omega$ -m. The third layer may be highly fractured limestone with resistivity of 13  $\Omega$ -m while, the last layer may be massive limestone having resistivity of 105  $\Omega$ -m. The thickness of topmost layer is 1.8 m and the second layer & third layer thickness were 2 and 18 m respectively.

**VES-7:**

It is also a QH type curve and it has four layers. The topmost layer having resistivity value of 245  $\Omega$ -m is lateritic soil whereas the second layer is weathered limestone with resistivity of 78  $\Omega$ -m. The third layer may be highly fractured limestone with resistivity of 19  $\Omega$ -m while, the last layer may be massive limestone having resistivity of 220  $\Omega$ -m. The thickness of topmost layer is 1.8 m and the second layer & third layer thickness were 3.5 and 16 m respectively.

**VES-8:**

It is a HA type curve and it has four layer. The topmost layer having resistivity value of 115  $\Omega$ -m is lateritic soil whereas the second layer is weathered limestone with resistivity of 17  $\Omega$ -m. The third layer may be fractured limestone with resistivity of 120  $\Omega$ -m while, the last layer may be massive limestone having resistivity of 285  $\Omega$ -m. The thickness of topmost layer is 1.5 m and the second layer & third layer thickness were 8.5 and 11.3 m respectively.

**VES-9:**

It is also a HA type curve and it has four layer. The topmost layer having resistivity value of 50  $\Omega$ -m is top soil whereas the second layer is weathered limestone with resistivity of 22.5  $\Omega$ -m. The third layer may be fractured limestone with resistivity of 30  $\Omega$ -m while, the last layer may be limestone having

resistivity of 65  $\Omega$ -m. The thickness of topmost layer is 1.3 m and the second layer & third layer thickness were 10.6 and 21.2 m respectively.

**VES-10:**

It is also a QH type curve and it has four layers. The topmost layer having resistivity value of 75  $\Omega$ -m is lateritic soil whereas the second layer is weathered limestone with resistivity of 38  $\Omega$ -m. The third layer may be highly fractured limestone with resistivity of 12.5  $\Omega$ -m while, the last layer may be massive limestone having resistivity of 160  $\Omega$ -m. The thickness of topmost layer is 2.8 m and the second layer & third layer thickness were 2.5 and 8.2 m respectively.

**6.5 Conclusions & Recommendations**

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

The thickness of lateritic topsoil varies from 1.3 meter to 2.8 meters with resistivity range from 50 $\Omega$ -m to 245  $\Omega$ -m.

The thickness of weathered formation varies from 2.0 meter to 14.3 meters and the resistivity range is 10.5  $\Omega$ -m to 78  $\Omega$ -m.

Third layer mostly indicates fracture zones and the thickness of this layer varies from 4.8 meters to 23.2 meters and resistivity range is 13 $\Omega$ -m to 125  $\Omega$ -m.

The last layer is massive formation which shows high electrical resistivity with the range of 65  $\Omega$ -m to 550  $\Omega$ -m.

<b>Table-6.1: VES Data</b>				
<b>VES 1</b>	<b>VES 2</b>	<b>VES 3</b>	<b>VES 4</b>	<b>VES 5</b>
<b>Location:</b> <b>Mura</b>	<b>Location:</b> <b>Chicholi</b>	<b>Location:</b> <b>Bartori</b>	<b>Location:</b> <b>Tarsiva</b>	<b>Location:</b> <b>Baronda</b>
Latitude: N21°26' 17.52"	Latitude: N21°27' 46.93"	Latitude: N 21° 29' 27.83"	Latitude: N 21° 28' 35.50"	Latitude: N 21° 23' 04.37"
Longitude: E 81° 52' 04.72"	Longitude: E 81° 52' 19.08"	Longitude: E 81° 48' 29.82"	Longitude: E 81° 51' 08.38"	Longitude: E 81° 49' 37.50"

Date:		Date:		Date:		Date:		Date:	
Altitude: 303 m		Altitude: 314m		Altitude: 299m		Altitude: 310m		Altitude: 286m	
AB/2	App. R	AB/2	App. R	AB/2	App. R	AB/2	App. R	AB/2	App. R
2	98.69	2	37.57	2	205.53	2	268.75	2	224.69
3	74.32	3	34.38	3	153.85	3	179.55	3	174.34
4	58.50	4	26.14	4	121.97	4	127.57	4	131.31
5	47.81	5	19.52	5	94.65	5	92.70	5	102.46
6	38.02	6	15.49	6	76.03	6	70.40	6	76.03
8	32.60	8	12.54	8	52.67	8	45.14	8	42.64
10	35.30	10	11.77	10	43.14	10	62.76	10	23.53
12	39.68	12	11.70	12	35.78	12	47.75	12	15.25
14	44.12	14	11.77	14	35.53	14	36.38	14	11.77
16	48.26	16	11.23	16	33.31	16	31.04	16	10.30
18	53.93	18	12.48	18	36.66	18	30.31	18	11.77
20	57.64	20	11.03	20	38.38	20	26.26	20	12.94
25	66.60	25	13.84	25	49.25	25	23.53	25	15.65
30	68.64	30	14.98	30	55.27	30	16.98	30	18.91
35	77.90	35	15.40	35	67.37	35	19.62	35	23.34
40	80.94	40	16.85	40	77.37	40	21.39	40	26.26
45	81.14	45	18.40	45	77.20	45	22.17	45	27.79
50	80.33	50	20.12	50	86.85	50	24.70	50	30.57
60	96.70	60	23.71	60	112.90	60	24.77	60	40.84
70	92.30	70	27.12	70	119.75	70	31.08	70	46.66
80	94.23	80	30.40	80	136.21	80	34.26	80	52.90
90	102.56	90	34.84	90	159.66	90	37.29	90	60.10
100	116.34	100	38.45	100	148.19	100	41.02	100	67.08

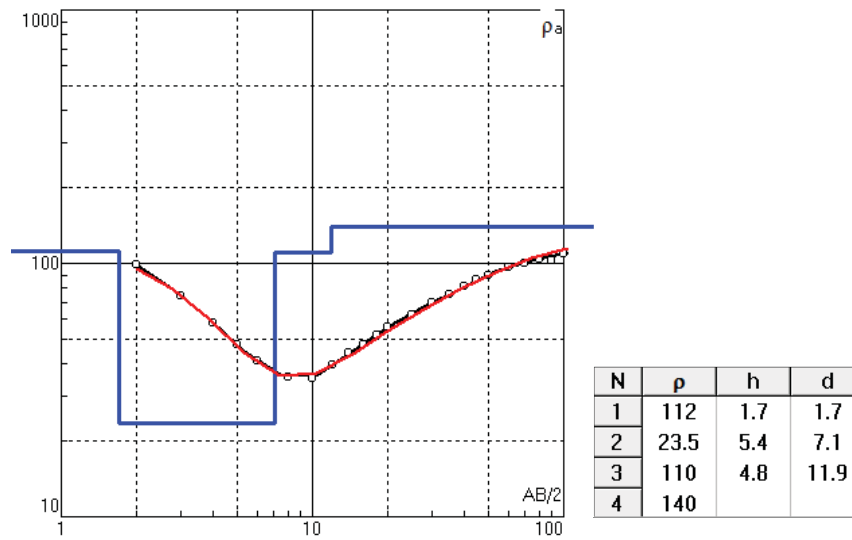
**Table-6.2: VES Data**

VES 6	VES 7	VES 8	VES 9	VES 10
Location: Raikheda	Location: Math	Location: Sontara	Location: Plant Area	Location: Plant Area

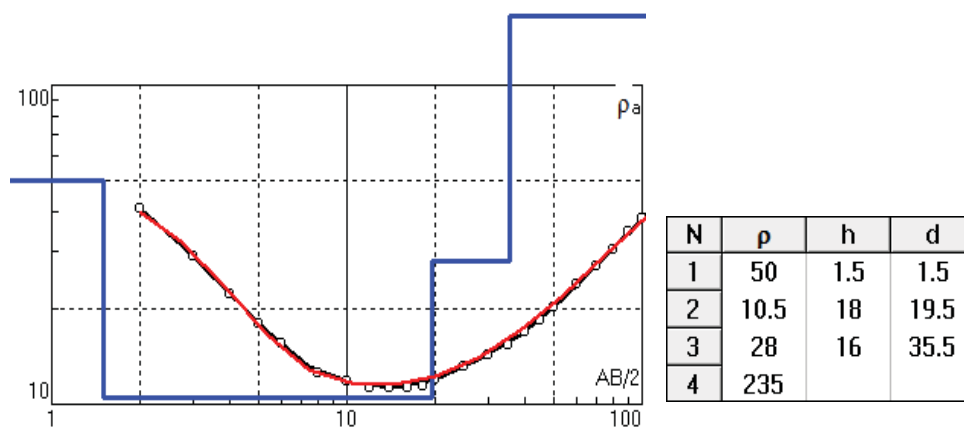
						<b>(Pump House)</b>		<b>(Goshan Area)</b>	
Latitude: N 21° 27' 19.50"		Latitude: N 21° 23' 44.91"		Latitude: N 21° 27' 15.25"		Latitude: N 21° 27' 10.55"		Latitude: N 21° 27' 15.19'	
Longitude: E 81° 50' 20.11"		Longitude: E 81° 53' 14.98"		Longitude: E 81° 49' 20.11"		Longitude: E 81° 51' 50.69"		Longitude: E 81° 50' 43.66"	
Date:		Date:		Date:		Date:		Date:	
Altitude: 311m		Altitude: 302m		Altitude: 301m		Altitude: 305m		Altitude: 308m	
<b>AB/2</b>	<b>App.</b>	<b>AB/2</b>	<b>App.</b>	<b>AB/2</b>	<b>App.</b>	<b>AB/2</b>	<b>App.</b>	<b>AB/2</b>	<b>App. R</b>
2	171.12	2	211.86	2	232.99	2	33.80	2	72.88
3	134.06	3	169.14	3	143.43	3	26.74	3	69.46
4	102.06	4	143.13	4	98.95	4	25.51	4	67.83
5	72.21	5	121.00	5	63.43	5	24.40	5	58.55
6	50.69	6	101.38	6	45.06	6	25.34	6	52.10
8	27.59	8	67.72	8	35.11	8	27.59	8	40.13
10	19.61	10	50.99	10	39.22	10	27.46	10	35.30
12	14.79	12	36.15	12	37.01	12	26.69	12	28.96
14	16.23	14	28.33	14	41.53	14	28.29	14	26.47
16	15.98	16	24.17	16	45.42	16	28.39	16	25.10
18	14.88	18	21.24	18	49.99	18	33.28	18	26.96
20	17.02	20	21.32	20	57.10	20	30.33	20	27.30
25	19.25	25	23.82	25	59.70	25	25.21	25	28.54
30	20.20	30	28.42	30	79.67	30	26.08	30	34.32
35	20.52	35	31.89	35	84.98	35	27.18	35	39.22
40	22.44	40	36.74	40	97.20	40	26.76	40	41.18
45	23.94	45	43.11	45	101.17	45	26.83	45	45.76
50	25.39	50	48.23	50	116.43	50	28.03	50	48.53
60	29.54	60	59.11	60	133.82	60	28.77	60	58.42
70	34.73	70	69.09	70	157.82	70	29.06	70	63.73
80	36.15	80	81.91	80	177.55	80	30.16	80	62.74
90	39.92	90	91.63	90	201.04	90	32.67	90	66.39
100	44.46	100	101.13	100	209.26	100	33.46	100	65.72

**Table-6.3: Interpreted Results of VES**

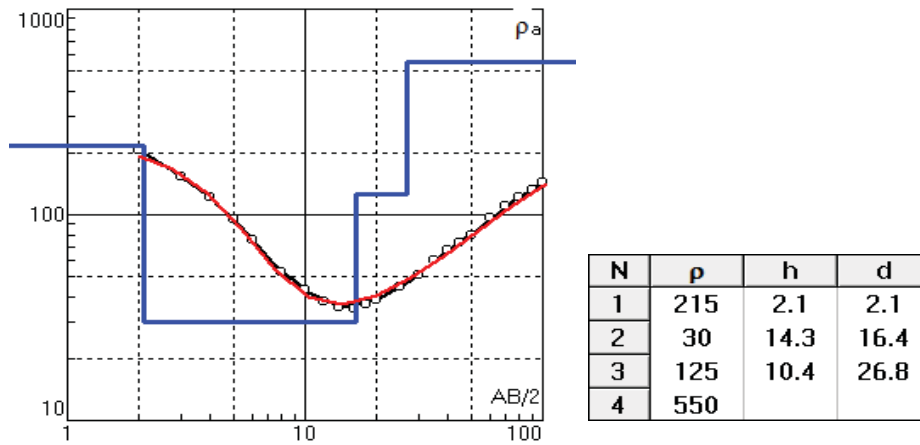
VES No	Layer Resistivity(in Ohm-m)				Layer Thickness(in m)		
	$\rho_1$	$\rho_2$	$\rho_3$	$\rho_4$	$h_1$	$h_2$	$h_3$
VES-1	112	23.5	110	140	1.7	5.4	4.8
VES-2	50	10.5	28	235	1.5	18.0	16.0
VES-3	215	30	125	550	2.1	14.3	10.4
VES-4	175	62	16.5	175	1.3	5.0	32.0
VES-5	170	30	14	165	1.5	4.0	16.5
VES-6	105	23	13	105	1.8	2.0	18.0
VES-7	245	78	19	220	1.8	3.5	16.0
VES-8	115	17	120	285	1.5	8.5	11.3
VES-9	50	22.5	30	65	1.3	10.6	21.2
VES-10	75	38	12.5	160	2.8	2.5	8.2



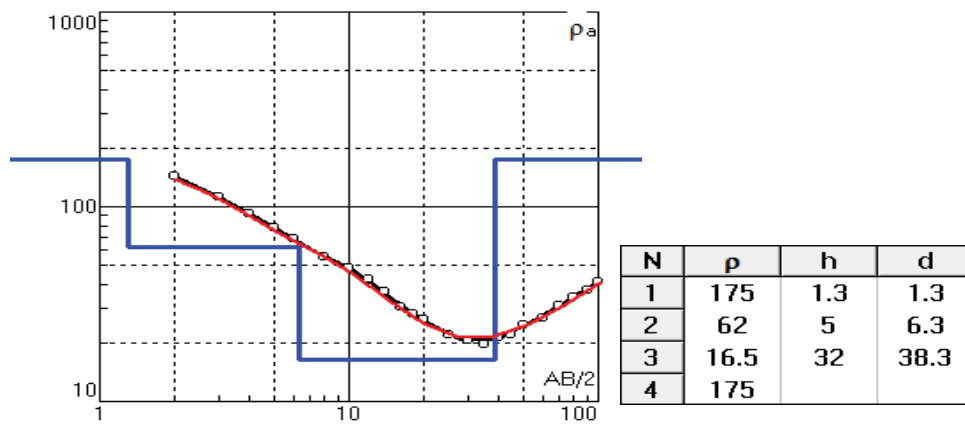
**Fig-6.3: VES Curve and interpreted results at Mura (VES 1)**



**Fig-6.4: VES Curve and interpreted results at Chicholi (VES 2)**

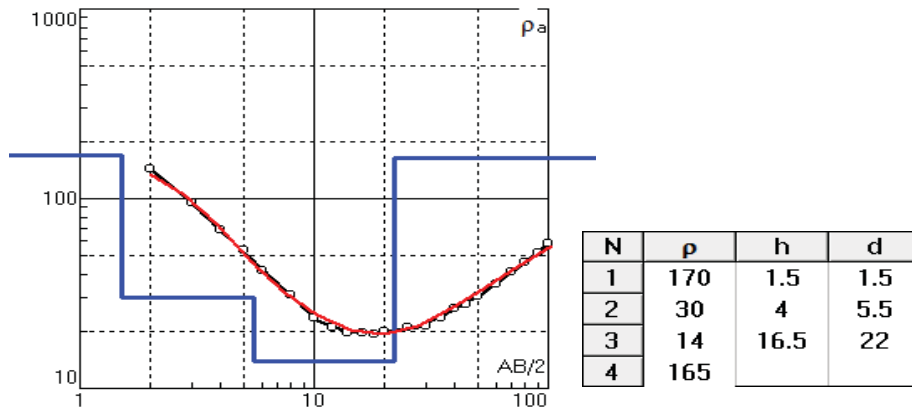


**Fig-6.5: VES Curve and interpreted results at Bartori (VES 3)**



**Fig-6.6: VES Curve and interpreted results at Tarsiva (VES 4)**





6.7: VES Curve and interpreted results at Baronda - (VES 5)

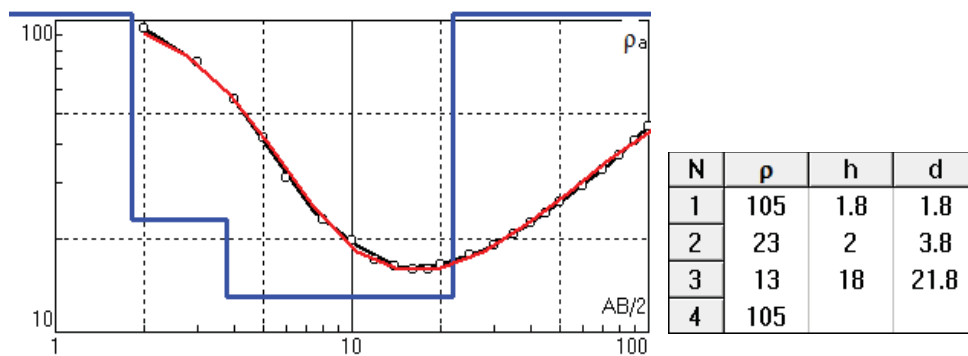
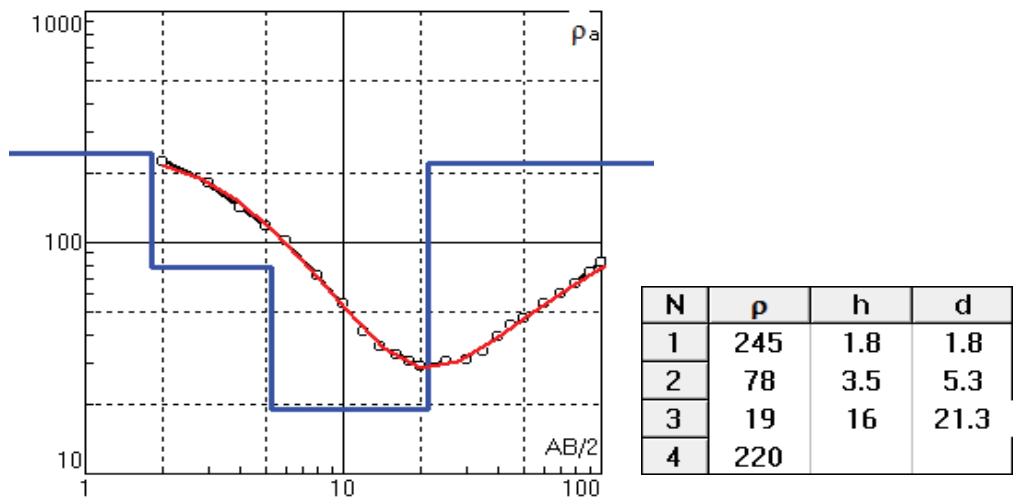
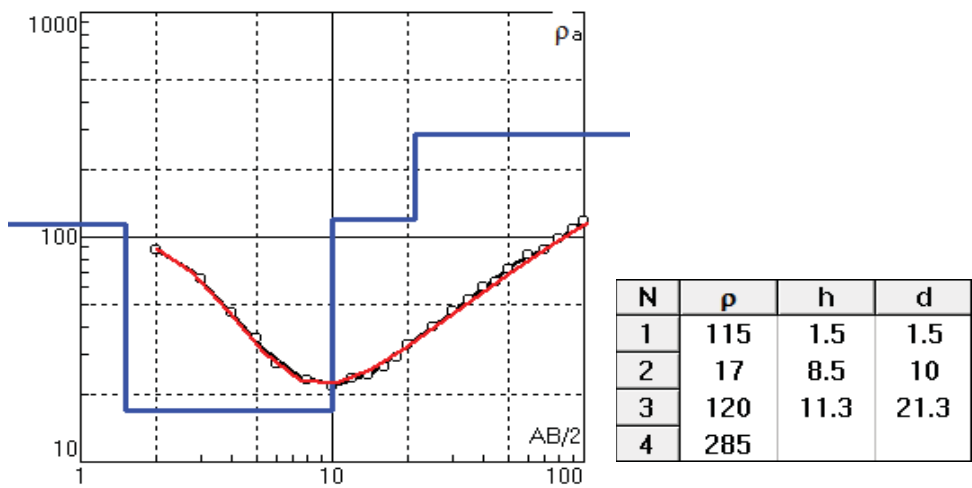


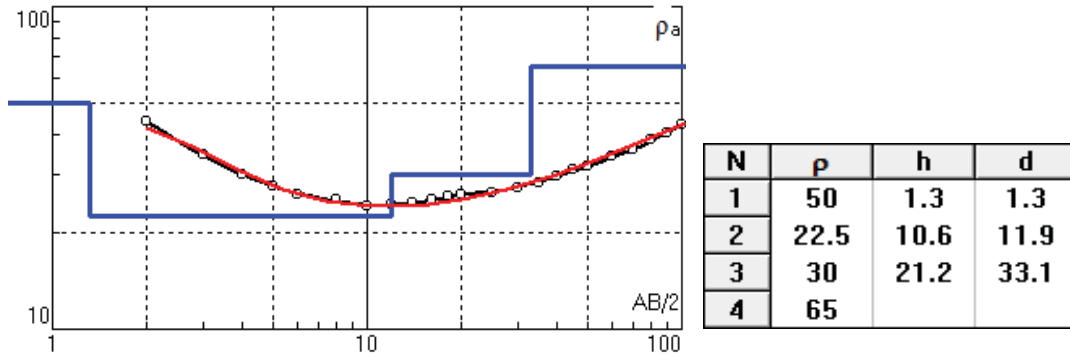
Fig-6.8: VES Curve and interpreted results at Raikheda - (VES 6)



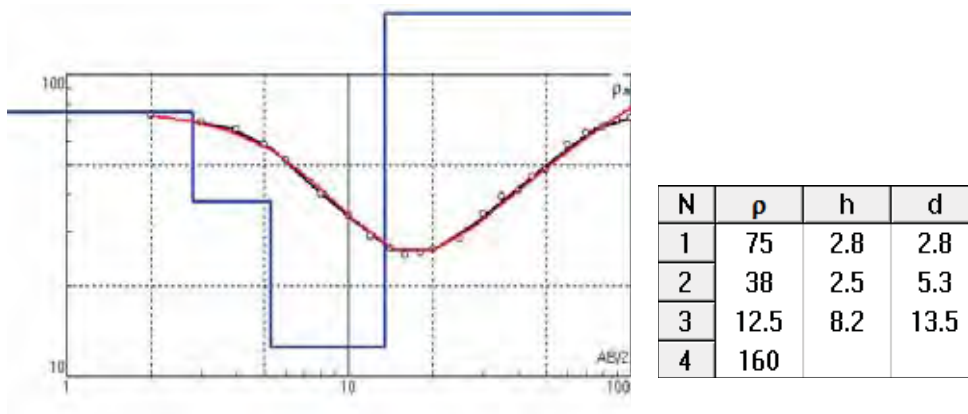
**Fig-6.9: VES Curve and interpreted results at Math(VES 7)**



**Fig-6.10: VES Curve and interpreted results at Sontara(VES8)**



**Fig-6.11: VES Curve and interpreted results at Plant Area (Pump House)(VES 9)**



**Fig-6.12: VES Curve and interpreted results at Plant Area (Goshan Area) (VES10)**

**FIG 6.13: PHOTOGRAPHS OF GEOPHYSICAL SURVEY IN VARIOUS VILLAGES IN STUDY AREA**









## 7. GROUND WATER RESOURCES

The ground water resources for the study area were assessed as per methodology recommended by ground water estimation committee'2015. The resources were calculated by Infiltration method due to non-availability of long term water level data and fluctuation in the area. The rain fall recharge was calculated by Rainfall Infiltration method. Domestic water requirement has been estimated based on population as per Census 2011 by taking the average per capita consumption as 60 liter per day by considering 100% dependence of total population on ground water. The ground water draft for irrigation was calculated from number of ground water abstraction structure.

### 7.1: GROUND WATER RECHARGE:

- a) Total geographical area in ha. = 31400
- b) Area not suitable for ground recharge in ha. =Nil
- c) Area suitable for ground recharge in ha. =31400
- d) Average water level:

Pre-monsoon = 6.81mbgl.

Post-monsoon = 1.88mbgl.

- e) Normal annual rain fall = 1.04 m.
- f) Normal monsoon rain fall = 0.88 m.
- g) Normal non monsoon rain fall = 0.16 m
- h) Ground Water Recharge by rain fall infiltration method - The rain fall infiltration factors for different formations have been taken as those recommended by GEC 2015 .The equation used for computation of recharge is

$$R_{rf} = NAR \times A \times RFI$$

Where,

$R_{rf}$  = Recharge from rainfall

NAR = Normal annual rain fall

A = Area of the unit in ha



RIF = Rain fall infiltration factor

Recharge from rainfall =  $1.04 \times 31400 \times 0.06$

= 1959.36 ham.

Return seepage from surface water irrigation

Crop type	Area irrigated (ha)	Average depth of water applied (m)	Irrigation water applied (ham)	Water delivered at 80% efficiency	Seepage factor	Seepage (ham)
Paddy	3239	0.4	1295.6	1619.5	0.4	647.8

**i) Seepage from tanks/ ponds**

No of tanks = 278

Total water spreaded area in ha = 1570

Seepage factor (m/year) = 0.6

Total non monsoon seepage (ham) = 942

**j) Annual ground water recharge =**

Rainfall recharge + Seepage from irrigation + Recharge from tanks/ponds

=  $1959.36 + 647.8 + 942$

= 3549.16 ham

**K) Annual Extractable Ground Water Recharge**

Annual Extractable Ground Water Recharge has been computed by deducting the unaccounted natural discharge from the total annual recharge as per the criteria recommended by GEC'2015. In the study area 10% of replenishable ground water is considered to deduct from total recharge as it goes as base flow.

Annual Extractable Ground Water Recharge = Total annual recharge - Base flow

=  $3549.16 \text{ ham} - 354.9 \text{ ham}$

= 3194.26 ham

## 7.2: ANNUAL GROUND WATER EXTRACTION:

### 7.2.1: Domestic purposes:

Water draft has been estimated based on population. The average per capita consumption has been taken as 60 liters per day by considering 100% dependence on the ground water. The total annual demand is calculated as follows

$$\begin{aligned}\text{Total annual demand in ham} &= \text{Population} \times 60 \times 365 / 1000 \times 1000 \\ &= 90074 \times 60 \times 365 / 1000 \times 1000 \\ &= 197.26 \text{ ham}\end{aligned}$$

### 7.2.2: Ground water draft for irrigation:

Ground water draft for irrigation was calculated from number of ground water abstraction structures present in the area.

Ground water structure	No of G W structure	Unit draft in ham	Gross extraction in ham
Dug wells	520	1.0	520
Tube wells	500	2.0	1000

### 7.3: Ground water balance (ham) :

$$\begin{aligned}&= \text{Annual Extractable Ground Water Recharge} - \text{Gross ground water extraction} \\ &= 3194.26 \text{ ham} - 1717.26 \text{ ham} \\ &= 1477.0 \text{ ham}\end{aligned}$$

From the above it may be seen that the balance ground water resources in the area is of the order of 1477 ham

### 7.4: Stage of ground water Extraction:

$$\begin{aligned}&= \text{Gross ground water extraction} \times 100 / \text{Annual extractable ground water recharge} \\ &= 1717.26 * 100 / 3194.26 = 53.76 \%\end{aligned}$$

According to recommended methodology stage of ground water extraction below 70% is considered safe under all circumstances whereas stage of extraction up to 90% is considered safe, if the long-term water levels do not show any declining trends. So the present study area is come in “SAFE” category.

## **8. 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 – **3439950 sq.m.**

Rainfall – 1145 mm. (60-65 rainy days)

Formations –Laterite and Limestone.

**A. Runoff Available for Recharge:**

S. N.	Land use type	Area (m <sup>2</sup> )	Rainfall (m)	Amount of water that received Through Rain (Cub meter)	Co-efficient of runoff	Quantity of Rainwater (m <sup>3</sup> )
1.	Building/ sheds	1719975	1.14	1960771.5	0.85	1666655.77
2.	Green belt area Approx.	1133160	1.14	1291802.4	0.15	193770.36
3.	Open land area	343995	1.14	392154.3	0.20	78430.86
4.	Road area	242820	1.14	276814.8	0.65	179929.62
5.	Total Area	<b>3439950</b>	.....	.....	.....	<b>2118786.61</b>
6.	Assuming 10% is not Suitable for recharge, hence available quantum of Rain water for Recharge is about <b>1906907.95m<sup>3</sup></b> [90% <b>2118786.61 m<sup>3</sup></b> ]					

From the above, it is observed that a total potential of **1906907.95** cum of rainfall runoff can be harvested at feasible, viable and sustainable location annually.

### B. Estimation of Peak Rain fall Runoff:

Sr. No.	Type of land-use	Area [in m <sup>2</sup> ]	Peak Rainfall [in m/ hour]	Coefficient of runoff	Rain water collected [in m <sup>3</sup> / hour]	Runoff for 15 min peak intensity (Cu.Mtr)
1.	Building/ sheds	1719975	0.035	0.85	51169.25	12792.31
2.	Green belt area	1133160	0.035	0.15	5949.09	1487.27
3.	Open land area	343995	0.035	0.20	2407.96	601.99
4.	Road area	242820	0.035	0.65	5524.15	1381.03
5.	Total Area	<b>3439950</b>	---	.....		16262.6
6.	Assuming 10% is not suitable for recharge, hence available quantum of Rain water for recharge is about <b>14636.34 m<sup>3</sup></b> [90% of <b>16262.6 m<sup>3</sup></b> ]					

### 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.

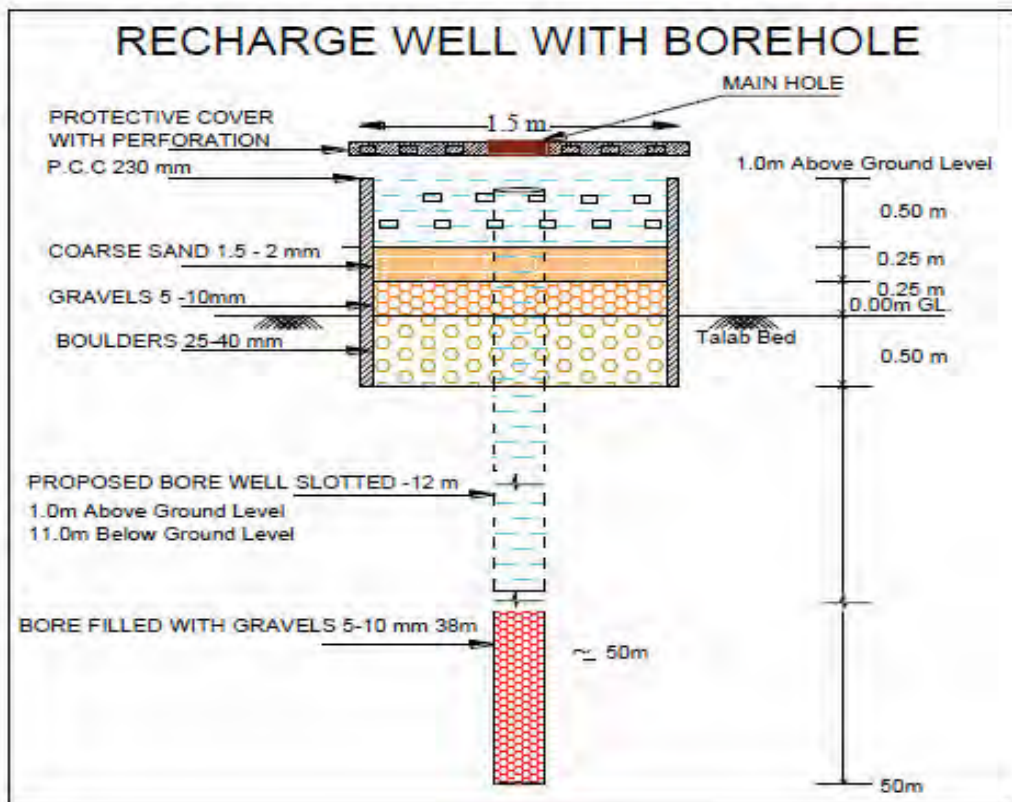
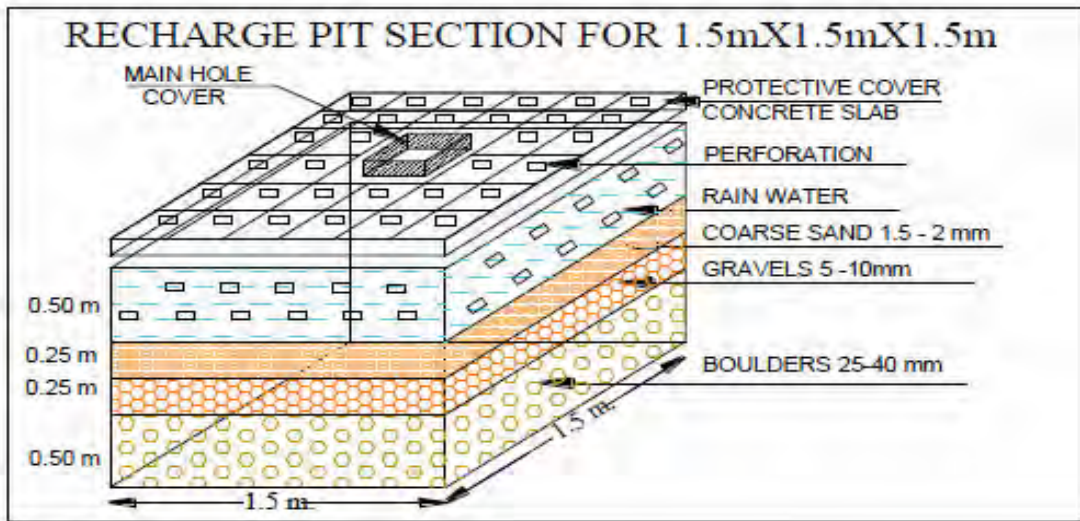
The increasing stress on ground water needs, preventive measures like rain water harvesting structures and recharge measures are to be taken. It has been found that the plant areas of M/S Raipur Energen Limited offers enough scope and options for rain water harvesting and recharge measures. In view of 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 **1906907.95** 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.

percolation pits may be with dimension as 1 m (length) x 1 m (width) x 2 m (depth) with 8" dia. injection well of 90 m depth having 8" plain pipe up to 6 m depth Thereafter, 7" dia. necked borehole in rock may be made up to 84 m depth by DTH drilling machine. Each structure made at minimum spacing of 100 m may be made capable of recharging 195 m<sup>3</sup>/day by each pit. The inlet of the structure may be kept 1 m above pond bed leaving, 1 m water column for settlement of silt/dust etc. The annual cleaning/ removal of silt/ dust from the pond bed are suggested before monsoon for efficient working of system. We have already two no's of Recharge pond to recharge the ground water of the study area.

**RECHARGE PIT:** On the bed of recharge pit of 1.5m x 1.5m x 1.50m will be constructed as per design of pit given in **Figure 8.1**.



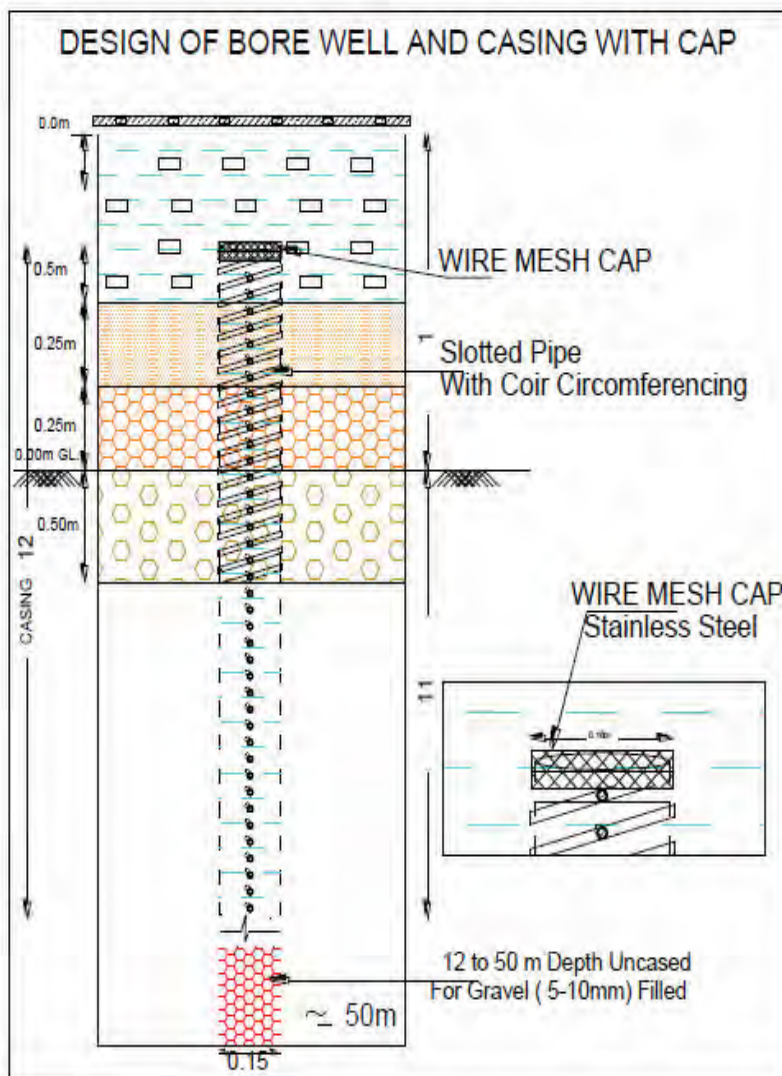
**Fig 8.1** Recharge pit with bore well



**BOREWELLDISIGN:**

The depth of each new bore well will be 90m. The depth of bore well will be 90m below ground level and one meter above ground level that is pit bed. The diameter of bore well will be 150 mm. The cased portion will be top 06 meter and remaining 84 m will be uncased filled with gravel.

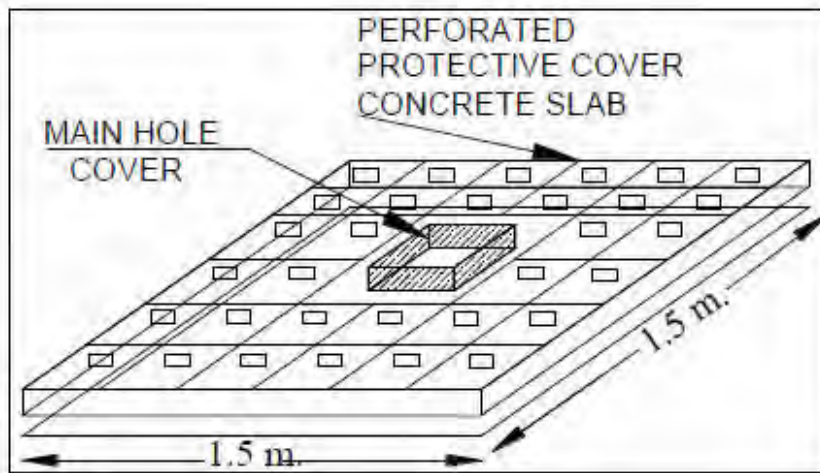
The casing of bore wells are slotted down to the depth of 6.00 m. the upper portion of casing above bottom of recharge pit is only 1.00m. This portion will be circumference with coir rope so that entry of fine sand and sl it can be avoided. The top of casing should be capped with stain less steel wire mesh so that clear water can be recharged directly without any floating particle. The relevant design is placed **Figure 8.2**



**Fig 8.2: Bore well design**

### COVER TO RECHARGE PIT:

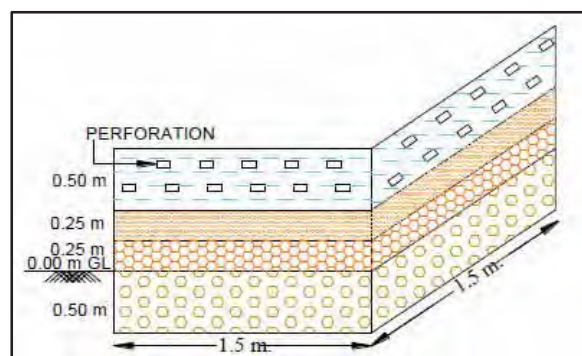
The cover for recharge pit is essential. The rain water harvesting is proposed to catch monsoon months. The recharge pit cover also safe guards the external pollutant like leaf and other local material. It is strongly recommend covering recharge pit by concrete slab with perforation. The design of recharge pit cover is exhibited in design at **Figure No 8.3.**



**Fig 8.3 Design of recharge pit cover**

### SIDEWELLOFRECHARGE PIT:

The all four side wall of recharge pit will be perforated down to the depth of 0.50 m from top. The area occupied by perforated portion is in clear water above filter media filling. The design of recharge pit wall is given in **Figure8.4**



**Fig 8.4 Perforation in side wall of recharge pit**

## 9. GROUND WATER QUALITY

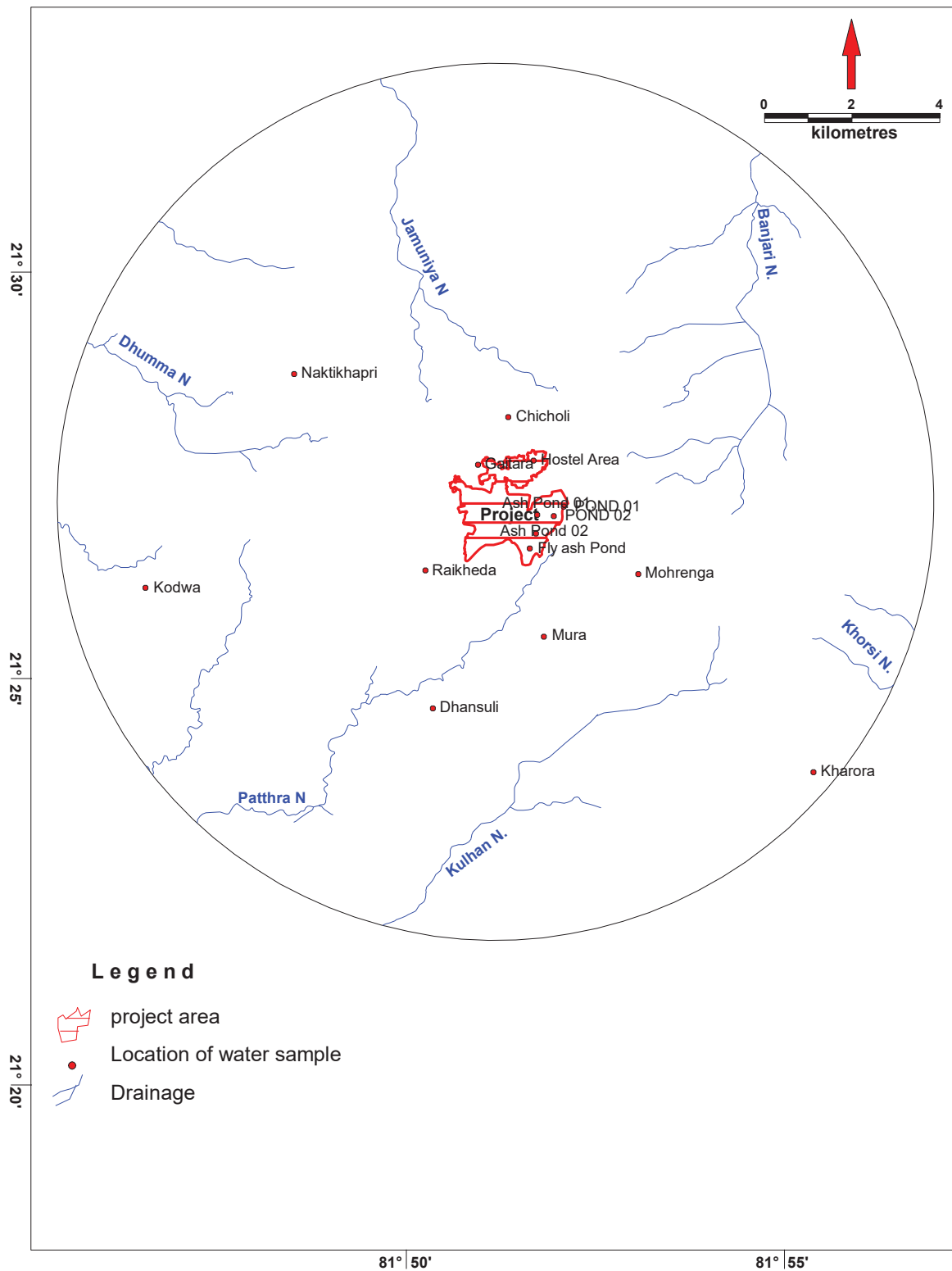
The suitability of ground water for drinking/irrigation/industrial purposes is determined keeping in view the effects of various chemical constituents present in water on the growth of human being, animals, and various plants and also on industrial requirement. However, many ions are very essential for 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, 15 ground water & Surface Water samples have been collected from 10 k.m. radius area. The ground water samples were analyzed for major as well as heavy chemical constituents. The ranges of different chemical constituents present in ground water are given in Table 9.1 and details are given in **Annexure I** and location of water sampling is given in fig 9.1.

**Table 9.1: Aquifer wise ranges of chemical constituents**

SN	Parameters	Prescribed limits as per IS 10500		Observed value
		Desirable limit	Permissible limit	
1	PH	6.5-8.5	No Relaxation	6.17-7.79
2	EC $\mu$ S/cm @ 25°C	750	2250	146-1513
3	Turbidity	1	5	0.16-442
4	Total Dissolved Solid (mg/l)	500	2000	93.6-968.7
5	Calcium (Ca) (mg/l)	75	200	24-88.1
6	Fluride (as F) (mg/l)	1	1.5	0.11-6.92
7	chloride (As Cl) (mg/l)	250	1000	12.9-209
8	magnesium (As mg) (mg/l)	30	100	1.45-126
9	Nitrate (As No <sub>3</sub> ) (mg/l)	45	No Relaxation	0.14-12.30
10	Sulphate (As So <sub>4</sub> ) (mg/l)	200	400	8.1-192

11	Total Hardness (as Caco3) (mg/l)	200	600	76-640
12	Barium (as Ba) (mg/l)	0.7	No Relaxation	N.D.
13	Boron (as B) (mg/l)	0.5	1	N.D.
14	Aluminium (as Al) (mg/l)	0.003	0.2	N.D.
15	Copper (as Cu) (mg/l)	0.05	1.5	N.D.
16	iron (as Fe) (mg/l)	0.3	No Relaxation	0.37-0.44
17	Manganese (as mn) (mg/l)	0.1	0.3	0.035-0.58
18	Silver (as Ag) (mg/l)	0.1	No Relaxation	N.D.
19	Zinc (as zn) (mg/l)	5	15	0.02-3.12
20	Mercury (as Hg) (mg/l)	0.001	No Relaxation	N.D.
21	cadmium (as cd) (mg/l)	0.003	No Relaxation	N.D.
22	Lead (as Pb) (mg/l)	0.01	No Relaxation	N.D.
23	Nickel (as Ni) (mg/l)	0.02	No Relaxation	N.D.
24	Arsenic (as As) (mg/l)		0.001	N.D.
25	Chromium (as Cr) (mg/l)	0.03	No Relaxation	N.D.

According to above table, majority of chemical constituent of all samples are within permissible limit and suitable for drinking, irrigation and industrial use, fluoride contamination is observed only at Bottom Ash Pond 02, Plant Area may be due to ash, and Iron concentration is slightly higher in all sample due to leaching of iron from laterite. Higher concentration of Mn observed at Mohrenga village and Mg contamination observed at Mura. Rest of the parameters is within permissible limit.



**Fig-9.1: Location of water sampling**

### 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/Na-HCO<sub>3</sub> 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, **Table 9.2.** The type of ground water found in each ground water sample collected is given in the **Table 9.2.**

**Table 9.2: The type of ground water**

SNo.	Station ID	Geology	X coordinate	Y coordinate	Water Type
1	Ash Pond 01	LST	81.86222	21.45028	Mg-HCO <sub>3</sub> -Cl-SO <sub>4</sub>
2	Ash Pond 02	LST	81.86195	21.44639	Mg-Ca-Cl-SO <sub>4</sub> -HCO <sub>3</sub>
3	Chicholi	LST	81.85583	21.47028	Mg-Ca-HCO <sub>3</sub>
4	Dhansuli	LST	81.83916	21.41055	Mg-Ca-HCO <sub>3</sub>
5	Fly ash Pond	LST	81.86056	21.44333	Mg-Ca-SO <sub>4</sub> -Cl
6	Gaitara	LST	81.84917	21.46056	Mg-Ca-Na-HCO <sub>3</sub>
7	Hostel Area	LST	81.86139	21.46139	Ca-Mg-HCO <sub>3</sub>
8	Kharora	LST	81.92306	21.3975	Mg-Ca-HCO <sub>3</sub> -Cl
9	Kodwa	LST	81.77583	21.43528	Mg-Ca-HCO <sub>3</sub> -Cl-SO <sub>4</sub>
10	Mohrenga	LST	81.88445	21.43806	Mg-Ca-HCO <sub>3</sub> -Cl
11	Mura	LST	81.86361	21.42528	Mg-Cl-HCO <sub>3</sub>
12	Naktikhapri	LST	81.80861	21.47917	Mg-Ca-HCO <sub>3</sub> -Cl
13	POND 01	LST	81.86806	21.45194	Ca-Na-HCO <sub>3</sub> -Cl
14	POND 02	LST	81.86584	21.45	Na-Ca-HCO <sub>3</sub>
15	Raikheda	LST	81.8375	21.43889	Mg-Ca-Cl-SO <sub>4</sub>

## Suitability of Ground Water for Drinking purpose and Irrigation purpose

### 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-2003, 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 9.3**

**Table 9.3: Classification of Ground Water Samples for Drinking Purposes.**

Parameters	Drinking water Standards (IS-10500-91, Revised 2003)		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	15	15	100	0	0		0
TDS (mg/L)	500	2000	15	8	53.33	7	46.67		0
TH (mg/L)	300	600	15	7	46.67	7	46.67	1	6.67
Ca (mg/L)	75	200	15	14	93.33		0	1	6.67
Mg (mg/L)	30	100	15	4	26.67	10	66.67	1	6.67
Cl (mg/L)	250	1000	15	15	100		0		0
SO <sub>4</sub> (mg/L)	200	400	15	15	100		0		0
NO <sub>3</sub> (mg/L)	45	-	15	15	100		0		0

It is observed from the above **table 9.3**, that than 93.3% of samples are suitable for drinking purposes. It is also observed that only 6.6% of samples show the TH, Mg and Ca concentration above the

maximum permissible limit of BIS Standards. Therefore, it is concluded that the portability of ground water in major part of 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 action 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-

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

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

### **Residual Sodium Carbonate (RSC)**

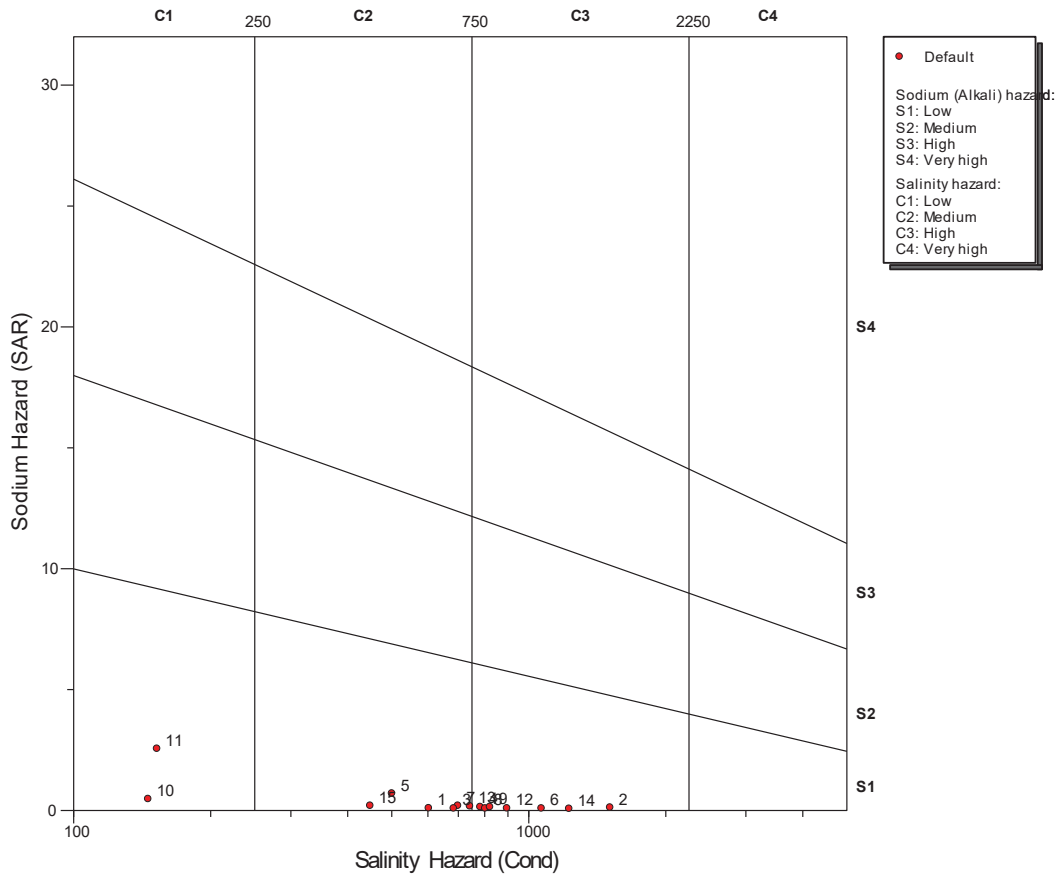
Water containing carbon dioxide on way gets saturated with carbon dioxide and forms bicarbonates. The excess bicarbonates of Mg and Ca are precipitated out as carbonates. This produces impermeability to the top soil. Bicarbonate concentration of water has been suggested as additional criteria of suitability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

$$\text{RSC} = (\text{CO}_3 + \text{HCO}_3) - (\text{Ca} + \text{Mg})$$

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  $\mu\text{S}/\text{cm}$  at  $25^\circ\text{C}$  upto  $5000 \mu\text{S}/\text{cm}$  at  $25^\circ\text{C}$  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 is given



in the **Table 9.4**, and the EC and SAR values are plotted in **Wilcox Diagram (Fig 9.2)** and **Piper(Fig 9.3)**.



**Fig 9.2 Wilcox Diagram**

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 9.4**.

**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)	2	2	-	-	-
250-750 (C2)	6	6	-	-	-
750-2250 (C3)	7	7		-	-
2250-5000 (C4)					
> 5000					
<b>Total</b>	15	15			
<b>Overall Percentage</b>		100%			

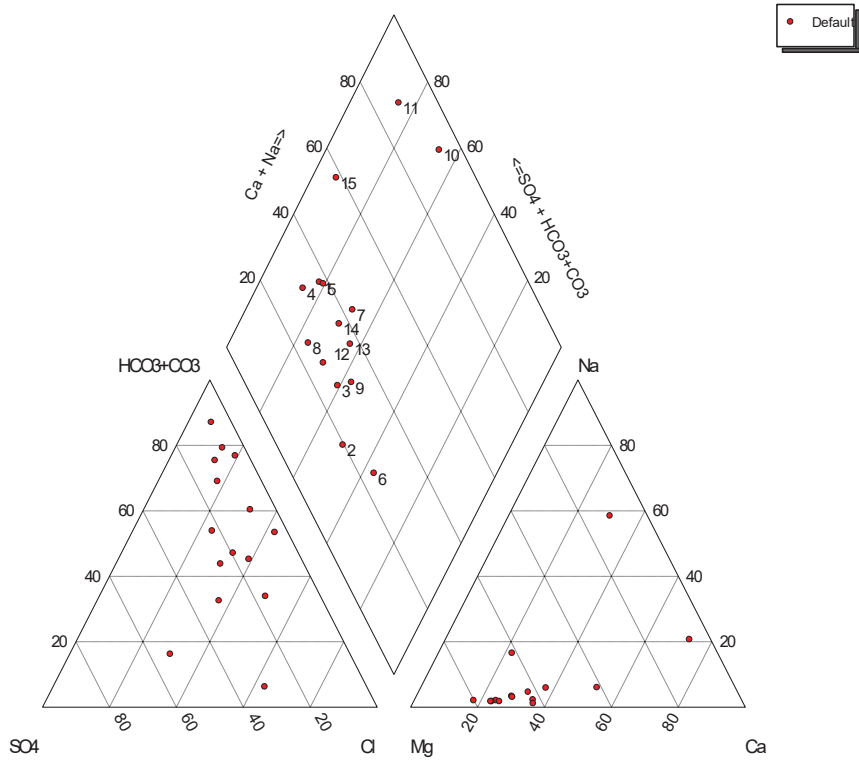
From the Table 9.4, it is observed that 100% of samples show SAR values below 10 and falling in the Low Sodium (alkali) Hazard Zone (S1). Such type of water can be used for irrigation on almost all soils with little danger of development of sodium exchangeable problem. Out of 15 samples collected from study area is having EC above  $> 2250 \mu\text{S}/\text{cm}$  at  $25^\circ$ .

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.

Based on above **table 9.4**, ground water samples are classified with respect to salinity and sodium hazard is presented in **Table 9.5**.

<b>Table 9.5: Classification of ground water samples with respect to salinity and sodium hazards</b>			
<b>Type of Classification</b>	<b>Characteristics</b>	<b>No. of samples falling</b>	<b>%</b>
C1S1		2	13.33
C1S2			
C2S1	Medium salinity and low sodium water	5	33.33
C3S1	High salinity and low sodium water	8	53.33
C4S1	Very high salinity and low sodium water		
<b>Total</b>		<b>15</b>	<b>100</b>



**Fig 9.3: Trainer piper diagram**

## 10. CONCLUSIONS & SUMMARY

Adani Power Limited (APL), India's largest private sector thermal power producer, announced the completion of acquisition of Raipur Energen Limited, which owns and operates a 1,370 MW (2 X 685 MW) Supercritical power plant at Raikheda village, in Raipur District of Chhattisgarh.

The area is drained by tributaries of Seonath River especially by Banjari River and Khorsi nala. Banjari River is north flowing tributary to Seonath River and flows in the western part of the mine lease area while Khorsi nala flows in the east of project area.

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.

Geomorphologically the study area is represented by Pediment, Pediplain, Buried plain and Flood Plain. The Pediplain is developed in the major parts of the study area. They are also control by fractures and joints. They are having gently sloping smooth surface of erosional bed rock.

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. limestone & shale at depths.

The depth to water level on ground water of May 2020, it is observed that the overall depth to water level remains between 2.05 to 12.2 meters below ground level. The pre-monsoon depth to water levels ranges between 5 and 10 mbgl in 63% of the villages. Water levels more than 10 mbgl are observed in the villages namely Kurra, Bharuwadih, Bharuwadih kala, Murdhpur and Ganiyari villages while in mohrenga, Raikheda, Dhansuli, Murra, Deogaon. Amlitalab, MathKhapri and Taraviv showing water level less than 5 mbgl.

The depth to water level of Nov 2019 remains between 0.45 and 5.8 meters below ground level. The post-monsoon depths to water level range of 3 to 5 mbgl are observed at Kurra, Ganiyari and Bangoli villages. Ground water levels more than 5 mbgl are observed in the villages Bharuwadihkhurdof and Murdhpur Water level less than 3 mbgl are observed in the 86 % of the villages and along river courses Seasonal ground water level fluctuation in the study area is varies from 1.35 to 10.4 meters. Lower range of water level fluctuation is also observed along the river course followed by > 8. 0 to 2, 6 to 8,

2 to 4 & 4 to 6.

In the study area, the ground water flow direction is towards north-east and north- west. However in the core zone, the flow direction is North-West and South-East. A local variation in flow direction is also observed, the mining lease is located in the zone of surface water divide.

In the major portion of the area the yield ranges between 1 to 5 lps indicating the area is covered by flaggy limestone and cavernous while in rest of the area it is 1 to 3 lps covered with shale.

In the study area both shallow and deep aquifer occurs. The shallow aquifers of the study area occur within an average depth of 20 m. In general the yield of dug wells ranges from 40 to 60 m<sup>3</sup>/day. Deep aquifer system in the area mainly formed by the Raipur group of rocks mainly Chandi formation which comprises of limestone and shale. The deep aquifers of the area are mostly developed by way of bore wells in the area whose depth varies from 60 to 80m. Tarenga formation in the area is more productive & yield around 1 to 8 lps, while limestone in the area along & nearby river courses yield 1 to 5 lps of water.

The aquifer parameters of the study area covered by limestone for deep aquifer the transmissivity values of phreatic aquifer tapped in open well in general varies from 4 to 8.5 m<sup>2</sup>/day while specific capacity ranges from 15 to 40 lpm/m/day. However for deep aquifer the transmissivity ranges from 15-32 m<sup>2</sup>/day and at places it ranges up to 40 m<sup>2</sup>/day. The potential fractures for boreholes up to 100 mbgl depth in the area are recorded at various depths i.e. 40-45, 60-65, 75-80, 90-95 mbgl and are 4 to 5 in numbers.

The ground water resources within 10 km of radius estimated on the basis of norms as per GEC'2015 indicate that the total ground water resource of the present study area is of the order of 3549.16 Ham while the total extractable ground water resources in the area are of the order of 3194.26 Ham. Gross ground water extraction in the area is around 1717.26 Ham while Balance ground water resources are 1477 Ham. The stage of ground water extraction in the area is around 53.6 % which comes in "SAFE" category.

Total recharge potential of **1906907.95** 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.

percolation pits may be with dimension as 1 m (length) x 1 m (width) x 2 m (depth) with 8” dia. injection well of 90 m depth having 8” plain pipe up to 6 m depth Thereafter, 7” dia. necked borehole in rock may be made up to 84 m depth by DTH drilling machine. Each structure made at minimum spacing of 100 m may be made capable of recharging 195 m<sup>3</sup>/day by each pit. The inlet of the structure may be kept 1 m above pond bed leaving, 1 m water column for settlement of silt/dust etc. The annual cleaning/ removal of silt/ dust from the pond bed are suggested before monsoon for efficient working of system. We have already two no’s of Recharge pond to recharge the ground water of the study area.

The detailed chemical analysis for water samples drawn at six locations at plant area (Ash Dyke ponds RESERVOIR POND) and 9 villages of buffer zone for non-metallic ingredients like pH, Turbidity, TDS, TSS, CaCO<sub>3</sub>, Ca, Cl, Mg, SO<sub>4</sub> & SiO<sub>2</sub> and metallic ingredients like Pb, Hg, Ag, Mn, Zn, Fe, & Cr etc. were done in-2020. The data indicates that the ground water quality is improved in downstream for most of metallic and non-metallic ingredients and most of the ingredients are in permissible limit as per IS:10500-2012.

The majority of chemical constituent of all samples are within permissible limit and suitable for drinking, irrigation and industrial use, fluoride contamination is observed only at Bottom Ash Pond 02, Plant Area may be due to ash, and Iron concentration is slightly higher in all sample due to leaching of iron from laterite. Higher concentration of Mn observed at Mohrenga village and Mg contamination observed at Mura. Rest of the parameters is within permissible limit.

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<sub>3</sub> 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  $\mu\text{S}/\text{cm}$  at 25°C upto 5000  $\mu\text{S}/\text{cm}$  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 15 samples collected from study area is having EC above  $> 2250 \mu\text{S}/\text{cm}$  at  $25^\circ$ .

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.

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



# ANNEXURE -VI



SOCIAL AUDIT & SOCIAL IMPACT EVALUATION OF  
CSR ACTIVITIES OF  
RAIPUR ENERGEN LIMITED

Executed By



October 2020

**SOCIAL AUDIT AND SOCIAL IMPACT EVALUATION  
OF CSR ACTIVITIES OF RAIPUR ENERGEN LIMITED**



**RAIPUR ENERGEN LIMITED**  
Vill-Raikheda, Block-Tilda  
Distt-Raipur - 493225 (CG)

Document No. IISWBM/IRP/SA-REL/2020/01 Dated 30/10/2020 V1.1

*Executed by*



**Indian Institute of Social Welfare  
& Business Management**  
(A Constituents Institute of University of Calcutta)  
Kolkata – 700 073

October, 2020

## FOREWORD

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*The Adani Group has made foray into high growth sector like Power, Infrastructure, Global Trading, Logistics, and Energy. Adani Power Limited (APL) has recently acquired 2 x 685 MW Coal-based Super Critical Thermal Power Plant of M/S GMR Chhattisgarh Energy Ltd (GCEL), Raipur in the State of Chhattisgarh and changed name is Raipur Energen Limited (REL). With reference to the Ministry of Environment, Forest & Climate Change (MoEF&CC), Government of India (GoI), Environmental Clearance (EC) Social Audit for the CSR Schemes shall be carried out periodically as per the CSR guidelines of Government of India. Accordingly, they engaged Indian Institute of Social Welfare and Business Management (IISWBM), Kolkata to undertake Social Audit & Social Impact Evaluation of CSR activities undertaken during last three years i.e. 2017-18 to 2019-20.*

*The prime aims of the present study were to evaluate the social impact of CSR activities undertaken in and around the vicinity of the REL's TPP area for upliftment of quality of life of local people of the neighboring villages.*

*IISWBM was required to conduct field survey including public consultation, collect primary and secondary data on the basis of structured questionnaires to evaluate the social impact. This report presents the detail of CSR activities undertaken during the last three years and its impact on community development and improvement of quality of life of local people. The present social audit reveals that CSR Activities are being implemented with a result based approach and community is highly satisfied.*

*The cooperation and guidance received from Shri Rambhav Gattu, Station Head, REL; Shri Amit Kr. Soni, Head (Environment), REL; Shri Atul Gupta, Adani Foundation, REL and other executives & officers of REL in conducting this study is highly acknowledged.*

*This study would have not been possible without the constant support and guidance of Executives of Adani Power Limited. We are grateful to acknowledge the constant guidance and support extended by Shri Santosh Singh, Sr. VP, Corporate Environment Group and Shri R. N. Shukla, AGM, Corporate Environment Group, Adani Power Limited as well as their officers and staff.*

*We would also extend a warm thanks to the members of local village panchayats, anganbadi workers, village school teachers, Mitanins, beneficiaries of MMU, students, parents, farmers and other beneficiaries from covered villages, all who contributed magnanimously to our study with their comments and insights.*

Kolkata  
October 30, 2020



Prof. (Dr.) K. M Agrawal  
Project Director, IISWBM

---

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## LIST OF ABBREVIATIONS

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ABBREVIATION	DESCRIPTION
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APL	: Adani Power Limited
AF	: Adani Foundation
BDO	: Block Development Officer
BPL	: Below Poverty Line
CHC	: Community Health Centre
CPRs	: Common Property Resources
CSR	: Corporate Social Responsibility
EHS	: Environment, Health & Safety
FGDs	: Focus Group Discussions
GCEL	: GMR Chhattisgarh Energy Limited
GP	: Gram Panchayet
HSC	: Health Sub-Centre
ICDS	: Integrated child development services
ITI	: Industrial Training Institute
Ha	: Hectare
HH	: Household
IISWBM	: Indian Institute of Social Welfare & Business Management
IMR	: Infant Mortality Rate
MoEF&CC	: Ministry of Environment, Forests & Climate Change
MMR	: Maternal Mortality Rate
MTPA	: Metric Tonne per Annum
MW	: Megawatt
NFHS	: National Family Health Survey
NGOs	: Non-Governmental Organizations
O&M	: Operation & Maintenance
OBC	: Other Backward Class
PAPs	: Project Affected Persons
PAFs	: Project Affected Families
PC	: Public Consultation
PHC	: Primary Health Centre
PRA	: Participatory Rural Appraisal
QoL	: Quality of Life
QoC	: Cumulative Quality of Life
R&R	: Resettlement & Rehabilitation

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**ABBREVIATION DESCRIPTION**

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RAP	: Resettlement Action Plan
REL	: Raipur Energen Limited
RRA	: Rapid Rural Appraisal
SA	: Social Audit
SC	: Scheduled Caste
SES	: Socio-Economic Survey
SHG	: Self Help Group
SIA	: Social Impact Assessment
SIE	: Social Impact Evaluation
SPCB	: State Pollution Control Board
ST	: Scheduled Tribe
TFR	: Total Fertility Rate
TPP	: Thermal Power Plant
TSC	: Total Sanitation Campaign
TPP	: Thermal Power Plant
ULBs	: Urban Local Bodies
VDAC	: Village Development Advisory Committee
VFCs	: Value Function Curves
ZP	: Zila Parishad

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# EXECUTIVE SUMMARY

## 1.0 INTRODUCTION

The Adani Group (1988) has grown from being a trading house to a diversified business group with interests from infrastructural development to FMCGs. The Adani Group has made foray into high growth sector like Power, Infrastructure, Global Trading, Logistics and Energy.

Adani Power Limited has recently acquired 2 x 685 MW Thermal Power Plant of M/S GMR Chhattisgarh Ltd (GCEL), Raipur in the State of Chhattisgarh and changed name is Raipur Energen Limited (REL). With reference to the Ministry of Environment, Forest & Climate Change (MoEF&CC), Government of India (GoI), Environmental Clearance (EC) for 2x685 MW TPP Social Audit for the CSR Schemes shall be carried out periodically as per the CSR guidelines of Government of India. Accordingly, in compliance to the conditions of MoEF&CC's EC for TPP of REL Social Audit & Social Impact Assessment Study have been carried out.

The salient features of 1370 MW (2 × 685 MW) coal based super critical thermal power plant of Raipur Energen Limited (REL), a wholly owned company of Adani Power Limited (APL) are presented in following table:

Item	Particulars
Location of the Plant	Village: Raikhed, Block: Tilda, District: Raipur, State: Chhattisgarh
Net capacity	1370 MW
No. of Units and configuration	2 x 685 MW
Date of Commercial Operation (COD)	Unit 1: June, 2013 Unit 2: Nov, 2014
<b>Technology</b>	
Steam Generator	Super critical Pressure 255 kg /cm <sup>2</sup> Temperature 571°C
Turbo Generator	Turbine -246 kg/cm <sup>2</sup> (a), 563°C, 3000 rpm Generator - 685 MW (Each unit) Generator Transformer - 776 MVA
Major Auxiliary System	<ul style="list-style-type: none"> <li>• Boiler &amp; Turbine Auxiliaries</li> <li>• Pre-treatment Plant</li> <li>• Compressed Air System</li> <li>• Coal and Ash Handling System</li> <li>• CW System and Raw Water System</li> </ul>



Item	Particulars
	<ul style="list-style-type: none"> <li>• Fire fighting System</li> <li>• Air conditioning System</li> <li>• Ventilation System</li> </ul>
<b>Stack Details</b>	
No. of Stack	1
Stack Height (meter)	275 each
No. of flue	Bi-flue
Additional equipment	Electrostatic Precipitator
Coal	Indigenous Coal – 5.0 MTPA Transportation: Railways
<b>Land</b>	
Plant Land Area	800.00 Acre
<b>Water</b>	
Cooling Technology	Natural draft cooling system
Total Water Requirement	32 MCM (withdraw 25 MCM)
Total Discharge	'Zero Discharge Norm' is being followed
<b>General Information</b>	
Manpower Requirement (Total)	Approx 200
Project Cost	Rs 7,378 crores

### Objectives of Study

The aims of the proposed social audit are to evaluate social impact of CSR activities undertaken in and around the vicinity of the REL's TPP area for upliftment of quality of life of local people of the neighbouring villages. The prime objectives of the study includes:

- To assess the baseline status of key social parameters around the REL's TPP site;
- To evaluate the social impact of the TPP based on the available secondary data and information generated during the study/survey;
- To present all potential significant social impacts and local employable youth for training in skills, relevant to the project;
- To undertake detailed social audit of CSR Activities undertaken by REL in last three years.



## Scope of Study

The scope of study includes:

- 1) Social Audit & Social Impact Evaluation Survey/study.
- 2) Action plan for identification of local employable youth for training in skills, relevant to the project.
- 3) Evaluation of Socio-economic profile of the CSR villages.
- 4) Public consultation in selected Panchayat/villages to ascertain the public views on various social and local issues.
- 5) Gap analysis and comparison of last three years for local development as well as social upliftment of local society.

## Detail of REL-CSR Zone

The REL's Thermal Power Plant (TPP) is located at Raikheda Village under Tilda Block/Tehsil of Raipur District, Chhattisgarh. The CSR Zone i.e. 10 km radius of TPP falls primarily under Tilda Block/Tehsil. However, small area towards SW-W directions of TPP falls under Raipur Block/Tehsil. The analysis of the CSR villages reveal that out of total 65 villages, 5% (3 villages) are falling under core zone and 25% (16 villages) are under Buffer Zone-I (i.e. 5 km radius of TPP ) and remaining in Buffer Zone-II (i.e. 5-10 km radius of TPP ).

## 2.0 PRINCIPLES & GUIDELINES FOR SA & SIE

Social Impact Evaluation basically means the evaluation of qualitative and quantitative impact of the Community Development Programme carried out by the organization on the community. The evaluation includes assessment of the physical changes that have taken place during an identified span of time because of the activities undertaken as well as the awareness and perception of the people for whom the activities were aimed. The impact could be short term or / and long term. It could be on the economic aspect or the socio-cultural aspect or on both the aspects. This impact would vary depending upon the efficiency and effectiveness of the CD activities carried out and the social/physical infrastructure provided to the Community.

Adani Power Limited (APL) has always been committed to the cause of social service and has repeatedly channelized a part of its resources and activities, such that it positively affects the society socially, ethically and also environmentally. The company has taken up various CSR initiatives and enhanced values in the society.



With the advent of the Companies Act, 2013 constitution of a Corporate Social Responsibility Committee of the Board and formulation of a CSR policy became a mandatory requirement. Accordingly, the company has formulated a robust CSR policy which encompasses its philosophy and guides its sustained efforts for undertaking and supporting socially useful programmes for the welfare and sustainable development of the society. The CSR policy of APL was approved by the Board of Directors on 6<sup>th</sup> August, 2014.

Social auditing is a process that enables an organisation to assess and demonstrate its social, economic, and environmental benefits and limitations. It is a way of measuring the extent to which an organisation lives up to the shared values and objectives it has committed itself to. Social auditing also provides an assessment of the impact of an organisation's non-financial objectives through systematically and regularly monitoring its performance and the views of its stakeholders. Social auditing requires the involvement of stakeholders. This may include employees, clients, volunteers, funders, contractors, suppliers and local residents interested in the organisation. Stakeholders are defined as those persons or organisations who have an interest in, or who have invested resources in, the organisation.

### 3.0 METHODS & TOOLS FOR SA & SIE

The Social Audit (SA) & Social Impact Evaluation (SIE) has been conducted using primary data as well as secondary data available with the Districts & Blocks as well as APL and REL. Interview with the local people and discussions with community, Government officials and community based organizations of the area were an important component of the study.

The sample villages were selected representing whole CSR region of the REL's TPP for the present study. We have used both primary and secondary data for the study. The secondary data have been collected from the various source, namely, Census of India, Health Department, Education department, office of ICDS, Statistical department of the concerned district. The primary data have been collected from the beneficiaries of different programmes, Local community, Representatives of Gram Panchayets etc. from selected villages. The overall impact of CSR activities has been assessed for the last three years i.e. 2017-2018 to 2019-2020.

As discussed earlier the framework for Social Audit was evolved including Social Process Method clubbed with Activity Analysis Approach. This uses SA4P focus system that assesses an activity around 4Ps viz. Policy, People, Process, Programmes. The individual weightage against these factors shall sum up to gross assessment measurable figure on a pre framed scale. The impact assessment matrix was evolved considering following factors:

- Design Quality
- Measurable Quantitative Progress - Days/Coverage/Change in Income/Money saved /Mandays etc.



- Programme Approach
- Satisfaction of Stakeholders

A kick-off meeting was organised on 23<sup>rd</sup> July, 2020 to discuss the modalities for initiating the social audit and social impact evaluation study and logistic support required for the same under the guidance of Shri R. N. Shukla, Corporate Environment Group, APL and Shri Amit Kr. Soni, Head (Environment), REL along with Shri Atul Gupta Adani Foundation, REL. The field survey and data collection was undertaken between August-September, 2020. The series of public consultation meeting conducted involving Sarpanch/ Upsarpanch/ member of Gram Panchayet along with the local people to evaluate the social impact of setting up and operation of REL's TPP along with the evaluation of social impact of CSR activities undertaken by AF-REL during the last three years i.e. 2017-18 to 2019-20 as well as their suggestions for improving the quality of life of local people in all the core as well as buffer zone villages falling within the 10 km radius of the REL's Thermal Power Plant.

#### 4.0 SOCIO-ECONOMIC PROFILE OF CSR ZONE

The Socio-economic profile of REL's CSR zone have been assessed using primary as well as secondary available with the Districts & Blocks as well as APL and REL. PRA/RRA techniques were also adopted for the purpose.

The analysis of demographic profile of villages falling within the REL-CSR Zone reveals that total number of households i.e. 21,651 and population of i.e. 1,04,490 in CSR Zone only 1,131 household with population of 5,536 in core zone villages. Out of all the core zone villages, the maximum population is in Raikheda i.e. 3,541 followed by Chicholi i.e. 1,103. Gender wise distribution of population in CSR villages reveals that 50.27% of the population are male and remaining 49.73% are female in the REL-CSR zone. Analysis of status of child population (0-6 years) in REL-CSR zone reveals that 14.42% are children (0-6 years) of total population in CSR zone. The analysis further shows that the sex ratio among child population is comparatively higher i.e. 965 females per 1000 male as compared to overall sex ratio i.e. 913 females per 1000 male in CSR zone. The analysis of distribution of SC & ST population reveals that 18.78% is scheduled caste and 4.75% are scheduled tribe of total population in REL CSR zone. Overall status of literacy in CSR zone is 73.21% .

The analysis of status of workers in villages falling under CSR zone shows that out of total working population, 64.94% are main workers and remaining 35.06% are marginal workers. It also reveals that 24.45% are cultivators, 45.95% are agricultural labours, 1.53% are engaged in household industries and remaining 28.07% of the total main workers are other workers in the CSR zone. Whereas majority (78.40%) are agricultural labours followed by cultivators (13.03%) of the total marginal workers in the CSR zone.



## 5.0 DETAIL OF CSR ACTIVITIES UNDERTAKEN

GCEL had run CSR activities through GMR-Varalakshmi Foundation (GMR-VF) a CSR arm of GMR group since 2009. CSR activities in Railway Siding and other nearby villages had started in the year 2015. Raipur Energen Limited-Adani Foundation (REL-AF) a CSR arm of Adani Group, has taken over CSR activities from GMR-VF in Oct 2019 and decided to continue all the running activities as usual till March 2020.

As per the APL CSR policy AF-REL has undertaken various activities for providing sustainable livelihood and strengthening basic amenities & infrastructural facilities at villages of CSR zone REL. The major emphasis is being given in sustainable livelihood development and strengthening the educational facilities in terms of providing infrastructural supports at primary as well as the secondary schools of REL CSR zone. Besides improving the infrastructural facilities at educational institutions, the study materials, scholarships, etc. were also provided. For undertaking the CSR activities at CSR zones, the emphasis were also given in improving drinking water and health, hygiene & sanitation facilities, etc. for villages of CSR zone.

As mentioned earlier, AF-REL has already initiated the various social mitigation and development activities in core as well as buffer zone villages within the 10 km radius of the TPP. Initially, AF-REL has identified 13 PAVs/RAVs namely Raikheda, Chicholi, Gaitra, Gourkheda, Sontara, Murra, Tulsi, Khamharia, Konari, Bartori, Tarashiv Chatod and Samoda under 12 Gram Panchayats of Tilda and Aarang block of Raipur District in Chhattisgarh. Subsequently, all the villages falling within 10 km radius of TPP i.e. 65 have been classified into 3 zones for undertaking CSR activities. The brief detail of CSR activities undertaken during the last three years i.e. 2017-18 to 2019-20 are presented in following Table:

2017-18	2018-19	2019-20
<b>CSR ACTIVITIES UNDERTAKEN UNDER EDUCATION PROGRAMME</b>		
25 Vidya Volunteers were provided to 15 schools benefiting 1675 students	-	-
Provided 50% of the salary for 10 teachers at Raikheda Higher Secondary School	Supported 50% salary of 10 teachers at Raikheda Higher Sec. School that benefitted 125 students	-
5 students benefitted from the Saksham Scholarship Scheme	3 students benefitted from the Saksham Scholarship Scheme	-
TOMS Shoes distributed to 2,860 school children from 12 villages	-	-
Provided coaching to 55 students attending Navodaya	Provided coaching for 53 students of Navodaya Entrance	4 Navodaya Coaching centers for Navodaya Entrance Examination





2017-18	2018-19	2019-20
Entrance Examination	Examination	
Running Kid Smart Early Learning Centers at Raikheda, Chicholi and Gaitera, benefiting 123 children	Running Kid Smart Early Learning Centers at Raikheda, Chicholi and Gaitera benefiting 149 children	-
Provided transportation facility for 99 girls from the project affected villages to attend college in Tilda	Provided transportation facility for 87 girls from the project affected villages to attend college in Tilda	Transportation facility to the girls from the project affected villages to attend the college
Provided school uniform and Tie, Belt to 100 children of 4 Anganwadis	-	-
-	5 library centers in 5 villages were operational. 32867 people used library facility	5 Community library centers in 5 villages for the benefit of communities
-	Through library, Books support to College & D-Led students	-
-	-	Prayas career counselling & coaching center for the youths, who were perusing for further professional courses or recruitment in entrance exams
<b>CSR ACTIVITIES UNDERTAKEN UNDER HEALTH, HYGINE &amp; SANITATION PROGRAMME</b>		
4 dispensaries were operational catering to an average of 615 patients per month	4 dispensaries were operational catering to an average of 423 patients per month	-
Mobile Medical Unit services reached out to 1615 patients per month from 9 villages	Mobile Medical Unit Services reached out to 1016 patients per month from 9 villages	Mobile Medical Unit Services reached out to 13 PAVs & RAVsvillages
Provided door to door medical services for 65 elderly people	Provided door to door medical services for 212 elderly people	Provided door to door medical services to elderly people too
Provided support for 117 pregnant women through nutrition centers in 3 Panchayats	Provided support for 100 pregnant and lactating women through nutrition center in 3 Panchayats	Provided support to pregnant and lactating women through 5 nutrition center in 3 Panchayats under Suposhan
Conducted weekly community health awareness programs	-	Health Awareness Programs organized in schools
Conducted seasonal school	-	-



2017-18	2018-19	2019-20
health awareness/education programs		
Organized 16 health awareness programs in schools covering 1718 students	48 Health Awareness Programs organized in schools covering 2460 students	Conducted awareness camps on personal hygiene and sanitation
Public Toilets at Gaitera and Bhatapara benefitted 112 families	Public Toilets at Gaitera and Bhatapara benefitted more than 104 families	-
Conducted awareness camps on personal hygiene and sanitation for 875 women	Conducted awareness camps on personal hygiene and sanitation for over 920 women	-
<b>CSR ACTIVITIES UNDERTAKEN UNDER EMPOWERMENT &amp; SUSTAINABLE LIVELIHOOD DEVELOPMENT PROGRAMME</b>		
Trained 152 youth in 3 courses (Mobile, TV repairing and domestic electrical works) at Vocational Training Center and 60 youth were now self-employed	Trained 50 youth in 2 courses (Mobile and RAC repairing) at VTC and 07 youth were now self-employed	-
Provided computer training to 45 youth at the Computer Literacy Center	Provided support to 106 youth in computer training at the Computer Literacy Center	Provided support to youth in computer training at the Computer Literacy Center
Trained 62 women in advanced tailoring course	Trained 87 women on advanced tailoring course. 4 <sup>th</sup> Batch of 27 women & girls were near to be concluded	Women & Girls skilled with an advanced tailoring course runs under ASDC Saksham
Trainees of production center got a big order to make 5000 bags. They also stitched 400 school uniforms this year	30 women received bulk order to stitch school bags, pants, shirts and blouses etc	Women received bulk order to stitch petticoats & nighties from wholesaler of Raipur
Provided support to youth through Pratibha coaching center	18 students have been achieved success in this session at Pratibha Center	-
-	3 youth group, which has 36 members, was supported with Volley Ball kit	-
Provided capacity building	-	Women of 4 SHGs



2017-18	2018-19	2019-20
support to 32 Women Self Help Groups		supported under IGA for the sustainable livelihood
Provided livelihood support to 21 families of which 11 families earn an average of Rs 4500 per month	-	-
-	18 women of VO- SHG at Raikheda have laid fly ash brick manufacturing plant from Dec 2018	-
-	Approximately 80 tons fly ash have been delivered to the group from GMR-VF's plant free of cost for the brick	-
-	Around 60000 bricks have been sold by them so far	-
1 youth group with 6 members was supported with musical instruments for income generation	-	-
Organized Animal Husbandry Camps before monsoon. Vaccination and de-worming services were provided to 1200 cattle from 4 villages	-	-

The total expenditure on various CSR activities has been varied from Rs 51.29 to 69.39 lakh during 2017-18 to 2019-20. The analysis of sector wise expenditure incurred for CSR activities reveals that the maximum fund is being allocated for Health, Hygiene and Sanitation followed by Education. Out of total CSR fund, 38.25% of total fund have been spent by AF-REL in improving Health, Hygiene and Sanitation followed by 32.07% for improving the education facilities in selected CSR villages during 2019-20. Whereas out of total CSR fund, 42.79% of total fund have been spent by GMR-VF in improving Health, Hygiene and Sanitation followed by 33.25% for improving the education facilities in selected CSR villages during 2017-18. It may be pertinent to mention here that for these three financial years, 18.29-22.86% of total fund have been spent for Empowerment and Livelihoods.



## 6.0 SOCIAL AUDIT OF CSR ACTIVITIES

APL has always endeavoured to be a leader in community development (CD) and corporate performance, which can be measured in terms of economic, social, and environmental impacts. Further, specifically on CD, APL is governed by the CSR policy formulated in August, 2014. APL CSR policy is primarily governed by Section 135 of the Companies Act, 2013.

The social audit of CSR activities have been undertaken for the last three years i.e. 2017-18 to 2019-20. The comprehensive profile of all CSR activities illustrate the following two types of programmes and target groups:

- i) Activities targeted to individual persons like students, physically challenged persons, women, unemployed youth, etc.; and
- ii) Activities targeted on whole community, namely, infrastructure works, support provided to resource-poor institution (school, colleges, Panchayets, etc.), entertainment, health and sanitation etc.

Under the individual beneficiary oriented schemes like providing scholarships, free education, skill development training, computer training, provision of tri-cycle, special shoes and hearing aids for handicapped were given. With the provision of scholarship, free education and aids for handicapped, there has been a rise in the sense of solidarity and self-dependence among the beneficiaries. Skill development training for women and girls has helped in capacitating them with skills and opened avenues for earning opportunities. Many of these women and girls have now opened up their business at home which is providing additional income to support their family besides economically empowering them. ASDC and other training has helped several beneficiaries to make self-reliant. The high pressure welding training as well as electrical and nursing training at ASDC has made remarkable impact in terms of providing greater job opportunities especially to vulnerable group of people. The significant number of women in adjacent villages are motivated to scale up their business of mushroom cultivation.

Some of the benefits provided by the AF-REL for any particular village were also availed directly or indirectly by other villagers. Deepening of pond and streams and bus shelters for passengers have proved to be useful not only for the residents of the particular village, but also for all the other villagers who access these facilities. The problems of villagers with regard to water logging and swampy filthy areas have been solved with construction of drains at various villages. With construction of school buildings/classroom and better sanitation facilities including development of play ground, the expected results have been achieved to enhance the learning ambience in the educational institutions. With building up of school boundaries, safety of children in the school has enhanced. With the commencement and subsequent strengthening of MHCU services in almost all the CSR villages, the health status of local people



has improved significantly. With maintenance and renovation of schools and cleaning of drains, there has been a positive impact on the atmosphere of the villages.

The AF-REL has done commendable work in ensuring the provision of clean potable drinking water to villagers. In several adjoining villages, hand pumps have been installed and being maintained by local people effectively. This has helped in solving the problem of shortage of water availability to great extent.

Besides the regular mobile health care unit services to various CSR villages, every year the AF-REL also conducts various health camps in different villages where people from the nearby villages also come to get free medical check-up. In these camps medical check-ups and advice or consultation by specialized doctors is provided. Seasonal ailments are treated and free medicines are distributed. Patients suffering from serious ailments are referred to other hospitals. Such camps have had positive impact on the lives of the people who are now not only relieved of seasonal diseases but are also diagnosed for complicated ailments.

From time to time health camps for livestock are also organized wherein villagers from the concerned villages as well as nearby villages come for free medical treatment and advice. Apart from free medical checkups and medicines, other facilities like vaccines are also provided. With these camps being organized from time to time, the livestock mortality rates have gone down.

Sports competitions are also conducted/sponsored by AF-REL regularly at various villages/town. Volleyball, Kabaddi, Cricket, race, high jump, short puts throw and several other games are organized. The AF-REL bears the expenses of providing players food, etc. The winners are given medals and trophies. These tournaments have very positive impact on the local youths interested in games and sports. This not only enhances their interest in games and sports but also gives them recognition. Apart from this, AF-REL has provided computer, chairs, tables, sittings mats and games and sports appliances for schools. All the activities conducted in the selected villages under CSR were need-based and have had positive impact on the lives of the people.

## 7.0 SOCIAL AUDIT IMPACT MATRIX

Social Audit team applied tools to gather first hand response from the stakeholders including the implementing staff from the REL-AF. The findings are classified in the 3 thrust areas – Education (Quality Improvement, Infrastructure supplementation, HR Support); Health, Hygiene and Sanitation (Preventive and Curative measures); Empowerment and Livelihoods (Youth, Farmers, Women and Groups). In each of the segments selected sample units were considered to study the programme design, implementation approach, reception and impact among the beneficiaries. These sample units are quantitatively and qualitatively assessed as per the scheme of social audit as elaborated in earlier chapters.



The present social audit conducted for CSR activities undertaken during 2017-18 to 2019-20 on the basis of above mentioned framework. The overall summary of impact assessment matrix is presented in subsequent table:

Sl. No.	Description	Total Score	Score Obtained	% of Score
1	CSR Policy, Process & Programme	4000	3054.5	76.4
2	CSR Activities Under Education Programme	2000	1595.0	79.6
3	CSR Activities Under Health, Hygiene and Sanitation Programme	2000	1444.4	72.2
4	CSR Activities Under Empowerment and Livelihood Programme	2000	1674.4	83.7
<b>Grand Total</b>		<b>10000</b>	<b>7768.3</b>	<b>77.68</b>

CSR Activities are being implemented with a result based approach. Good indicators are being maintained. Community is highly satisfied. Quantitative Indicators exhibit a healthy level at 7768 of 10000 scale. Qualitative indicators meet satisfaction of the beneficiaries in the grade of 75% and above.

Since the SA point weight 7768 is in band 7500-10000 it is termed as – Sustainably Excellent. This indicates that the current position has the potential to improve, however it has gained basic strength to deliver. More value addition strategies need to be implied with the core approach in time to come. There is an increase of about 10 % against social audit impact score of 2016-17.



# 1.0 INTRODUCTION

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## 1.1 PROLOGUE

The Adani Group (1988) has grown from being a trading house to a diversified business group with interests from infrastructural development to FMCGs. The Adani Group has made foray into high growth sector like Power, Infrastructure, Global Trading, Logistics and Energy.

Adani Power Limited (APL), a member of the Adani Group, has taken up implementation of large Thermal Power Projects at various locations in India in view of the growing needs of power requirements in the country. APL is also actively planning to implement Thermal Power Stations at various locations in India, totaling to about 20,000 MW in the coming years.

Adani Power Limited has recently acquired 2 x 685 MW Thermal Power Plant of M/S GMR Chhattisgarh Ltd (GCEL), Raipur in the State of Chhattisgarh and changed name is Raipur Energen Limited (REL)

With reference to the Ministry of Environment & Forest (MoEF), Government of India (GoI), Environmental Clearance (EC) for 2x685 MW TPP Social Audit for the CSR Schemes shall be carried out periodically as per the CSR guidelines of Government of India and Details to be submitted to MoEF besides putting it on company's website.

Accordingly, in compliance to the conditions of MoEF's EC for TPP of REL Social Audit & Social Impact Assessment Study need to be carried out.

The proposed study would enable Raipur Energy Limited (REL) to meet the requirement of MoEF's EC compliance besides meeting its mission of being socially responsible corporate entity with thrust on community development around its Thermal Power Plant at Raipur, Chhattisgarh.



## 1.2 PROJECT DETAIL

A 1370 MW (2 × 685 MW) coal based super critical thermal power plant of GMR Chhattisgarh Energy Limited (GCEL) has been recently acquired by Raipur Energen Limited (REL), a wholly owned company of Adani Power Limited (APL). The location of REL's TPP is presented in Figure 1.1. The brief description of the plant is presented in Table 1.1. Figure 1.2 and 1.3 presents layout and configuration of REL's TPP. In addition to coal, LDO and HFO are used as an auxiliary liquid fuel. Light Diesel Oil (LDO) is used for cold start up and HFO is used for flame stabilization at lower load. The main plant is arranged within the three interconnected structures, the boiler, turbine building & integrated control and electrical building.

**TABLE 1.1: SALIENT FEATURES OF REL's TPP**

Item	Particulars
Location of the Plant	Village: Raikhed, Block: Tilda, District: Raipur, State: Chhattisgarh
Net capacity	1370 MW
No. of Units and configuration	2 x 685 MW
Date of Commercial Operation (COD)	Unit 1: June, 2013 Unit 2: Nov, 2014
<b>Technology</b>	
Steam Generator	Super critical Pressure 255 kg /cm <sup>2</sup> Temperature 571°C
Turbo Generator	Turbine -246 kg/cm <sup>2</sup> (a), 563°C, 3000 rpm Generator - 685 MW (Each unit) Generator Transformer - 776 MVA
Major Auxiliary System	<ul style="list-style-type: none"> <li>• Boiler &amp; Turbine Auxiliaries</li> <li>• Pre-treatment Plant</li> <li>• Compressed Air System</li> <li>• Coal and Ash Handling System</li> <li>• CW System and Raw Water System</li> <li>• Fire fighting System</li> <li>• Air conditioning System</li> <li>• Ventilation System</li> </ul>
<b>Stack Details</b>	
No. of Stack	1
Stack Height (meter)	275 each
No. of flue	Bi-flue





Item	Particulars
Additional equipment	Electrostatic Precipitator
Coal	Indigenous Coal – 5.0 MTPA Transportation: Railways
<b>Land</b>	
Plant Land Area	800.00 Acre
<b>Water</b>	
Cooling Technology	Natural draft cooling system
Total Water Requirement	32 MCM (withdraw 25 MCM)
Total Discharge	'Zero Discharge Norm' is being followed
<b>General Information</b>	
Manpower Requirement (Total)	Approx 200
Project Cost	Rs 7,378 crores

#### Advantages of Supercritical Thermal Cycle:

- The 685 MW units have super critical steam parameters to achieve higher efficiency and hence, lower cost of generation. The prime advantages of the Super-critical technology are:
  - Improvement in power plant efficiency is more than 2%.
  - Reduction in coal consumption.
  - Reduction in emission of Greenhouse gases.
  - Overall reduction in auxiliary Power Consumption,
  - Reduction in requirement of ash dike land and consumptive water.
  - Sliding pressure operation due to once through system.
  - Uniform distribution of heat due to spiral wall arrangement leading to less Boiler tube failure, thereby improving system continuity and availability of the station.
  - Low thermal stress in turbine.
  - Less start up time of the boiler.
  - Reduction in water requirement.



- The thermodynamic cycle for 685 MW units considers super-critical steam parameters. The unit comprises of boiler, steam turbine generator, condenser, condensate extraction and boiler feed system along with all other necessary equipment for single/double reheat-regenerative cycle. For purpose of the study, the MP/IP cylinders may be of single/double casing design as per manufacturers' standard. The exhaust from HP-IP turbine will further expand in the double flow LP Turbine.

<b>Steam Generator:</b>	Super critical Pressure 255 kg /cm <sup>2</sup> Temperature 571°C
<b>Turbo Generator:</b>	Turbine - 246 kg/cm <sup>2</sup> (a), 563°C, 3000 rpm Generator - 685 MW (Each unit) Generator Transformer - 776 MVA

- A common stack for both units having bi-flue with total height of reinforced concrete chimney is 275 m having 7.4 m exit diameter.
- For air pollution control system, each steam-generating unit has been provided with electrostatic precipitators. Each precipitator has two parallel gas paths, any of which can be isolated for maintenance when required, keeping the other path in operation.

These units utilize main and hot reheat steam at a temperature of 566°C at the turbine inlet. The main steam inlet pressure is about 254 Ata and the reheat steam pressures are in the order of 40 bar.

The energy flow in the process of thermal power generation is in four stages - firstly, the chemical energy of the coal is transformed into heat energy, which is then converted into mechanical energy and finally into electric energy through generator. The main raw materials required for thermal power generation are coal, water, and air.

In the first stage, the coal moves from the coal handling plant to the coal bunker, from where it is fed into the pulverizing mills. This mill stacks, reclaims and crushes the coal into fine powder, which is then mixed with air and blow down into the boiler by a fan. In the boiler, the mixture of coal dust and air burns like a gas and produces high temperature. The boiler walls are lined with tubes containing high quality de-mineralized water, better known as boiler water. The heat released by the burning coal is absorbed by the boiler which in turn transfers the water into steam. The steam is then channelized through nozzles onto the turbine's blades, where it makes the turbine rotate. A generator is attached to the turbine, which produce electricity once the turbine starts to move. The electricity is then passed through a step-up transfer which increase the voltage so that it can be transmitted efficiently over the power line of the grid.



The ash is generated due to combustion of coal as residue. Ash is collected at the bottom of the furnace as bottom ash, Economizer hoppers as Eco ash, Air-preheater hoppers as APH ash, electrostatic precipitator (ESP) hoppers as Fly ash and stack hoppers as Stack ash. The quantum of ash generation would depend on the plant load factor and the quality of coal being fed.

This ash, known as bottom ash, is water quenched, and then conveyed for disposal. The rest is fly-ash, which is in form of fine powders and is taken out of the furnace to the Electrostatic Precipitators. The fly-ash trapped by the ESP is collected pneumatically operated dry ash storage silos for cement manufacturing.

As already mentioned earlier, the plant is using super-critical technology. The thermal efficiency of the power plant can be improved by using the steam at super critical condition. The improvement in overall efficiency of the plant compared to sub critical parameters is usually at least 2% if the super critical parameters are implemented. The importance of thermal efficiency of the thermodynamic cycle and the methods to improve the thermal efficiency of the cycle are also analyzed. The indirect costs such as reduction in maintenance cost, auxiliary power consumption, ash dike land and environmental benefits such as reduction in greenhouse gases; water requirements, etc. are additional to the above increase in efficiency.

#### **Importance of Efficiency:**

Since the time thermal power stations have been engineered, there is a quest for efficiency improvement. One such effort in that direction is supercritical parameters (i.e.) the pressure above 225 kg/cm<sup>2</sup> and temperature above 374.15°C. The supercritical parameters for Raipur 685 MW boiler are: 259 kg/cm<sup>2</sup> of pressure and 571°C of temperature.

#### **Methods of Increasing Rankine Cycle Efficiency:**

The steam power cycle efficiency can be improved by the following methods:

Raising supply temperature by super heating: Increasing the turbine inlet temperature of steam will raise the heat supply to the boiler more than the heat rejection.

Raising inlet pressure of steam: Increasing the pressure will mean increase in saturation temperature at which steam evaporates thus increasing the average inlet temperature ( $T_1$ ).

Efficiency can be improved by dropping the final pressure (or temperature) at which heat is rejected.



Regenerative heating: Heating the feed water pumped to the boiler by bleeding steam from turbine.

Reheat cycle: Reheating of steam in boiler after it has already expanded in high pressure (HP) turbine will avoid moisture formation in low pressure (LP) Turbine. Also, more heat content of steam before LP turbine will improve efficiency.

At most elevated condition, the steam is supercritical. Thus, if water is at a supercritical pressure and is heated the temperature will increase continuously. At a particular value, the water will flash instantaneously into steam and super heating will commence. There is no change of specific volume from the liquid to the dry steam state.

### **Supercritical Boiler:**

A Boiler operating at a pressure above critical point is called Supercritical Boiler. Supercritical Boiler has no drum and heat-absorbing surface being, in effect, one continuous tube hence called 'Once Through Supercritical Pressure Boilers'. Boiler Feed Pump pressurizes the water in boiler, sensible heat is added in feed heaters, economizer, and furnace tubes, until water attains saturation temperature and flashes instantaneously to dry saturated steam and super heating commences.

### **Steam Generator Set:**

The steam generator for super-critical unit consists of a number of parallel circuits connected by inlet & outlet headers. Pressurized water enters the circuit at one end and leaves as supercritical steam at other end. Thus, boiler is of "Once-through type". Once-through boiler may be designed in both two-pass & tower type design. Since flow is once-through furnace wall tube. Temperature tends to increase at low load. Assisted circulation mode is super imposed to overcome this problem. The volume of the evaporator system is much smaller compared to a Natural circulation boiler. Due to smaller inventory of stored water & steam, theoretical rate of response is much faster than drum unit at base load. Super heater section has been divided in convection and radiant zones and designed so as to maintain rated steam temperature of 571°C at the outlet. The units have been completed with coal preparations and firing system, fuel oil firing system, draft plants comprising FD, ID and PA fans, electrostatic precipitators with required number of fields in series and a multi-flue 275 m high chimney.

Light Diesel Oil (Calorific value around 10,300 K Cal/Kg) is being used as start-up and stabilization fuel. As per GOI norms, space provision for FGD unit has been incorporated in the plant layout.



Due to elevated pressure and temperature, cycle efficiency improves which results in reduction of fuel consumption per unit of electricity generated, which in turn reduces CO<sub>2</sub>, NO<sub>x</sub> & SO<sub>2</sub> emission. To limit the dust load at the inlet to the chimney to a value of 50 mg/Nm<sup>3</sup>, as per the norms prescribed by the Ministry of Environment and Forest, Govt. of India, adequately sized electrostatic-precipitators have been provided.

### **Turbine Generator Set:**

The steam turbine set is with standard multi-stage, 3000 rpm, tandem compound, single/double reheat, regenerative, condensing, multi-cylinder unit with eight (8)/nine (9) uncontrolled extractions for regenerative feed water heating. The turbine has one single flow HP cylinder, one double flow IP turbine and two double flow LP casings. The LP turbine exhausts against a condenser pressure of 76 mm Hg (abs) and maximum cooling water temperature of 33°C. The unit has horizontally split double flow LP cylinder with the LP turbine exhausting steam directly into spring mounted surface type, two-pass condenser having divided water box. The turbo-generator sets are designed for a maximum throttle steam flow at turbine valve wide open (VWO) condition of 105% of turbine MCR flow. A quick acting "HP and LP Turbine Bypass Station" has been provided as a part of turbine package. The unit is equipped with all auxiliaries as per good engineering practice. The steam turbine is directly coupled to the horizontally mounted, three phases, two-pole, cylindrical rotor type electric generator terminal after meeting power requirement for excitation system. The generator is of 0.85 – plant load factor and thus the MVA rating works out to be about 776 MVA. The generators deliver power at the standard voltage of the manufacturer between 20-24 KV, 3 Phase, 50 Hz. The steam turbine is equipped with hydraulic/motorized turning gear for uniform heating/ cooling of the rotor during start up/shut down. Highly sensitive electronic-hydraulic governing system is provided with suitable hardware to ensure fast speed to operation & safety. The units are complete with twin flow, double-pass, horizontal, surface type, water cooled condensers, 2 x 100% vacuum pumps (1W + 1S), vertical/ horizontal shell and tube type high pressure feed water heaters with group bypass arrangement, 4-stage horizontal U-tube low pressure heaters, drain cooler, gland steam condenser, horizontal spray or spray-cum-tray type deaerator with integral vent condenser etc. The units are equipped with two (2) nos. 50% capacity turbine driven and one (1) 30% capacity motor driven centrifugal, horizontal, boiler feed pumps of barrel casing construction.



**FIGURE 1.1: LOCATION OF 2 X 685 MW THERMAL POWER PLANT OF RAIPUR ENERGEN LIMITED (REL)**

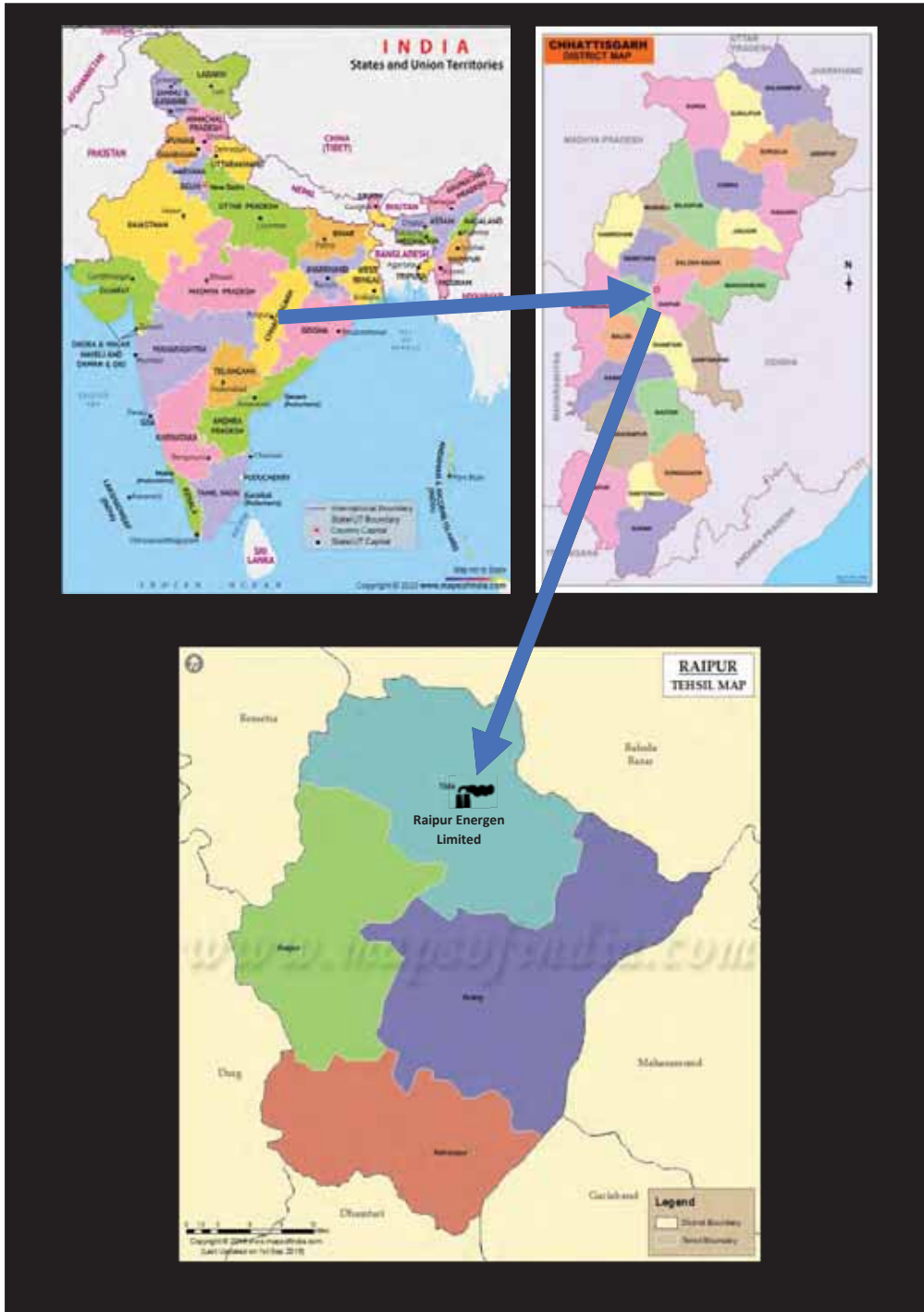
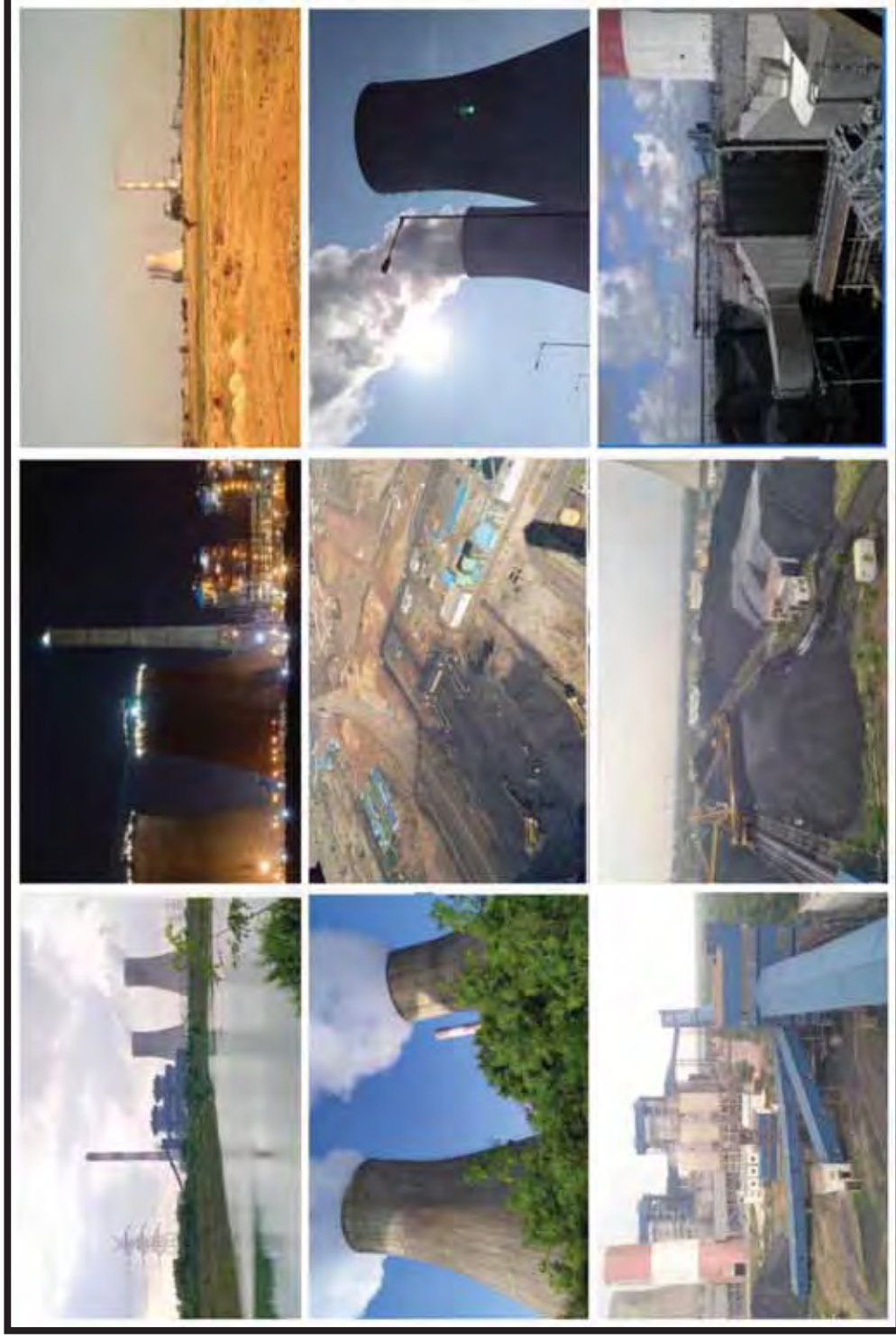


FIGURE 1.2: LAYOUT PLAN OF 2 X 685 MW THERMAL POWER PLANT OF RAIPUR ENERGEN LIMITED



FIGURE 1.3: VIEW OF 2 X 685 MW THERMAL POWER PLANT OF RAIPUR ENERGEN LIMITED





### 1.3 OBJECTIVES OF THE STUDY

The aims of the proposed social audit are to evaluate social impact of CSR activities undertaken in and around the vicinity of the REL's TPP area for upliftment of quality of life of local people of the neighbouring villages. The prime objectives of the study includes:

- To assess the baseline status of key social parameters around the REL's TPP site;
- To evaluate the social impact of the TPP based on the available secondary data and information generated during the study/survey;
- To present all potential significant social impacts and local employable youth for training in skills, relevant to the project;
- To undertake detailed social audit of CSR Activities undertaken by REL in last three years.

### 1.4 SCOPE OF THE STUDY

The scope of the study includes the undertaking of a reconnaissance Social Audit & Social Impact Evaluation of CSR activities undertaken by REL. On the basis of the survey, a framework for assessing social development in all the villages coming within 10 km radius of the project site would be evolved. The study shall be in line with National Legislation and in compliance with EC Conditions of MoEF & CC.

The scope of work includes:

- 1) Social Audit & Social Impact Evaluation Survey/study.
- 2) Action plan for identification of local employable youth for training in skills, relevant to the project.
- 3) Socio-economic profile of the villages and economic development profile of the villages.
- 4) Public consultation in all Panchayat/villages to ascertain the public views on various social and local issues.
- 5) Community engagement and social development plan.
- 6) Social Audit of 10 km radius and action plan for implementation.



- 7) Gap analysis and comparison of last three years for local development as well as social upliftment of local society.
- 8) Advantages of conducting Social Audit /Social Impact Evaluation.

## 1.5 DETAIL OF REL-CSR ZONE

The REL's Thermal Power Plant (TPP) is located at Raikheda Village under Tilda Block/Tehsil of Raipur District, Chhattisgarh. The CSR Zone i.e. 10 km radius of TPP falls primarily under Tilda Block/Tehsil. However, small area towards SW-W directions of TPP falls under Raipur Block/Tehsil.

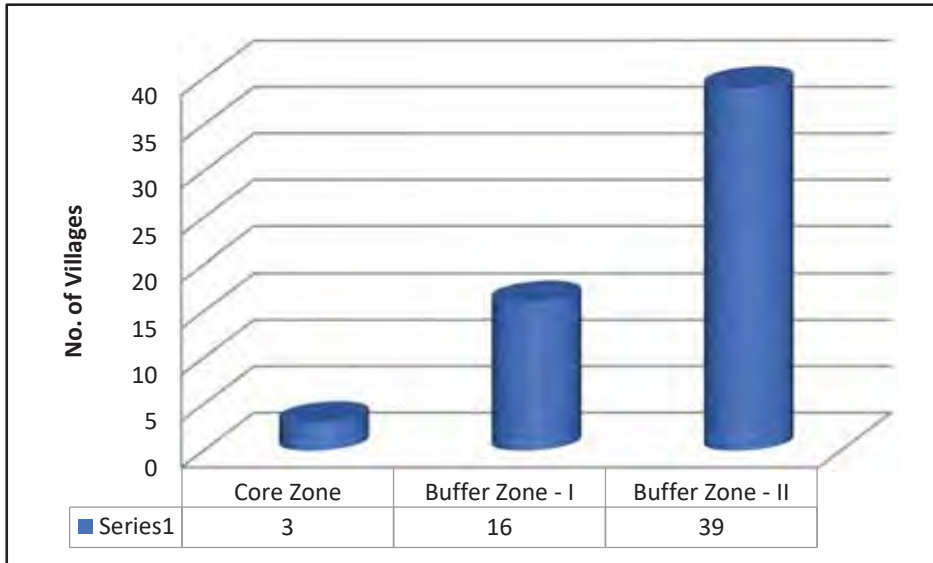
As the TPP is located under the 3 village/mouza, namely, Raikheda, Gaitra and Chicholi of Tilda Block/Tehsil under District Raipur, Chhattisgarh. Accordingly, these villages/mouzas have been considered as core villages and socio-economic impact to these villages are likely to be maximum. The villages falling within the 5 km radius of TPP are considered as buffer zone – I and the villages falling within the 5-10 km radius of TPP are considered as buffer zone – II. Table 1.2 presents zone wise distribution of villages falling under the REL-CSR zone. The analysis of the CSR villages reveals that out of total 65 villages, 5% (3 villages) are falling under core zone and 25% (16 villages) are under Buffer Zone-I and remaining in Buffer Zone-II (Figure 1.4). The Tehsil/Block wise distribution of these CSR villages is presented in Figure 1.5. The detail of villages falling under the REL-CSR zone are presented in Table 1.3. Figure 1.6 present location of REL's CSR Zone. The Tilda and Raipur block maps indicating location of CSR villages are presented in Annexure 1.1.

**TABLE 1.2: DISTRIBUTION OF VILLAGES FALLING UNDER REL-CSR ZONE**

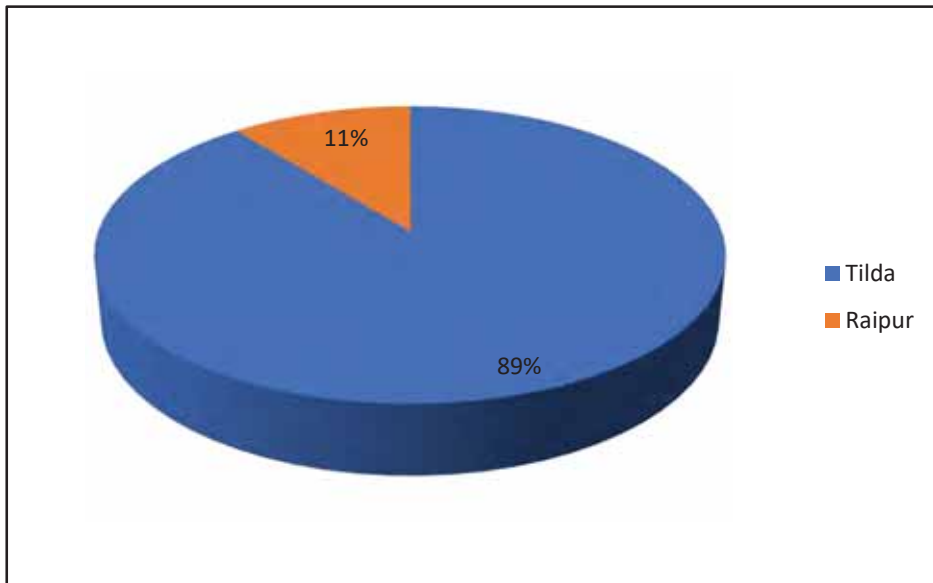
Zone	No. of Villages		
	Tilda Block	Raipur Block	Total
<b>Core Zone</b> (Project Affected Villages)	3	-	3 (4.61%)
<b>Buffer Zone-I</b> (Villages within 5 km radius of TPP)	16	-	16 (24.62%)
<b>Buffer Zone-II</b> (Villages within 5-10 km radius of TPP)	39	7	46 (70.77%)
<b>Total</b>	<b>58</b> <b>(89.23%)</b>	<b>7</b> <b>(10.77%)</b>	<b>65</b>



**Figure 1.4: Zone Wise Distribution of CSR Villages of REL's TPP**



**Figure 1.5: Block Wise Distribution of CSR Villages of REL's TPP**



**TABLE 1.3: DETAIL OF VILLAGES FALLING UNDER THE CSR ZONE OF REL**

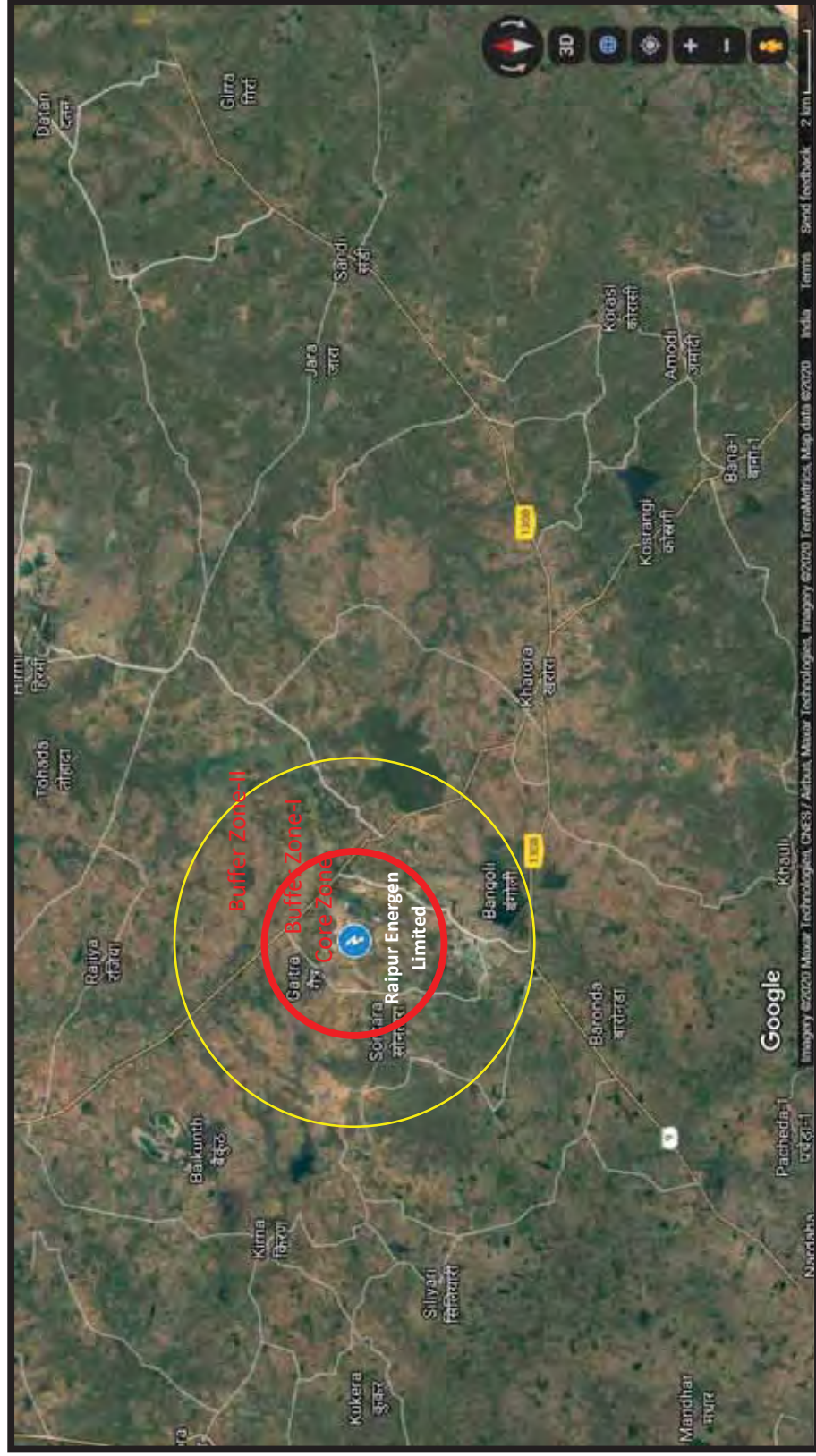
S No	Village Code	Name of Village	Block	District	Direction (wro TPP)	Distance (wro TPP in km)
<b>CORE ZONE</b>						
1	444970	Raikheda	Tilda	Raipur	TPP	-
2	444965	Chicholi	Tilda	Raipur	NE	3.7
3	444969	Gaitra	Tilda	Raipur	N	2.85
<b>BUFFER ZONE –I</b>						
4	444980	Dhansuli-1	Tilda	Raipur	S	2
5	444977	Amlitalab	Tilda	Raipur	SW	2
6	444976	Deogaon	Tilda	Raipur	W	2
7	444975	Sontara	Tilda	Raipur	NW	1.7
8	444966	Mohrenga	Tilda	Raipur	E	4
9	444979	Mura	Tilda	Raipur	SE	2.42
10	444982	Bangoli	Tilda	Raipur	S	3.28
11	444983	Pikaradih	Tilda	Raipur	S	5
12	444981	Kurra-1	Tilda	Raipur	SW	4.26
13	444978	Khauna	Tilda	Raipur	W	4.85
14	444973	Madhi	Tilda	Raipur	W	3.42
15	444972	Janjgira	Tilda	Raipur	NW	5
16	444968	Khapri	Tilda	Raipur	NW	3.42
17	444911	Khamhariya	Tilda	Raipur	N	4.85
18	444917	Tarasiw	Tilda	Raipur	N	4.28
19	444948	Gaurkheda	Tilda	Raipur	NE	5
<b>BUFFER ZONE -II</b>						
20	444916	Chhataud	Tilda	Raipur	N	6.27
21	444913	Rajiya	Tilda	Raipur	N	9.41
22	444921	Khudmudi	Tilda	Raipur	N	8.83
23	444943	Bhibhauri	Tilda	Raipur	NE	8.4
24	444944	Baheradih	Tilda	Raipur	NE	9.12
25	444945	Keotara	Tilda	Raipur	NE	7.13
26	444946	Nakti Kumhari	Tilda	Raipur	NE	9.55
27	444949	Pachdeori	Tilda	Raipur	NE	7.84
28	444950	Paraswani	Tilda	Raipur	NE	6.55
29	444951	Bharuwadih Khurd	Tilda	Raipur	NE	5.56
30	444952	Bharuwadih Kala	Tilda	Raipur	NE	7.41
31	444947	Kathiya-1	Tilda	Raipur	NE	9.26
32	444955	Pathara Kundi	Tilda	Raipur	E	8.26



S No	Village Code	Name of Village	Block	District	Direction (wro TPP)	Distance (wro TPP in km)
33	444967	Khauli Dabri	Tilda	Raipur	E	6.27
34	444957	Nahardih	Tilda	Raipur	E	10
35	444961	Kesla	Tilda	Raipur	SE	9.55
36	444962	Math	Tilda	Raipur	SE	7.41
37	444998	Budgahan	Tilda	Raipur	SE	10
38	444964	Tildadih	Tilda	Raipur	SE	6.41
39	444963	Mudpar-1	Tilda	Raipur	SE	5.98
40	445000	Beldar Seoni	Tilda	Raipur	SE	10
41	444984	Ganiyari	Tilda	Raipur	S	6.27
42	444985	Baronda	Tilda	Raipur	S	8.26
43	444990	Asaunda	Tilda	Raipur	S	8.69
44	444991	Tulsi-3	Tilda	Raipur	S	9.69
45	444989	Bithiya	Tilda	Raipur	SE	9.41
46	444987	Mohadi-2	Tilda	Raipur	S	10
47	444986	Adsena	Tilda	Raipur	S	8.84
48	444974	Bartori-2	Tilda	Raipur	W	7.12
49	444971	Kodawa	Tilda	Raipur	W	6.7
50	444906	Kirna	Tilda	Raipur	NW	9.55
51	444907	Jalso	Tilda	Raipur	NW	7.7
52	444908	kundru	Tilda	Raipur	NW	7.41
53	444904	Hatband	Tilda	Raipur	NW	10
54	444910	Nakti Khapri	Tilda	Raipur	NW	5.7
55	444909	Konari	Tilda	Raipur	N	5.98
56	444915	Bartori	Tilda	Raipur	N	7.41
57	444914	Bahesar	Tilda	Raipur	NW	8.26
58	444912	Sarwe	Tilda	Raipur	N	9.12
59	444697	Saragaon	Raipur	Raipur	S	7.84
60	444696	Nilja	Raipur	Raipur	SW	6.7
61	444695	Pawani	Raipur	Raipur	SW	7.41
62	444699	Mangasa	Raipur	Raipur	SW	7.84
63	444700	Pathari(Pathari Khudmudi)	Raipur	Raipur	SW	9.12
64	444701	Mauhagaon	Raipur	Raipur	W	8.26
65	444702	Malaud	Raipur	Raipur	W	9.26



FIGURE 1.6: LOCATION OF CSR ZONE OF RAIPUR ENERGEN LIMITED



## 2.0 PRINCIPLES AND GUIDELINES FOR SA & SIE

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### 2.1 CORPORATE SOCIAL RESPONSIBILITY (CSR)

#### 2.1.1 Concept of CSR

Corporate Social Responsibility (CSR) also called corporate responsibility, corporate citizenship, responsible business and corporate social opportunity is a concept whereby organizations consider the interests of society by taking responsibility for the impact of their activities on customers, suppliers, employees, shareholders, communities and other stakeholders, as well as the environment. This obligation is seen to extend beyond the statutory obligation to comply with legislation and sees organizations voluntarily taking further steps to improve the quality of life for employees and their families as well as for the local community and society at large. The practice of CSR is subject to much debate and criticism. Proponents argue that there is a strong business case for CSR, in that corporations benefit in multiple ways by operating with a perspective broader and longer than their own immediate, short-term profits. Critics argue that CSR distracts from the fundamental economic role of businesses; others argue that it is nothing more than superficial window-dressing; still others argue that it is an attempt to pre-empt the role of governments as a watchdog over powerful multinational corporations.

#### CSR in Global Context

While there may be no single universally accepted definition of CSR, each definition that currently exists underpins the impact that businesses have on society at large and the societal expectations of them. Although the roots of CSR lie in philanthropic activities (such as donations, charity, relief work, etc.) of corporations, globally, the concept of CSR has evolved and now encompasses all related concepts such as triple bottom line, corporate citizenship, philanthropy, strategic philanthropy, shared value, corporate sustainability and business responsibility. This is evident in some of the definitions presented below:

The European Commission defines CSR as “the responsibility of enterprises for their impacts on society”. To completely meet their social responsibility, enterprises “should have in place a process to integrate social, environmental, ethical human rights and consumer concerns into their business operations and core strategy in close collaboration with their stakeholders”.

The World Business Council for Sustainable Development (WBCSD) defines CSR as “the continuing commitment by business to contribute to economic development while improving the quality of life of the workforce and their families as well as of the community and society at large.”



According to the United Nations International Development Organization (UNIDO), “Corporate social responsibility is a management concept whereby companies integrate social and environmental concerns in their business operations and interactions with their stakeholders. CSR is generally understood as being the way through which a company achieves a balance of economic, environmental and social imperatives (Triple-Bottom-Line Approach), while at the same time addressing the expectations of shareholders and stakeholders. In this sense it is important to draw a distinction between CSR, which can be a strategic business management concept, and charity, sponsorships or philanthropy. Even though the latter can also make a valuable contribution to poverty reduction, will directly enhance the reputation of a company and strengthen its brand, the concept of CSR clearly goes beyond that.”

From the above definitions, it is clear that:

- The CSR approach is holistic and integrated with the core business strategy for addressing social and environmental impacts of businesses.
- CSR needs to address the well-being of all stakeholders and not just the company's shareholders.
- Philanthropic activities are only a part of CSR, which otherwise constitutes a much larger set of activities entailing strategic business benefits.

### **CSR in Indian Context**

CSR in India has traditionally been seen as a philanthropic activity. And in keeping with the Indian tradition, it was an activity that was performed but not deliberated. As a result, there is limited documentation on specific activities related to this concept. However, what was clearly evident that much of this had a national character encapsulated within it, whether it was endowing institutions to actively participating in India's freedom movement, and embedded in the idea of trusteeship.

As some observers have pointed out, the practice of CSR in India still remains within the philanthropic space, but has moved from institutional building (educational, research and cultural) to community development through various projects. Also, with global influences and with communities becoming more active and demanding, there appears to be a discernible trend, that while CSR remains largely restricted to community development, it is getting more strategic in nature (that is, getting linked with business) than philanthropic, and a large number of companies are reporting the activities they are undertaking in this space in their official websites, annual reports, sustainability reports and even publishing CSR reports.





The Companies Act, 2013 has introduced the idea of CSR to the forefront and through its disclose-or-explain mandate, is promoting greater transparency and disclosure. Schedule VII of the Act, which lists out the CSR activities, suggests communities to be the focal point. On the other hand, by discussing a company's relationship to its stakeholders and integrating CSR into its core operations, the draft rules suggest that CSR needs to go beyond communities and beyond the concept of philanthropy. It will be interesting to observe the ways in which this will translate into action at the ground level, and how the understanding of CSR is set to undergo a change.

### 2.1.2 CSR and Sustainability

Sustainability (corporate sustainability) is derived from the concept of sustainable development which is defined by the Brundtland Commission as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs". Corporate sustainability essentially refers to the role that companies can play in meeting the agenda of sustainable development and entails a balanced approach to economic progress, social progress and environmental stewardship.

CSR in India tends to focus on what is done with profits after they are made. On the other hand, sustainability is about factoring the social and environmental impacts of conducting business, that is, how profits are made. Hence, much of the Indian practice of CSR is an important component of sustainability or responsible business, which is a larger idea, a fact that is evident from various sustainability frameworks. An interesting case in point is the NVGs for social, environmental and economic responsibilities of business issued by the Ministry of Corporate Affairs in June 2011. Principle eight relating to inclusive development encompasses most of the aspects covered by the CSR clause of the Companies Act, 2013. However, the remaining eight principles relate to other aspects of the business. The UN Global Compact, a widely used sustainability framework has 10 principles covering social, environmental, human rights and governance issues, and what is described as CSR is implicit rather than explicit in these principles.

Globally, the notion of CSR and sustainability seems to be converging, as is evident from the various definitions of CSR put forth by global organisations. The genesis of this convergence can be observed from the preamble to the recently released draft rules relating to the CSR clause within the Companies Act, 2013 which talks about stakeholders and integrating it with the social, environmental and economic objectives, all of which constitute the idea of a triple bottom line approach. It is also acknowledged in the Guidelines on Corporate Social Responsibility and Sustainability for Central Public Sector Enterprises issued by the Department of Public Enterprises (DPE), Ministry of Heavy Industries & Public Enterprises in April 2013. The



new guidelines, which have replaced two existing separate guidelines on CSR and sustainable development, issued in 2010 and 2011 respectively, mentions the following:

“Since corporate social responsibility and sustainability are so closely entwined, it can be said that corporate social responsibility and sustainability is a company’s commitment to its stakeholders to conduct business in an economically, socially and environmentally sustainable manner that is transparent and ethical.”

### 2.1.3 Functional Elements of CSR

Milton Friedman, Nobel Laureate in Economics and author of several books wrote in 1970 in the New York Times Magazine that "the social responsibility of business is to increase its profits" and "the business of business is business". This represented an extreme view that the only social responsibility a law-abiding business has is to maximize profits for the shareholders, which were considered the only stakeholders for the company. However, time has given the term 'stakeholder' wider connotations. Edward Freeman defines, 'a stakeholder in an organization is any group or individual who can affect or is affected by the achievement of the organization's objectives.' Thus, the term stakeholder includes (apart from shareholders), but not limited to, customers, employees, suppliers, community, environment and society at large.

These and a host of other such ideas have given rise to the concept of Corporate Social Responsibility (CSR). The concept of CSR goes beyond charity or philanthropy and requires the company to act beyond its legal obligations and to integrate social, environmental and ethical concerns into its business process. Business for Social Responsibility defines CSR as "achieving commercial success in ways that honour ethical values and respect people, communities, and the environment. It means addressing the legal, ethical, commercial and other expectations that society has for business and making decisions that fairly balance the claims of all key stakeholders. In its simplest terms it is: "what you do, how you do it, and when and what you say." A widely quoted definition by the World Business Council for Sustainable Development states that "Corporate social responsibility is the continuing commitment by business to behave ethically and contribute to economic development while improving the quality of life of the workforce and their families as well as of the local community and society at large".

Though, there is no universal definition of CSR but the common understanding amongst most of these definitions concern with how the profits are made and how they are used, keeping in mind the interests of all stakeholders. The concept of Corporate Social Responsibility is constantly evolving. The emerging concept of CSR goes beyond charity and requires the company to act beyond its legal obligations and to integrate social, environmental and ethical concerns into company's business process. What is generally understood by CSR is that the



business has a responsibility - towards its stakeholders and society at large - that extends beyond its legal and enforceable obligations. The triple bottom line approach to CSR emphasizes a company's commitment to operating in an economically, socially and environmentally sustainable manner. The emerging concept of CSR advocates moving away from a 'shareholder alone' focus to a 'multi-stakeholder' focus. This would include investors, employees, business partners, customers, regulators, supply chain, local communities, the environment and society at large. The key components of CSR would therefore include the following:

**Corporate Governance:** Within the ambit of corporate governance, major issues are the accountability, transparency and conduct in conformity with the laws. Good corporate governance policy would enable the company to realize its corporate objectives, protect shareholder rights, meet legal requirements and create transparency for all stakeholders.

**Business Ethics:** relates to value-based and ethical business practices. 'Business ethics defines how a company integrates core values - such as honesty, trust, respect, and fairness – into its policies, practices, and decision making. Business ethics also involves a company's compliance with legal standards and adherence to internal rules and regulations.

**Workplace & Labour Relations:** Human resources are most important and critical to a company. Good CSR practices relating to workplace and labour relations can help in improving the workplace in terms of health and safety, employee relations as well as result in a healthy balance between work and non-work aspects of employees' life. It can also make it easier to recruit employees and make them stay longer, thereby reducing the costs and disruption of recruitment and retraining.

**Affirmative Action/Good Practices:** Equal opportunity employer, diversity of workforce that includes people with disability, people from the local community etc., gender policy, code of conduct/guidelines on prevention of sexual harassment at workplace, prevention of HIV/AIDS at workplace, employee volunteering etc. are some of the good practices which reflect CSR practices of the company.

**Supply Chain:** The business process of the company is not just limited to the operations internal to the company but to the entire supply chain involved in goods and services. If anyone from the supply chain neglects social, environmental, human rights or other aspects, it may reflect badly on the company and may ultimately affect business heavily. Thus, company should use its strategic position to influence the entire supply chain to positively impact the stakeholders.

**Customers:** The products and services of a company are ultimately aimed at the customers. The cost and quality of products may be of greatest concern to the customers but these are not the only aspects that the customers are concerned with. With increased awareness and means of communication, customer satisfaction and loyalty would depend on how the company has



produced the goods and services, considering the social, environmental, supply-chain and other such aspects.

**Environment:** Merely meeting legal requirements in itself does not comprise CSR but it requires company to engage in such a way that goes beyond mandatory requirements and delivers environmental benefits. It would include, but not limited to, finding sustainable solutions for natural resources, reducing adverse impacts on environment, reducing environment-risky pollutants/emissions as well as producing environment-friendly goods.

**Community:** A major stakeholder to the business is the community in which the company operates. The involvement of a company with the community would depend upon its direct interaction with the community and assessment of issues/risks faced by those living in the company surrounding areas. This helps in delivering a community-focused CSR strategy - making positive changes to the lives of the people and improving the brand-image of the company. Involvement with the community could be both direct & indirect - through funding and other support for community projects implemented by local agencies.

#### 2.1.4 Benefits of a CSR Programme

As the business environment gets increasingly complex and stakeholders become vocal about their expectations, good CSR practices can only bring in greater benefits, some of which are as follows:

- **Communities provide the licence to operate:** Apart from internal drivers such as values and ethos, some of the key stakeholders that influence corporate behaviour include governments (through laws and regulations), investors and customers. In India, a fourth and increasingly important stakeholder is the community, and many companies have started realizing that the 'licence to operate' is no longer given by governments alone, but communities that are impacted by a company's business operations. Thus, a robust CSR programme that meets the aspirations of these communities not only provides them with the licence to operate, but also to maintain the licence, thereby precluding the 'trust deficit'.
- **Attracting and retaining employees:** Several human resource studies have linked a company's ability to attract, retain and motivate employees with their CSR commitments. Interventions that encourage and enable employees to participate are shown to increase employee morale and a sense of belonging to the company.



- **Communities as suppliers:** There are certain innovative CSR initiatives emerging, wherein companies have invested in enhancing community livelihood by incorporating them into their supply chain. This has benefitted communities and increased their income levels, while providing these companies with an additional and secure supply chain.
- **Enhancing corporate reputation:** The traditional benefit of generating goodwill, creating a positive image and branding benefits continue to exist for companies that operate effective CSR programmes. This allows companies to position themselves as responsible corporate citizens.

### 2.1.5 Principles and Guidelines of CSR

National Voluntary Guidelines on Social, Environmental and Economic Responsibilities of Business rolled-out by the Ministry of Corporate Affairs in India, were developed through an extensive consultative process with the objective of providing a distinctive India-centric approach for Indian businesses to understand the nuances of responsible business, applicable to large and small businesses alike. They are easy to comprehend and implement and encourage businesses to adopt the triple bottom line approach. These guidelines consist of nine principles which relate to ethics and transparency, product life cycle sustainability, employee well-being, stakeholder engagement, human rights, environmental stewardship, responsible policy advocacy, inclusive development and consumer well-being. Each principle consists of core elements that further articulate the purpose and sense of each principle. It also provides an approach for adopting these guidelines.

In India, the concept of CSR is governed by Section 135 of the Companies Act, 2013, which was passed by both Houses of the Parliament, and had received the assent of the President of India on 29 August 2013. The CSR provisions within the Act is applicable to companies with an annual turnover of 1,000 crore INR and more, or a net worth of 500 crore INR and more, or a net profit of five crore INR and more. The new rules, which are applicable from the fiscal year 2014-15 onwards, also require companies to set-up a CSR Committee consisting of their board members, including at least one independent director.

The Act encourages companies to spend at least 2% of their average net profit in the previous three years on CSR activities. The ministry's rules, that have been put up for public comment, define net profit as the profit before tax as per the books of accounts, excluding profits arising from branches outside India.

The Act lists out a set of activities eligible under CSR (Figure 2.1). Companies may implement these activities taking into account the local conditions after seeking board's approval. The



indicative activities which can be undertaken by a company under CSR have been specified under Schedule VII of the Act.

The Companies (Corporate Social Responsibility Policy) Rules, 2014 provide a number of clarifications, some the highlights are as follows:

- Surplus arising out of CSR activities will have to be reinvested into CSR initiatives, and this will be over and above the 2% figure.
- The company can implement its CSR activities through the following methods:
  - Directly on its own
  - Through its own non-profit foundation set- up so as to facilitate this initiative
  - Through independently registered non-profit organisations that have a record of at least three years in similar such related activities
  - Collaborating or pooling their resources with other companies

**FIGURE 2.1: LIST OF CSR ACTIVITIES  
(AS PER COMPANIES ACT, 2013 SCHEDULE VII)**



- Only CSR activities undertaken in India will be taken into consideration.
- Activities meant exclusively for employees and their families will not qualify.
- A format for the board report on CSR has been provided which includes amongst others, activity-wise, reasons for spends under 2% of the average net profits of the previous three years and a responsibility statement that the CSR policy, implementation and monitoring process is in compliance with the CSR objectives, in letter and in spirit. This has to be signed by either the CEO, or the MD or a director of the company.

### 2.1.6 CSR Policy of APL

Adani Power Limited (APL) has always been committed to the cause of social service and has repeatedly channelized a part of its resources and activities, such that it positively affects the society socially, ethically and also environmentally. The company has taken up various CSR initiatives and enhanced values in the society.

With the advent of the Companies Act, 2013 constitution of a Corporate Social Responsibility Committee of the Board and formulation of a CSR policy became a mandatory requirement. Accordingly, the company has formulated a robust CSR policy which encompasses its philosophy and guides its sustained efforts for undertaking and supporting socially useful programmes for the welfare and sustainable development of the society. The CSR policy of APL was approved by the Board of Directors on 6<sup>th</sup> August, 2014. The detail of CSR Policy of APL, August, 2014 is presented in Annexure 2.1.

## 2.2 SOCIAL IMPACT EVALUATION (SIE)

REL believes in growth with a human face, and pursuing people-centred development. REL is a socially committed organization and a socially responsible corporate citizen. It attaches great importance to discharging its overall social responsibilities to the community and the society at large. In accordance with its mission of being socially responsible corporate entity with thrust on Community Development, REL aims to focus on implementing all community development (CD) programmes in the affected/ neighbouring villages around its TPP based on the specific needs of the community assessed through the Need Assessment Survey. REL has undertaken CSR activities as per the APL's CSR policy in approximately 13 Project Affected Villages (PAVs) under Raipur District of Chhattisgarh on the basis of NAS. To understand the effectiveness and



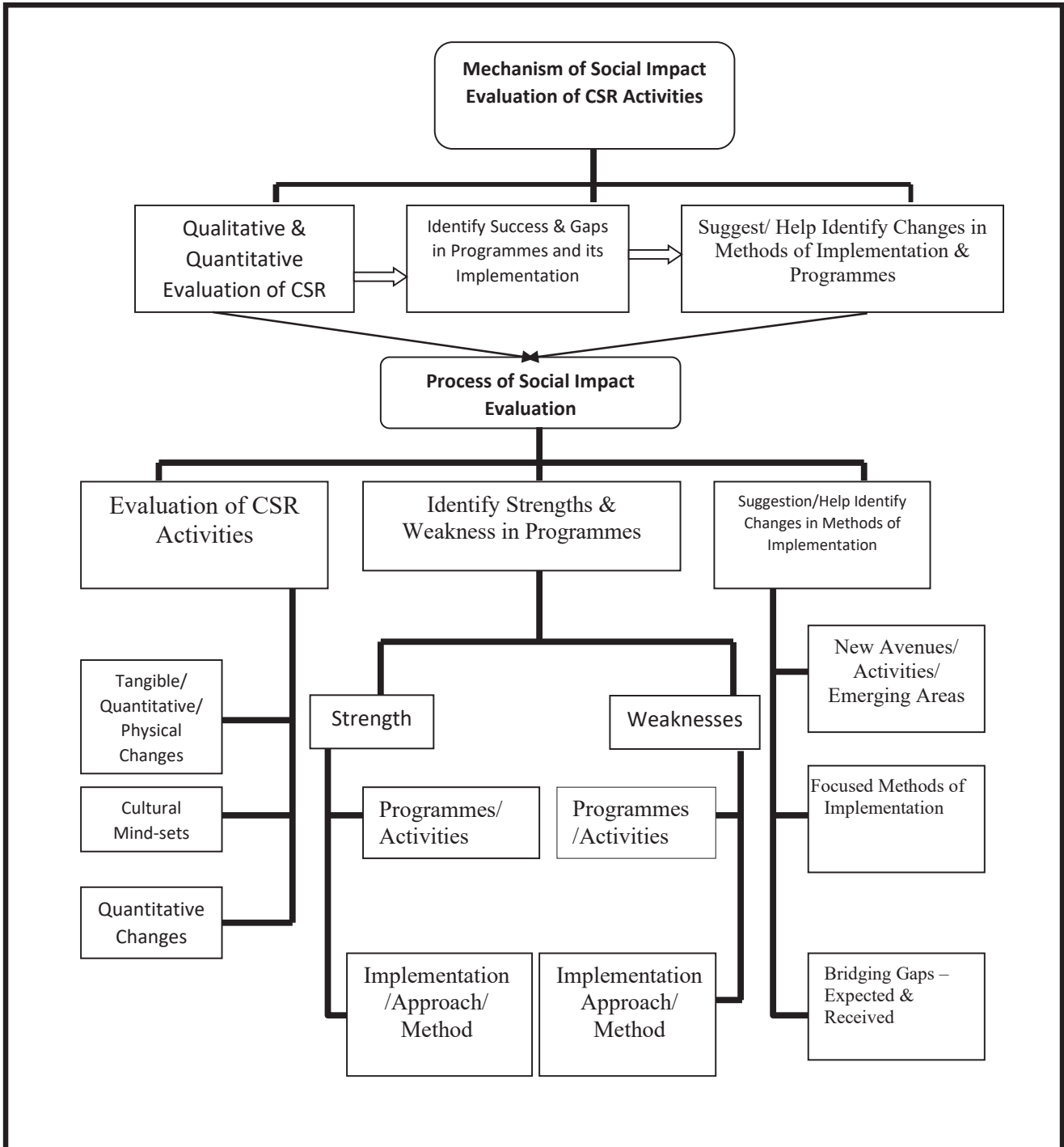
utility of the CSR activities carried out, it is imperative to conduct an evaluation study to measure the social, economic & cultural impacts of the programs/activities on the community. The whole exercise aims to set long-term CD priority, which could be achieved within the specified time frame. The evaluation process would also help REL to create positive brand image and contribute to sustainable development. Very briefly, social impact evaluation is a way of assessing the impact of CSR activities on groups/community members. The results for evaluation then guide future actions.

Social Impact Evaluation basically means the evaluation of qualitative and quantitative impact of the Community Development Programme carried out by the organization on the community. The evaluation includes assessment of the physical changes that have taken place during an identified span of time because of the activities undertaken as well as the awareness and perception of the people for whom the activities were aimed. The impact could be short term or / and long term. It could be on the economic aspect or the socio-cultural aspect or on both the aspects. This impact would vary depending upon the efficiency and effectiveness of the CD activities carried out and the social/physical infrastructure provided to the Community. The mechanism of SIE of CSR activities is presented in Figure 2.2





**FIGURE 2.2: MECHANISM OF SOCIAL IMPACT EVALUATION OF CSR ACTIVITIES**



Social impact evaluation would help to determine the extent to which the community people have got benefited from the CSR activities implemented for them and whether CSR activities have been able to bring desired changes in the educational/ health / economic status of the communities, thereby providing an understanding of the effectiveness of the existing programs/ activities. SIE also proposes the changes that need to be undertaken in future implementation of CSR activities. SIE helps to understand the following aspects of community:

- The short term and long term social/ cultural / economic impacts of the CSR activities on the community people.
- The effectiveness of the existing programs / activities with respect to the needs of the community.
- The contribution of CSR activities in raising the living standard of people.
- The changing needs of the community people.

### 2.3 SOCIAL AUDIT (SA)

Social auditing is a process that enables an organisation to assess and demonstrate its social, economic, and environmental benefits and limitations. It is a way of measuring the extent to which an organisation lives up to the shared values and objectives it has committed itself to. Social auditing also provides an assessment of the impact of an organisation's non-financial objectives through systematically and regularly monitoring its performance and the views of its stakeholders. Social auditing requires the involvement of stakeholders. This may include employees, clients, volunteers, funders, contractors, suppliers and local residents interested in the organisation. Stakeholders are defined as those persons or organisations who have an interest in, or who have invested resources in, the organisation.

In other words, 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.

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.



### 2.3.1 Objectives of Social Audit

The prime objectives of social audit include:

- Increasing efficacy and effectiveness of community development programmes.
- Assessing the physical and financial gaps between needs and resources available for community development.
- Scrutiny of various policy decisions, keeping in view stakeholder interests and priorities, particularly of vulnerable & poor people.
- Creating awareness among beneficiaries and providers of local social and productive services.
- Estimation of the opportunity cost for stakeholders of not getting timely access to common property resources.

### 2.3.2 Advantages of Social Audit

A social audit can complement an organisation's annual financial audit by providing clear information on performance against social objectives. The results can be fed into the organisation's strategic review and planning processes to improve overall performance and social impact. It has been shown to increase accountability of the organisation to its stakeholders and to enhance democratic practice. In addition to serving as a management tool, social audits can be used for marketing, promotion and advocacy purposes. The prime advantages of social audit include:

- Encourages local democracy.
- Trains the community on participatory local planning.
- Encourages community participation.
- Benefits disadvantaged groups.
- Promotes collective decision making and sharing responsibilities.
- Develops human resources and social capital.



### 2.3.3 Process of Social Audit

CSR Audit is a formal strategic process that helps to measure company's actual social performance against the social objectives it has set for itself, and how decision making, mission statement, guiding principles, and business conduct are aligned with social responsibilities. The audit helps in discovering the interests and objectives of employees and stakeholders.

Recent research has indicated that integrating business strategy and corporate social responsibility contributes to:

- Improved community relations
- Reduced operating costs
- Increased employee satisfaction
- Corporate accountability
- Positive brand awareness

There are six key steps of Social Audit which are as follows:

#### 1. Participatory activities

- Understanding key principle of social audit.
- List core values of the programmes
- List down social objectives of the programme
- Match activities with objectives
- List current practices and delivery system
- Fix the responsibility for doing social audit
- Budget for social audit

#### 2. Defining audit boundaries and identifying stakeholders

- Elaborate key issues for social auditing based on the social objectives
- Prepare a statement of purpose, objectives, key issue and activities for social auditing.
- Identify key stakeholders for consultation (Government and civil society)
- Forge consensus on audit boundaries to identify stakeholders and formalize commitments.

#### 3. Social accounting & bookkeeping

- Select performance indicator for social accounting
- Identify what additional with existing records can be used.



- Identify what additional data to be collected, who would collect this data and how
- When stakeholders would be consulted and about what?
- Prepare a social accounting plan timeline
- Plan for monitoring social accounting activities

#### 4. Preparing and using accounts

- Prepare social accounts using existing information, data collection and views of stakeholders
- Identify key issues for action
- Take stock of objective, activities and core values
- Set targets for future

#### 5. Social audit & dissemination

- Presenting social accounts to social auditors
- Social auditors verify data and comment on the quality of social accounting and reporting
- Social auditor has to collect information from the stakeholders regarding programme implementation and benefits accrued to them
- Disseminate social auditors consolidate report to the decision making committee
- Disseminate report to civil society
- Begin next cycle of social accounting

#### 6. Feedback & institutionalization of social audit

- Feedback for fine tuning of policy legislation, administrative functioning and programming towards social objectives
- Follow up action
- Reviewing support to civil society for the participation
- Institutionalization of process

Following are key factors for successful Social Audit:

- Level of information shared with and involvement of stakeholders, particularly of the rural poor, women, and other marginalized sections.
- Commitment, seriousness and clear responsibilities for follow-up actions.
- Involvement of key facilitators in the process.



## 3.0 METHODS & TOOLS FOR SA & SIE

The Social Audit (SA) & Social Impact Evaluation (SIE) has been conducted using primary data as well as secondary data available with the Districts & Blocks as well as APL and REL. Interview with the local people and discussions with community, Government officials and community based organizations of the area were an important component of the study.

Conducting SA & SIE involve the use of a broad array of data collection methods, quantitative and qualitative, common in social science research. Often, a combination of tools may be required to do SIE and SA. In addition to substantive analytical tools, SA&SIE use participatory methods that contribute to a better understanding of the social as well as cultural issues.

### 3.1 DATA COLLECTION PROCEDURE

There are several methods of collecting data for purposes of conducting SA and SIE. The methods generally in use include:

#### *Quantitative Methods*

- Sample survey
- Other administrative records

#### *Qualitative Methods*

- Key beneficiaries/informant interviews
- Focus Group Discussions (FGDs)
- Rapid Rural Appraisal (RRA)/Participatory Rural Appraisal (PRA)
- Public consultation

The sample villages were selected representing whole CSR region of the REL's TPP for the present study. We have used both primary and secondary data for the study. The secondary data have been collected from the various source, namely, Census of India, Health Department, Education department, office of ICDS, Statistical department of the concerned district. The primary data have been collected from the beneficiaries of different programmes, Local community, Representatives of Gram Panchayets etc. from selected villages. The overall impact of CSR activities has been assessed for the last three years i.e. 2017-2018 to 2019-2020. The data collection work has been executed in two phases; under Phase-I, we developed rapport with different local communities, representatives of Gram Panchayat and some key persons of the selected villages and also approached different government officers of the concerned Blocks and District. Under Phase-II, we collected all relevant data from different sources. We



recorded qualitative observations from Focus Group Discussion (FGDs), interviews with beneficiaries and Gram Panchayat members during our field survey. The field survey and data collection were initiated in August, 2020 and completed in September, 2020. All the collected data were coded for computerization and subsequent analysis. All the data were then fed into the software of Statistical Package for Social Sciences (SPSS) and rechecked before analysis. The study tools, sample size for different targeted activities and methodology are given below:

## 3.2 SAMPLING & ANALYTICAL TOOLS

### 3.2.1 Sampling Tools, Sample Size and Coverage

Depending on the nature of information required, we developed six types of schedules/questionnaires for different target groups, namely, Beneficiaries under different programme, Village schedule for Gram Panchayats, schedule for Focus Group Discussions (FGDs) of communities, profiling of the CSR activities through local people, questionnaires for concerned government officials and thematic points for field observations. The tools and coverage by respondents have been given in Table 3.1.

**TABLE 3.1: SAMPLING TOOLS, SAMPLE SIZE AND COVERAGE**

Sampling Tools	Respondent	Sample Size	Scope
<b>Part-A: Individual Beneficiary-Oriented Activities</b>			
Beneficiary Schedule	Beneficiaries of Different programmes	At least 5 beneficiaries from each programme in each village (if <5, then all)	Obtain information on socio-economic, educational and demographic features of the households, type of benefits and its impact and need of the household
<b>Part-B: Community Beneficiary-Oriented Activities</b>			
Schedule for profiling the CSR activities	A group comprised of representatives of local body, Prominent Local People and Local communities	One Schedule administered in each village	Profiling of all the activities executed under CSR in the village



Sampling Tools	Respondent	Sample Size	Scope
Schedule for Focus Group Discussions (FGDs)	Representatives of Local body, Prominent people, Representatives of weaker sections and project affected persons, if any	One FGD organized in each village and discussion initiated with 8-10 members of the specified areas ensuring gender representation	Community needs, quality of work/services & impact of executed activities like Infrastructural, Socio-cultural, Awareness, Livestock and Programmes for changing the traditional agricultural production system or any other CSR activities.
Village Schedule	Representatives of Gram Panchayat & Prominent people	One Schedule administered in each village	Availability of basic amenities, Demographic, Socio-economic and educational characteristics etc.
Qualitative Information	Self Observation	All team members	Impact on socio-economic - cultural –political aspects and any specific fact beyond the purview of structured schedule.
<b>Part-C: Collection of Secondary Data</b>			
Questionnaires /Data Format for Education Department	BSA/Coordinator from concerned Block Resource Centre	One from each Block	Population of the school going (6-14 years) children, enrolment, dropout, never enrolled children by gender and caste, retention etc.
Questionnaires/Data Format for Health Department	CMO/Medical Officer from PHC/CHC	One from each Block	Health status of the people regarding no. of cases of Measles, TB, Polio, Malaria and birth & death rate of the concern areas.
Questionnaires/Data Format for ICDS Department	DPO/CDPO of concerned Block	One from each Block	Immunization, information regarding mother and child care, IMR, MMR, U5MR





The sample copy of the questionnaires/formats developed for social impact evaluation of REL's TPP along with social audit of CSR activities is presented in Annexure 3.1.

### 3.2.2 Method for Sampling and Administration of Tools

The method adopted for survey and selection of sample was simple random sampling and purposive sampling. The simple random method has been used for the selection of different types of beneficiaries and purposive method was used for the selection of persons for FGDs and profiling the executed activities in the villages. The details are given in Table 3.2.

**TABLE 3.2: METHODS OF SAMPLING AND ADMINISTRATION OF TOOL**

Particulars	Sample method	Method for Administration of Tools
For collection of basic information of the village	The member of the team approached the concerned representatives of Gram Panchayats and prominent people of the village.	Individual interviews were conducted with the representatives of gram Panchayat and prominent people of the village avoiding the crowd.
Profiling the Executed Activities	For this purpose, we purposively selected groups, consisting of representatives of local body, prominent local people and local communities in each CSR village.	Identified the target persons with the help of facilitators. Due care for ensuring gender representation was taken. The date, time and venue for profiling of activities were fixed with the prior consent of identified persons. A two-member team in which one was monitor and other was writer started the profiling in a pre-decided venue.
Beneficiary from Different Programmes	We have arranged the list of beneficiaries in alphabetical orders and then randomly selected the desired number. The additional sample has been taken to compensate the sample loss.	Trained members of the team approached the selected beneficiary with the help of facilitator and established rapport building. The individual interview was conducted in the house of the respondent avoiding the crowd.



Particulars	Sample method	Method for Administration of Tools
Focus Group Discussions (FGDs)	For this exercise, we have purposively selected a group consisting of the representatives of local body, prominent people, representatives of weaker section and project affected person, if any, in each CSR village.	Identified the targeted persons with the help of facilitators ensuring gender representation. The date, time and venue for FGD fixed with the consent of the identified group. The two members of the team, in which one was monitor and the other was writer, started the FGD on pre-fixed venue. The monitor raised questions/issues and encouraged the members to discuss and explore the facts. The writer recorded the entire discussion in structured schedule and a voice recorder was also used for recording the matter of discussion.
Qualitative Information	In the above process each team member recorded his own observation on selected issues. The significant observation helped to understand the complicity of the data.	
Information from Secondary sources	The team members requested the District Magistrate, Raipur, to provide his support and cooperation for collection of necessary data from different departments and for this purpose, the DM issued a letter to all concerned departments. The team members approached the concerned office and requested officers to provide the information on questionnaires. The concerned departments provided the available data.	



### 3.3 FRAMEWORK FOR SOCIAL AUDIT

As discussed earlier the framework for Social Audit was evolved including Social Process Method clubbed with Activity Analysis Approach. This uses SA4P focus system that assesses an activity around 4Ps viz. Policy, People, Process, Programmes. The individual weightage against these factors shall sum up to gross assessment measurable figure on a pre framed scale.

The social impact assessment of CSR activities was undertaken on following lines :

- Design Quality
- Measurable Quantitative Progress - Days/ Coverage / Change in Income / Money saved / Mandays etc.
- Programme Approach
- Satisfaction of Stakeholders

The impact assessment matrix was evolved considering above mentioned factors as presented in subsequent sections:

Stage	Process	Output
Stage 1	Identification of SA Indicators	The SA team suggested 3 categories of 23 indicators : <ul style="list-style-type: none"> <li>• Policy and Process -2</li> <li>• Programme Factors –4</li> <li>• Sample Activity / Observation type - 17</li> </ul>
Stage 2	Identification of Social Audit Compliance factors	7 points identified to factor the procedural appropriateness of SA
Stage 3	Awarding points and then weight award by the SA team in consultation with the independent field observers	A set of 23 indicators + 1 SA factor for calculating the SA Point weight
Stage 4	Boxing the qualitative and few standard quantitative observations based on FGD and other interactions in scale of Good, Average and Bad.	A summary table delivering SA Point Weight, effectiveness checks and other quantitative details of coverage and expenditure along with brief comment by SA Team.
Stage 5	Sharing of SA findings with the stakeholders in REL_AF and local villages.	SA is available to the community to catalyze the performance for better score during next assessment year.



### Point Weightage for Selected Components

Such weightage was attributed by the SA team after analyzing the relative importance of the activities to the overall understanding of Social Audit objectives as per the ToR. The assessment scheme provides adequate approach to include following dimensions:

1. Direction (Positive to Negative that can lead to interpretation of Good and Poor)
2. Degree of Direction over a scale of -3 to +3 scale.

Each section focuses on certain aspect of assessment through a number of questions that the assessment team has placed against a 3 tail response pattern indicating – 1. The optimum side 2. The neutral point and -3. The Cause of concern point.

Once the gross point weight of each section is summed up it is available to reflect the overall health of CSR activities, policies and approach. But in order to be more rational we further multiply this with Social Audit procedural correctness factor which gives the final output value of SA score.

The list of SA Indicators as well as the weight attributed to each indicator are as follows:

S N	SA Indicator	Weightage
<b>CSR POLICY &amp; PROCESS:</b>		
1	Overall Common Factors –I (POLICY)	10X
2	Overall Common Factors-II (PROCESS)	5X
	Sub-total	20X
<b>CSR PROGRAMME:</b>		
3	Programme Common Factors (PROGRAMMES)	5X
4	Programme Specific Factors (EDUCATION)	5X
5	Programme Specific Factors (HEALTH HYGIENE AND SANITATION)	5X
6	Programme Specific Factors (EMPOWERMENT and LIVELIHOODS)	5X
	Sub-total	20X
<b>CSR ACTIVITIES:</b>		
7	Sample Activity Education-Navoday Coaching Centres	3X
8	Sample Activity Education-Vidya Volunteers	3X
9	Sample Activity Education : Minimum Learning Standard(MLS)	3X
10	Sample Activity Education : Anaganwadi Strengthening	3X
11	Sample Activity Education : Kidsmart	2X
12	Sample Activity Education : Community Library	2X
13	Sample Observation Education. : Transport Facilities for Students	4X
14	Sample Activity Health. : Nutrition Centre	5X
15	Sample Activity Health : Mobile Medical Unit (MMU)	5X



S N	SA Indicator	Weightage
16	Sample Activity Health : Women Hygiene and Sanitation	5X
17	Sample Activity Health : Individual Toilet Tiles Fitting	5X
18	Sample Observation Emp. & Livelihoods : Pratibha Centres	3X
19	Sample Observation Emp. & Livelihoods : Vocational Training Centre	3X
20	Sample Activity Emp. & Livelihoods : Community Level Training	3X
21	Sample Activity Emp. & Livelihoods : Computer Literacy	3X
22	Sample Observation Emp. & Livelihoods : Self Help Groups (SHG)	5X
23	Sample Observation Emp. & Livelihoods : Tailoring Production Centre	3X
	Sub-total	60X
	Grand total	100X

### 3.4 FIELD SURVEY & DATA COLLECTION

#### 3.4.1 Reconnaissance Survey

A kick-off meeting was organised on 23<sup>rd</sup> July, 2020 to discuss the modalities for initiating the social audit and social impact evaluation study and logistic support required for the same under the guidance of Shri R. N. Shukla, Corporate Environment Group, APL and Shri Amit Kr. Soni, Head (Environment), REL with IISWBM team members.

During the introductory meeting with Shri R. N. Shukla, Corporate Environment Group, APL and Shri Amit Kr. Soni, Head (Environment), REL along with Shri Atul Gupta, Adani Foundation, REL and IISWBM team members, following issues were discussed & resolved to initiate the social audit & social impact evaluation study for REL's TPP:

1. Initially Shri R. N. Shukla mentioned the objectives of proposed study as well as time period which need to be considered for the same. Shri Amit Kr Soni and Shri Atul Gupta explained the various CSR activities undertaken during last three years i.e. 2017-18 to 2019-20 and emphasised the recent CSR interventions of REL and their salient features viz. Sustainable Livelihood Development, Water Conservation & Rain Water Harvesting, Strengthening of Health and Sanitation facilities, Live Stock Development, etc as well as various IG activities for women empowerment like Agarbatti Making, Bio-manure, bio-pesticide, etc. Subsequently Shri Shukla highlighted the prime thrust area and coverage of proposed study to be undertaken by IISWBM and mentioned that the study should consider all the major social issues in line with the regulatory agency's requirement as well as needs of local people while assessing the impact of CSR activities on local community in particular and on region as a whole. Accordingly, various parameters included in the draft questionnaire submitted by IISWBM for social audit & social impact evaluation study have been discussed. Shri Soni & Shri Gupta mentioned that the proposed questionnaire may be used for pilot survey and on the basis of pilot survey



certain parameters to address the local people need may be included, if required. Accordingly, it was resolved that the suggestions made during discussion as well as the observation recorded during the pilot survey would be incorporated in the proposed questionnaire and the same would be subsequently used for the field survey and data collection.

2. Subsequently the detail meeting was held with Shri Amit Soni and Shri Atul Gupta, Unit CSR Head, Adani Foundation, REL with IISWBM team members to understand the CSR activities of REL being undertaken by Adani Foundation. Shri Gupta highlighted the new intervention initiated for skill development and income generation besides the other SLD, Education, Health and Infrastructure Development activities. The following information and documents were provided by CSR Cell of Adani Foundation, Raikheda:
  - a. List of priority villages along with name of Gram Panchayet and contact person;
  - b. Copy of Annual Report of CSR for 2017-18 and 2019-20 along with Budget and Expenditure.
  - c. Detail of CSR activities undertaken during last three years i.e. 2017-18 to 2019-20.
3. Dr. Agrawal requested to Shri Gupta to kindly provide village wise detail of CSR activities undertaken along with cost incurred for last three years i.e. 2017-2018 to 2019-2020. Shri Gupta ensured to provide all the information related to CSR activities of REL required for the present study. Accordingly, Dr. Agrawal submitted checklist of detailed information required in connection with CSR activities of REL.
4. It was resolved that the formal letter to sarpanch of selected GPs may be given in advance (at least 1-2 days) mentioning the objectives and modus operandi of social audit and social impact evaluation study. The format for the same as well as social impact of various CSR activities undertaken and suggestions for improvement was evolved under the guidance of Shri R N Shukla and Shri Amit Soni.
5. The time schedule for initiating the field survey and data collection was discussed in view of prevailing pandemic (COVID-19) and technical as well as logistic support required for the same. Shri Shukla suggested to undertake field survey and data collection in consideration of prevailing norms and guidelines of Central and State Governments with proper protection of project team members as well as other



stakeholders involved in the present study and the same was agreed by IISWBM project team.

### 3.4.2 Field Survey & Data Collection

As discussed in earlier section, the field survey and data collection was undertaken between August-September, 2020. The series of public consultation meeting conducted involving Sarpanch/ Upsarpanch/ member of Gram Panchayet along with the local people to evaluate the social impact of setting up and operation of REL's TPP along with the evaluation of social impact of CSR activities undertaken by AF-REL during the last three years i.e. 2017-18 to 2019-20 as well as their suggestions for improving the quality of life of local people in all the core as well as buffer zone villages falling within the 10 km radius of the REL's Thermal Power Plant. The sample copy of FGD- public consultation intimation letter issued to Sarpanch/ Upsarpanch with request to organize public consultation on pre-decided date and time involving local people for the purpose along with endorsement regarding their presence during public consultation and the social issues identified along with their suggestions for the same is presented in Annexure 3.1.

Assessment of the existing basic amenities and infrastructural facilities along with the changes due to setting up and operation of REL's TPP as well as need for strengthening the same in the concerned villages was also undertaken. The detail of sample surveyed villages is presented in Table 3.3.

**TABLE 3.3: DETAIL OF SAMPLE VILLAGES SURVEYED FOR SIE AND SA FOR REL'S TPP**

Sl. No.	Name of Village	Gram Panchayet	Block/Tehsil	Zone	Remark
1	Raikheda	Raikheda	Tilda	Core Zone	Adjacent to REL Plant Area
2	Chicholi	Chicholi	Tilda	Core Zone	Adjacent to REL Plant Area
3	Gaitra	Gaitra	Tilda	Core Zone	Adjacent to REL Plant Area
4	Gourkheda	Gourkheda	Tilda	Buffer Zone - I	Along Railway Coridor of REL
5	Sontara	Sontara	Tilda	Buffer Zone - I	Along Railway Coridor of REL
6	Murra	Murra	Tilda	Buffer Zone - I	Along Railway Coridor of REL
7	Tulsi	Tulsi	Tilda	Buffer Zone - II	Along Railway Coridor of REL
8	Khamharia	Khamharia	Tilda	Buffer Zone - I	Along Railway Coridor of REL



Sl. No.	Name of Village	Gram Panchayet	Block/Tehsil	Zone	Remark
9	Konari	Konari	Tilda	Buffer Zone - II	Along Railway Corridor of REL
10	Bartori	Bartori	Tilda	Buffer Zone - II	Along Railway Corridor of REL
11	Tarashiva	Tarashiva	Tilda	Buffer Zone - I	Along Railway Corridor of REL
11	Chatod	Chatod	Tilda	Buffer Zone - II	Along Railway Corridor of REL
13	Samoda	Samoda	Arang	Buffer Zone - I	Along Barrage/Water Intake of REL

The impact/feedback of CSR activities undertaken by REL at villages around TPP as well as railway track were undertaken during the field survey and data collection. The priorities of local people were also identified for undertaking CSR activities.

### 3.4.3 Focus Group Discussions

An exhaustive guideline for conducting public consultation through Focus Group Discussions (FGD) was also developed. For discussion with male groups, various thematic areas were selected which included village history and its natural resources, access to public services, employment, housing, farm and non-farm livelihood, landholding and poverty, access to intuitional credit and transportation facilities. The thematic areas selected for discussion with women groups included PDS, Anganwadi, Primary Education, Women employment, drudgery and health issues.

The following Participatory Rural Appraisal (PLA) techniques were applied in the assessment process:

- Resource mapping
- Social mapping
- Input – Output tree
- Timeline analysis
- Health chart
- Institution mapping

The series of public consultation meeting conducted involving Sarpanch/ Upsarpanch/ member of Gram Panchayet along with the local people to identify the likely social issues as well as their





suggestions for tackling the same in all the core as well as buffer zone villages falling within the 10 km radius of the REL's TPP.

The public consultation intimation letters were issued to Sarpanch/ Upsarpanch with request to organize public consultation on pre-decided date and time involving local people. The local people participated in the public consultation were enlisted and their endorsement regarding their presence during public consultation were taken. During the public consultation, various social issues were identified along with their suggestions for mitigating the same were documented. Assessment of the existing basic amenities and infrastructural facilities along with the need for strengthening the same in the concerned villages was also undertaken.



## 4.0 SOCIO-ECONOMIC PROFILE OF CSR ZONE

The Socio-economic profile of REL's CSR zone have been assessed using primary as well as secondary available with the Districts & Blocks as well as APL and REL. Interview with the local people and discussions with community, Government officials and community based organizations of the area were an important component of the study. To assess the availability of basic amenities and other allied infrastructural facilities, all the villages falling under REL CSR zone have been considered. Accordingly, detailed village profile survey was undertaken through structured questionnaire. PRA/RRA techniques were also adopted for the purpose. In addition to substantive analytical tools, use of participatory methods that contribute to a better understanding of the social as well as cultural issues.

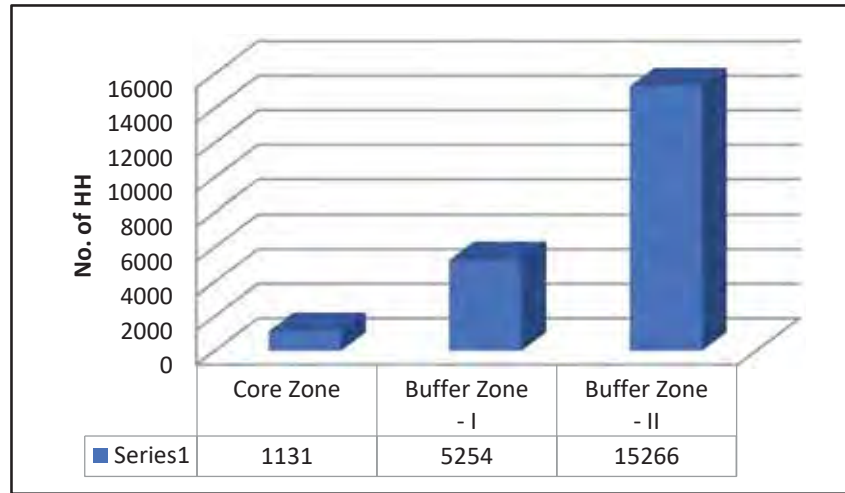
### 4.1 DEMOGRAPHIC PROFILE OF CSR ZONE

As mentioned in earlier chapter the REL's Thermal Power Plant (TPP) is located at Raikheda village under Tilda Tehsil of Raipur district, Chhattisgarh. The CSR Zone i.e. 10 km radius of TPP falls primarily under Tilda Tehsil. However, small area toward SW-W directions of TPP falls under Raipur Tehsil. The CSR zone have been divided in three zone i.e. core zone which consist of 3 villages from which majority of land was acquired for setting up of 2 x 685 MW TPP therefore socio-economic impact to these villages are likely to be maximum accordingly given maximum priority to these villages for planning and execution of need based CSR activities. Whereas buffer zone-I (i.e. the villages falling within the 5 km radius of TPP) have 16 village and buffer zone-II (i.e. the villages falling within the 5-10 km radius of TPP) 44 village. The demographic profile of the CSR zone has been presented in sections.

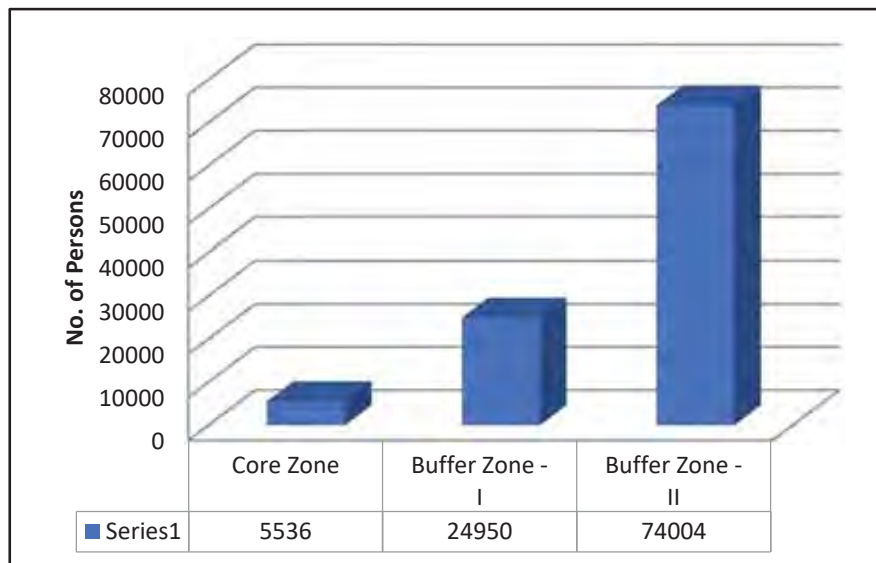
The demographic profile of villages falling within the REL-CSR Zone are presented in Table 4.1 and 4.2. The analysis reveals that total number of households in core zone are 1,131 with total population of 5,536 in core zone villages (Figure 4.1 and 4.2). Out of all the core zone villages, the maximum population is in Raikheda i.e. 3,541 followed by Chicholi i.e. 1,103.



**Figure 4.1: Zone Wise Distribution of Number of Households of REL-CSR Zone Villages**



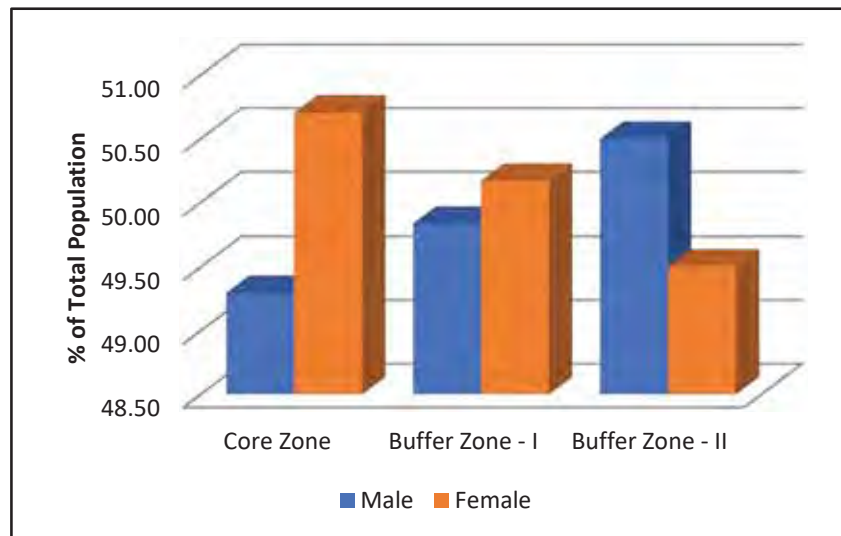
**Figure 4.2: Zone Wise Status of Population of REL-CSR Zone Villages**



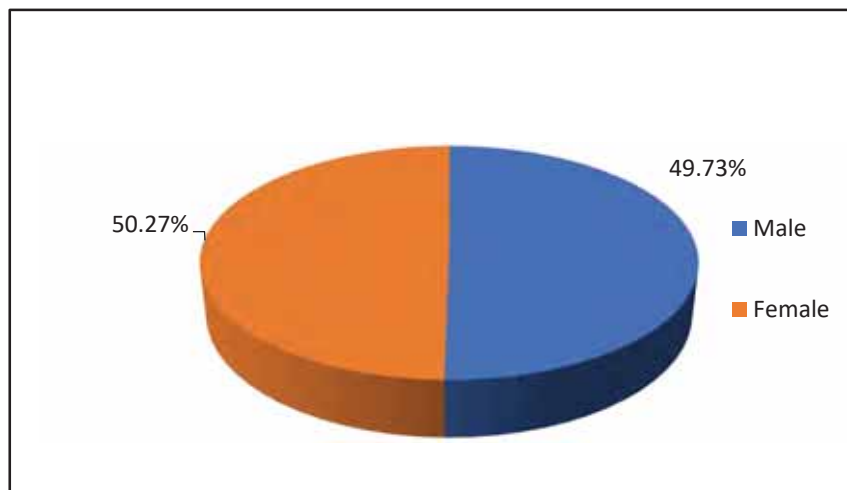
### Gender Wise Distribution

Gender wise distribution of population in CSR villages is presented in Figure 4.3. It shows that in core zone 49.30% of the population are male and remaining 50.70% are female. Whereas in buffer zone-I, male population is 49.83% against 50.17% female population. Overall gender wise distribution of population in CSR zone is presented in Figure 4.4. It reveals that 50.27% of the population are male and remaining 49.73% are female in the REL-CSR zone.

**Figure 4.3: Gender Wise Distribution of Population in REL-CSR Zone Villages**

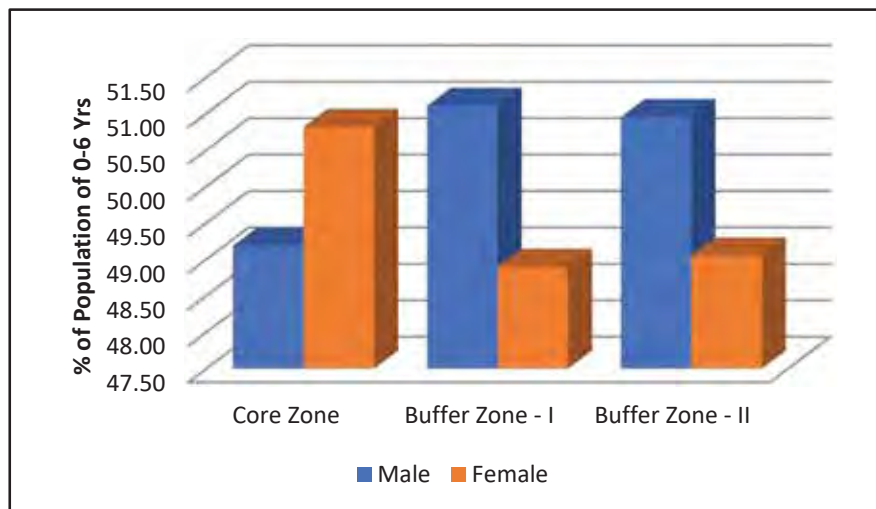


**Figure 4.4: Overall Gender Wise Distribution of Population in REL-CSR Zone**



The status of population in the age group of 0 – 6 yrs need to be assessed for vaccination program besides the availability of elementary education facilities. Analysis of status of child population (0-6 years) in REL-CSR zone reveals that 14.42% are children (0-6 years) of total population in CSR zone (Figure 4.5). The population of <6 years child in core zone villages account for 15.50% of total population. The analysis further shows that the sex ratio among child population is comparatively higher i.e. 965 females per 1000 male as compared to overall sex ratio i.e. 913 females per 1000 male in CSR zone.

**Figure 4.5: Percentage Distribution of Population of 0-6 Years in REL-CSR Zone Villages**

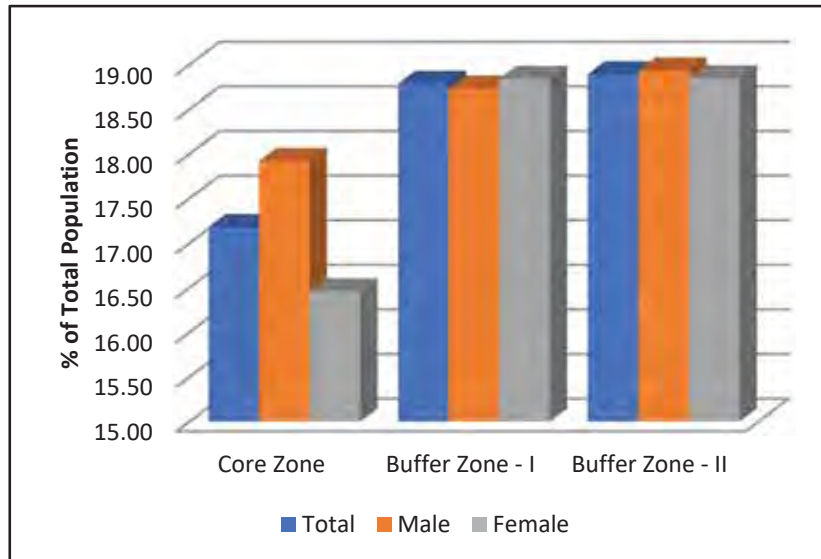


### Social Stratification

Distribution of scheduled caste population in REL CSR zone is presented in Figure 4.6. It reveals that 18.78% of total population is scheduled caste in REL CSR zone. The analysis further shows that 18.83% are male SC of the total male population and 18.72% are female SC of the total female population of REL CSR zone. Whereas in core zone 17.18% of total population are SC. The maximum concentration of SC is in Gaitra i.e. 427, which account for approximately 47.87% of total population of Gaitra village followed by Chicholi i.e. 472, which account for 42.79% of total population of Chicholi village.

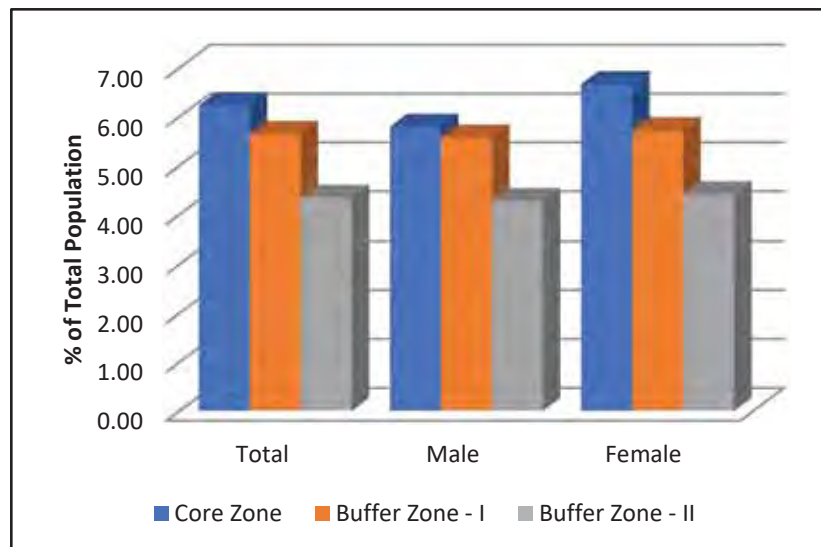


**Figure 4.6: Status of SC in REL-CSR Zone Villages**



Distribution of scheduled tribe population in REL CSR zone is presented in Figure 4.7. It reveals that 4.75% are scheduled tribe of total population in REL CSR zone. The analysis further shows that 4.66% are male ST of the total male population and 4.84% are female ST of the total female population of REL CSR zone. Whereas in core zone 6.23% of total population are ST.

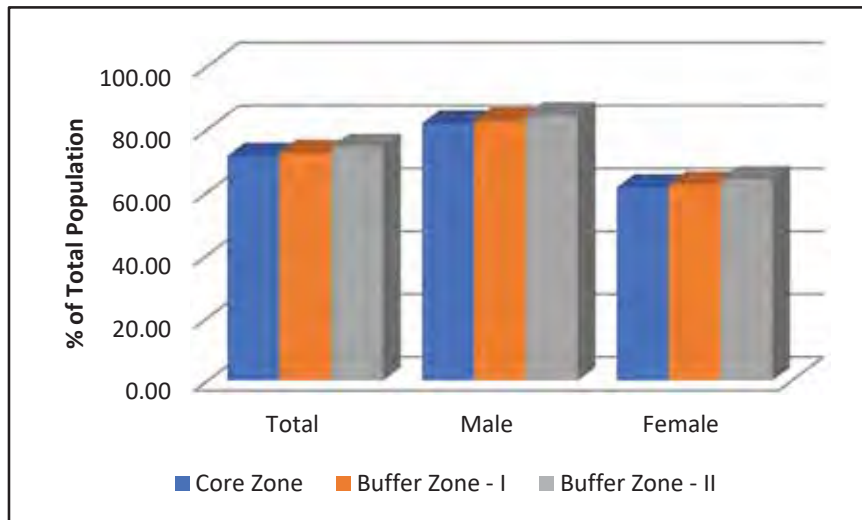
**Figure 4.7: Status of ST in REL-CSR Zone Villages**



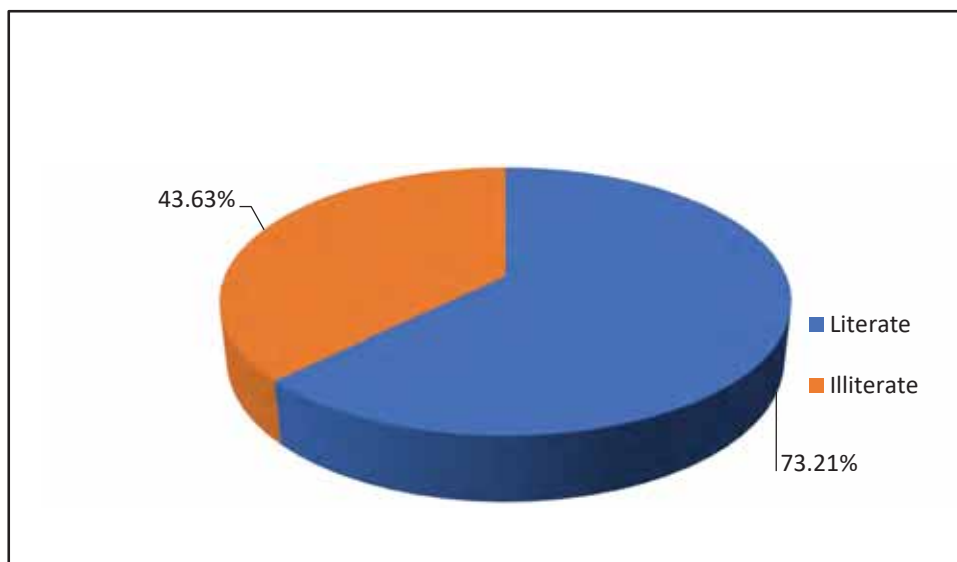
**Literacy Rate**

Status of literacy in villages falling under core zone, buffer zone-I and II is presented in Figure 4.8. It shows that in core zone villages 71.40% of the population are literates. Whereas in buffer zone-I villages, 72.35% are literates. Overall status of literacy in CSR zone is presented in Figure 4.9. It reveals that 73.21% of the population are literates.

**Figure 4.8: Status of Literacy in REL-CSR Zone Villages**



**Figure 4.9: Overall Status of Literacy in REL-CSR Zone**



Status of gender wise literacy in REL CSR zone reveals that 83.40% are male literates of the total male population against 62.96% female literates of the total female population of REL CSR zone. Similarly, in core zone 81.71% are male literates of the total male population against 61.37% female literates of the total female population. The maximum literacy rate among the core zone villages is in Raikheda i.e. 71.59% followed by Gaitra i.e. 71.58% and minimum is in Chicholi i.e. 70.59%. Table 4.2 depicts that male literacy rate is more than female literacy rate in all the villages.





TABLE 4.1: DEMOGRAPHIC PROFILE OF VILLAGES FALLING WITHIN REL-CSR ZONE

CSR Villages		No_HH	TOT_P	TOT_M	TOT_F	P_06	M_06	F_06	P_SC	M_SC	F_SC	P_ST	M_ST	F_ST
<b>Core Zone</b>														
Chicholi	Rural	236	1103	539	564	202	103	99	472	238	234	11	5	6
Gaitra	Rural	199	892	456	436	146	84	62	427	226	201	29	14	15
Raikheda	Rural	696	3541	1734	1807	510	235	275	52	25	27	305	139	166
<b>Sub-Total</b>		<b>1131</b>	<b>5536</b>	<b>2729</b>	<b>2807</b>	<b>858</b>	<b>422</b>	<b>436</b>	<b>951</b>	<b>489</b>	<b>462</b>	<b>345</b>	<b>158</b>	<b>187</b>
<b>Buffer Zone-I</b>														
Amitalab	Rural	114	528	275	253	94	46	48	313	165	148	0	0	0
Bangoli	Rural	438	1898	956	942	249	138	111	192	87	105	123	68	55
Deogaon	Rural	281	1245	613	632	174	86	88	388	201	187	84	34	50
Dhansuli 1	Rural	254	1241	607	634	216	100	116	310	151	159	13	7	6
Gaurkheda	Rural	163	853	425	428	87	39	48	77	41	36	24	11	13
Janjira	Rural	219	1265	614	651	207	92	115	431	198	233	260	132	128
Khamhariya	Rural	264	1252	612	640	174	91	83	80	38	42	287	139	148
Khapri	Rural	117	597	303	294	85	41	44	7	4	3	7	4	3
Khauna	Rural	786	3745	1894	1851	581	293	288	933	465	468	176	94	82
Kurra 1	Rural	251	1271	628	643	177	95	82	197	99	98	7	4	3
Madhi	Rural	506	2530	1231	1299	350	194	156	87	42	45	396	183	213
Mohrenga	Rural	525	2555	1275	1280	348	189	159	256	118	138	11	6	5
Mura	Rural	531	2359	1188	1171	350	186	164	625	311	314	20	10	10
Pikaridih	Rural	256	1067	543	524	153	74	79	268	136	132	0	0	0
Sontara	Rural	227	1084	543	541	149	69	80	459	240	219	0	0	0
Tarasiw	Rural	322	1460	726	734	183	95	88	64	33	31	0	0	0
<b>Sub-Total</b>		<b>5254</b>	<b>24950</b>	<b>12433</b>	<b>12517</b>	<b>3577</b>	<b>1828</b>	<b>1749</b>	<b>4687</b>	<b>2329</b>	<b>2358</b>	<b>1408</b>	<b>692</b>	<b>716</b>
<b>Buffer Zone-II</b>														
Adsena	Rural	783	3364	1710	1654	518	283	235	1124	586	538	0	0	0
Asaunda	Rural	382	1759	873	886	212	98	114	346	169	177	48	26	22
Baheradih	Rural	99	427	214	213	82	47	35	376	189	187	0	0	0
Bahesar	Rural	343	1694	847	847	270	140	130	593	301	292	25	14	11



CSR Villages	No_HH	TOT_P	TOT_M	TOT_F	P_06	M_06	F_06	P_SC	M_SC	F_SC	P_ST	M_ST	F_ST
Rural	419	2033	994	1039	318	152	166	556	278	278	13	7	6
Baronda													
Rural	272	1202	606	596	213	108	105	465	227	238	76	41	35
Bartori													
Rural	285	1573	769	804	240	108	132	2	0	2	125	66	59
Bartori 2													
Rural	579	2726	1350	1376	297	154	143	466	243	223	11	6	5
Beldar Seoni													
Rural	172	825	412	413	128	61	67	118	63	55	152	67	85
Bharuwadih Kala													
Rural	151	738	373	365	95	48	47	361	185	176	0	0	0
Bharuwadih Khurd													
Rural	290	1446	726	720	201	95	106	72	34	38	69	35	34
Bhibhauri													
Rural	225	1325	671	654	199	107	92	107	56	51	0	0	0
Bithiya													
Rural	230	1130	568	562	152	82	70	401	205	196	19	10	9
Budgahan													
Rural	461	2219	1070	1149	309	162	147	231	103	128	40	18	22
Chhataud													
Rural	393	2045	1022	1023	267	136	131	162	80	82	2	1	1
Ganiyari													
Rural	174	769	407	362	121	68	53	197	106	91	0	0	0
Hatband													
Rural	200	932	478	454	140	71	69	20	11	9	87	44	43
Jalso													
Rural	493	2410	1203	1207	408	205	203	541	283	258	326	158	168
Kathiya 1													
Rural	297	1469	758	711	197	106	91	674	352	322	151	77	74
Keotara													
Rural	1127	5188	2584	2604	722	360	362	953	464	489	30	11	19
Kesla													
Rural	89	422	202	220	69	29	40	226	112	114	22	11	11
Khauli Dabri													
Rural	200	969	506	463	166	95	71	235	120	115	0	0	0
Khudmudi													
Rural	617	2863	1459	1404	393	207	186	273	138	135	129	67	62
Kirna													
Rural	290	1382	697	685	177	94	83	446	223	223	22	12	10
Kodawa													
Rural	154	772	403	369	104	55	49	8	4	4	0	0	0
Konari													
Rural	916	4016	2071	1945	536	276	260	411	210	201	205	104	101
Kundru													
Rural	453	2501	1434	1067	325	184	141	584	320	264	243	126	117
Math													
Rural	236	1256	634	622	169	82	87	12	7	5	76	36	40
Mohadi 2													
Rural	245	1189	573	616	171	73	98	192	98	94	0	0	0
Mudpar 1													
Rural	156	847	424	423	139	69	70	102	54	48	21	13	8
Nahardih													
Rural	152	735	365	370	100	53	47	368	180	188	0	0	0
Nakti Khapri													
Rural	249	1215	599	616	201	100	101	175	83	92	47	23	24
Nakti Kumhari													
Rural	88	394	188	206	71	36	35	139	65	74	0	0	0
Pachdeori													
Rural	78	427	209	218	78	35	43	35	16	19	15	8	7
Paraswani													



CSR Villages	No_HH	TOT_P	TOT_M	TOT_F	P_06	M_06	F_06	P_SC	M_SC	F_SC	P_ST	M_ST	F_ST
Pathara Kundi	77	359	188	171	67	33	34	314	167	147	0	0	0
Rajiya	199	906	435	471	135	55	80	277	139	138	20	10	10
Sirwe	232	1172	580	592	178	85	93	153	75	78	277	136	141
Tildadih	226	1009	532	477	176	101	75	365	188	177	0	0	0
Tulsi 3	114	600	301	299	60	28	32	25	12	13	16	6	10
Malaud	373	1818	917	901	243	125	118	448	215	233	0	0	0
Mangasa	186	914	469	445	116	55	61	88	47	41	0	0	0
Mauhagaon	256	1255	628	627	179	95	84	893	442	451	8	3	5
Nilja	463	2476	1250	1226	394	204	190	25	13	12	655	322	333
Pathari(Pathari Khudmudi)	552	2976	1521	1455	428	213	215	181	97	84	247	120	127
Pawani	499	2310	1164	1146	312	158	154	143	69	74	20	10	10
Saragaon	791	3947	1986	1961	554	285	269	97	47	50	13	8	5
<b>Sub-Total</b>	<b>15266</b>	<b>74004</b>	<b>37370</b>	<b>36634</b>	<b>10630</b>	<b>5416</b>	<b>5214</b>	<b>13980</b>	<b>7076</b>	<b>6904</b>	<b>3210</b>	<b>1596</b>	<b>1614</b>
<b>Grand Total</b>	<b>21651</b>	<b>104490</b>	<b>52532</b>	<b>51958</b>	<b>15065</b>	<b>7666</b>	<b>7399</b>	<b>19618</b>	<b>9894</b>	<b>9724</b>	<b>4963</b>	<b>2446</b>	<b>2517</b>



TABLE 4.2: STATUS OF LITERACY IN VILLAGES FALLING WITHIN REL-CSR ZONE

CSR Villages		TOT_P	P_LIT	M_LIT	F_LIT	P_ILL	M_ILL	F_ILL
<b>Core Zone</b>								
Chicholi	Rural	1103	636	345	291	467	194	273
Gaitra	Rural	892	534	312	222	358	144	214
Raikheda	Rural	3541	2170	1228	942	1371	506	865
<b>Sub-Total</b>		<b>5536</b>	<b>3340</b>	<b>1885</b>	<b>1455</b>	<b>2196</b>	<b>844</b>	<b>1352</b>
<b>Buffer Zone-I</b>								
Amlitalab	Rural	528	309	195	114	219	80	139
Bangoli	Rural	1898	1236	691	545	662	265	397
Deogaon	Rural	1245	744	423	321	501	190	311
Dhansuli 1	Rural	1241	727	404	323	514	203	311
Gaurkheda	Rural	853	555	311	244	298	114	184
Janjira	Rural	1265	696	389	307	569	225	344
Khamhariya	Rural	1252	777	451	326	475	161	314
Khapri	Rural	597	398	234	164	199	69	130
Khauna	Rural	3745	2250	1297	953	1495	597	898
Kurra 1	Rural	1271	808	445	363	463	183	280
Madhi	Rural	2530	1613	871	742	917	360	557
Mohrenga	Rural	2555	1574	898	676	981	377	604
Mura	Rural	2359	1394	789	605	965	399	566
Pikaridih	Rural	1067	659	394	265	408	149	259
Sontara	Rural	1084	710	409	301	374	134	240
Tarasiw	Rural	1460	1014	562	452	446	164	282
<b>Sub-Total</b>		<b>24950</b>	<b>15464</b>	<b>8763</b>	<b>6701</b>	<b>9486</b>	<b>3670</b>	<b>5816</b>
<b>Buffer Zone-II</b>								
Adsena	Rural	3364	2016	1131	885	1348	579	769



CSR Villages		TOT_P	P_LIT	M_LIT	F_LIT	P_ILL	M_ILL	F_ILL
Asaunda	Rural	1759	1129	642	487	630	231	399
Baheradh	Rural	427	218	126	92	209	88	121
Bahesar	Rural	1694	1128	630	498	566	217	349
Baronda	Rural	2033	1258	721	537	775	273	502
Bartori	Rural	1202	690	403	287	512	203	309
Bartori 2	Rural	1573	998	563	435	575	206	369
Beldar Seoni	Rural	2726	1722	957	765	1004	393	611
Bharuwadih Kala	Rural	825	494	295	199	331	117	214
Bharuwadih Khurd	Rural	738	447	253	194	291	120	171
Bhibhauri	Rural	1446	942	545	397	504	181	323
Bithiya	Rural	1325	807	466	341	518	205	313
Budgahan	Rural	1130	730	410	320	400	158	242
Chhataud	Rural	2219	1339	732	607	880	338	542
Ganiyari	Rural	2045	1333	742	591	712	280	432
Hatband	Rural	769	506	306	200	263	101	162
Jalso	Rural	932	587	347	240	345	131	214
Kathiya 1	Rural	2410	1348	812	536	1062	391	671
Keotara	Rural	1469	949	540	409	520	218	302
Kesla	Rural	5188	3442	1924	1518	1746	660	1086
Khauli Dabri	Rural	422	231	125	106	191	77	114
Khudmudi	Rural	969	607	348	259	362	158	204
Kirna	Rural	2863	1923	1094	829	940	365	575
Kodawa	Rural	1382	964	548	416	418	149	269
Konari	Rural	772	544	320	224	228	83	145
Kundru	Rural	4016	2952	1619	1333	1064	452	612
Math	Rural	2501	1613	1065	548	888	369	519
Mohadi 2	Rural	1256	777	457	320	479	177	302



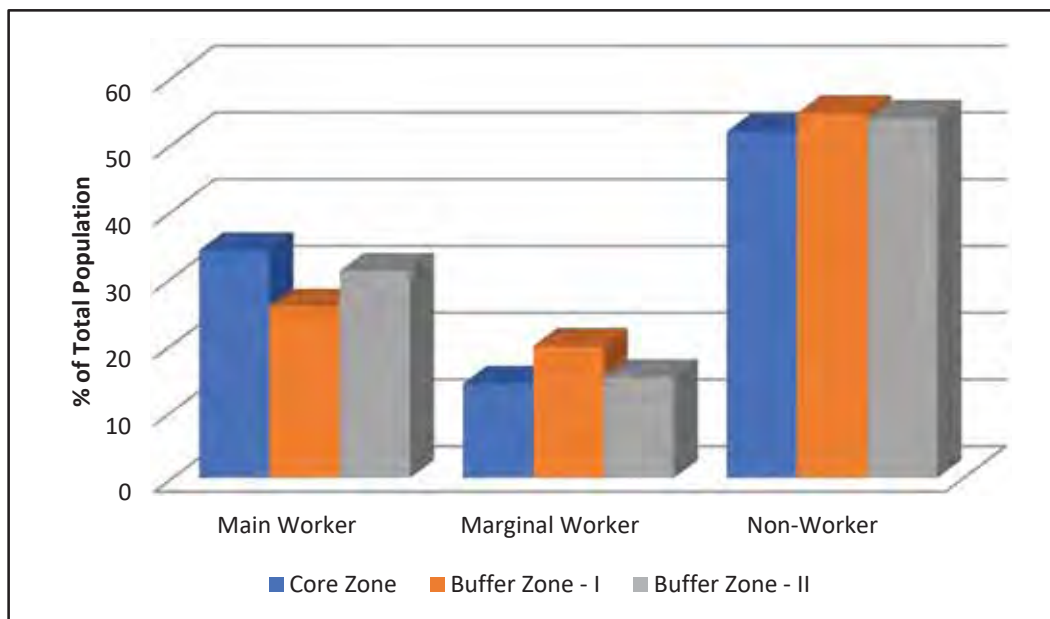
CSR Villages		TOT_P	P_LIT	M_LIT	F_LIT	P_ILL	M_ILL	F_ILL
Mudpar 1	Rural	1189	761	434	327	428	139	289
Nahardih	Rural	847	509	295	214	338	129	209
Nakti Khapri	Rural	735	461	260	201	274	105	169
Nakti Kumhari	Rural	1215	758	440	318	457	159	298
Pachdeori	Rural	394	209	120	89	185	68	117
Paraswani	Rural	427	239	140	99	188	69	119
Pathara Kundi	Rural	359	214	130	84	145	58	87
Rajiya	Rural	906	571	318	253	335	117	218
Sirwe	Rural	1172	706	413	293	466	167	299
Tildadih	Rural	1009	515	316	199	494	216	278
Tulsi 3	Rural	600	402	224	178	198	77	121
Malaud	Rural	1818	1175	680	495	643	237	406
Mangasa	Rural	914	593	354	239	321	115	206
Mauhagaon	Rural	1255	723	420	303	532	208	324
Nilija	Rural	2476	1293	764	529	1183	486	697
Pathari(Pathari Khudmudi)	Rural	2976	1851	1072	779	1125	449	676
Pawani	Rural	2310	1426	833	593	884	331	553
Saragaon	Rural	3947	2568	1437	1131	1379	549	830
<b>Sub-Total</b>		<b>74004</b>	<b>46668</b>	<b>26771</b>	<b>19897</b>	<b>27336</b>	<b>10599</b>	<b>16737</b>
<b>Grand Total</b>		<b>104490</b>	<b>65472</b>	<b>37419</b>	<b>28053</b>	<b>39018</b>	<b>15113</b>	<b>23905</b>



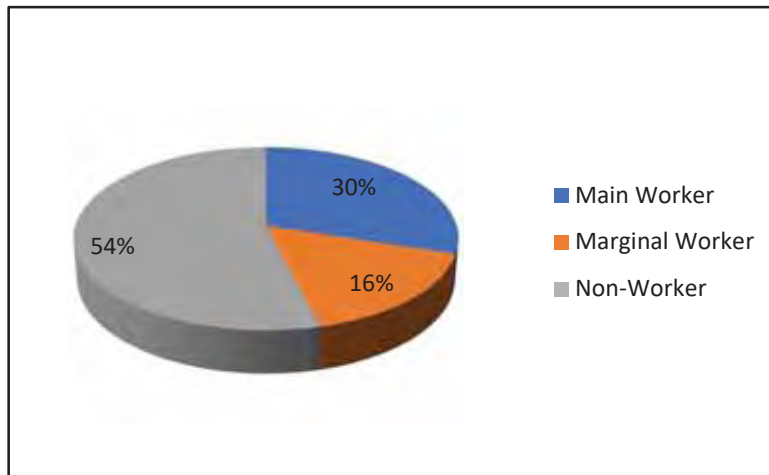
## 4.2 OCCUPATIONAL PATTERN IN CSR ZONE

Status of workers in villages falling under core zone, buffer zone-I and II is presented in Table 4.3 to 4.5. It shows that out of total working population, 64.94% are main workers and remaining 35.06% are marginal workers in REL CSR zone. Figure 4.10 shows that 29.88% are main workers of the total population, 16.13% are marginal workers and remaining more than 50% are non-workers of the total population, which includes children, aged persons and housewives, etc. Similarly, in core zone 34.07% are main workers, 14.07% are marginal workers and remaining more than 50% are non-workers of the total population. Whereas in buffer zone-II, main workers are 31% against 15.06% marginal workers and 53.94% non-workers of the total population. Overall status of workers in REL CSR zone is presented in Figure 4.11. It reveals that 46.01% are working population and remaining 53.99% of the total population are non-workers in the REL CSR zone.

**Figure 4.10: Status of Workers in REL-CSR Zone Villages**

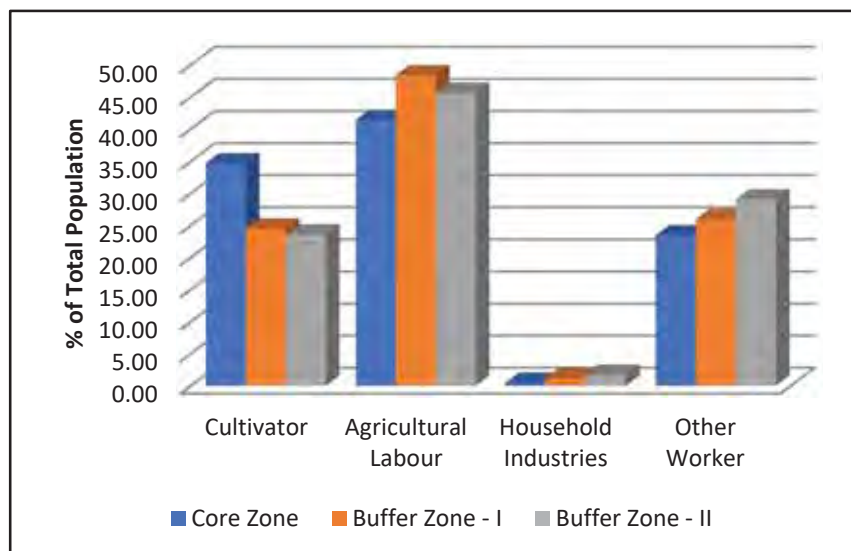


**Figure 4.11: Overall Status of Workers in REL-CSR Zone**

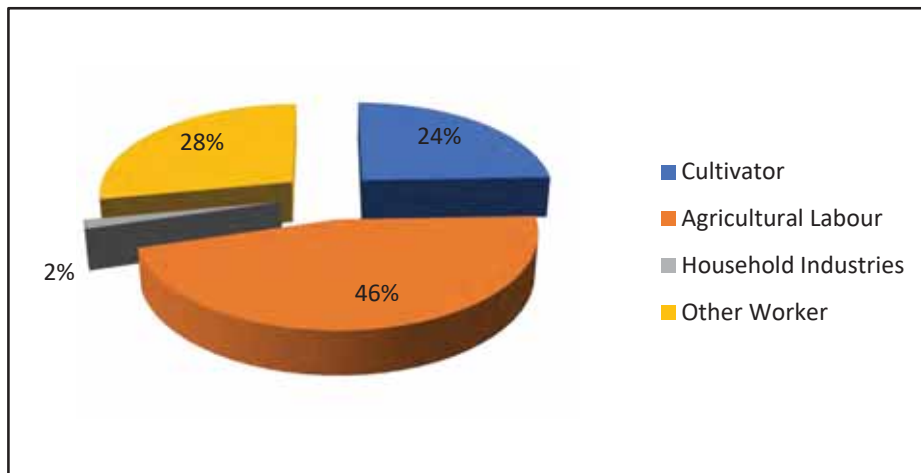


Detail of main workers of villages falling under core zone, buffer zone-I and II is presented in Table 4.4. Agriculture, agriculture labourer and casual labourer are the major occupations of the people in the core zone villages. Out of total main workers in core zone, majority (41.41%) are agricultural labour followed by (34.68%) cultivators. Similarly, in buffer zone-I, majority (48.37%) are agricultural labour followed by cultivators (24.48%) (Figure 4.12). Overall status of main workers in CSR zone is presented in Figure 4.13. It reveals that 24.45% are cultivators, 45.95% are agricultural labours, 1.53% are engaged in household industries and remaining 28.07% of the total main workers are other workers in the CSR zone.

**Figure 4.12: Detail of Main Workers in REL-CSR Zone**

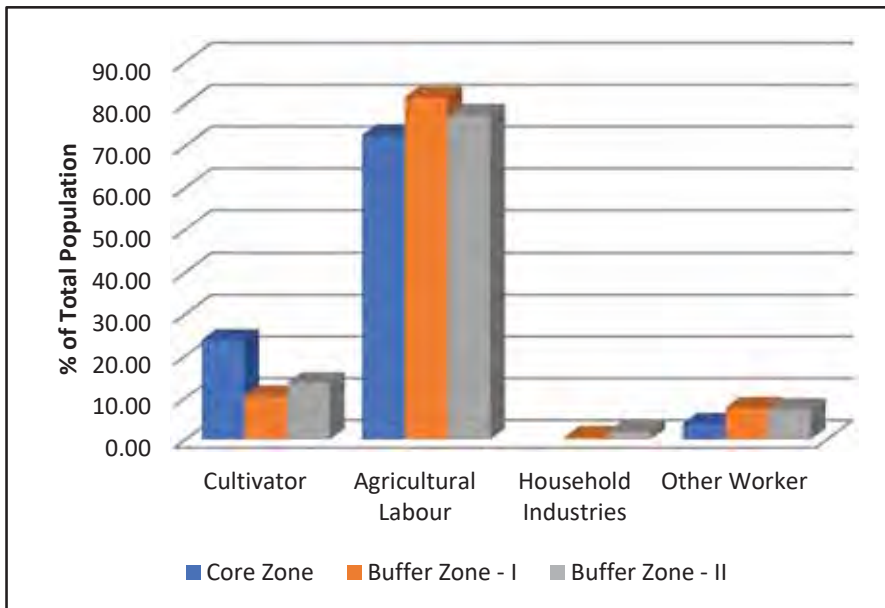




**Figure 4.13: Overall Status of Main Workers in REL-CSR Zone**

Detail of marginal workers of villages falling under core zone, buffer zone-I and II is presented in Table 4.5. Out of total marginal workers in core zone, majority (72.53%) are agricultural labour followed by cultivators (23.75%). Similarly, in buffer zone-I, majority (81.56%) are agricultural labour followed by cultivators (10.34%) (Figure 4.14). Overall status of marginal workers in CSR zone is presented in Figure 4.15. It reveals that majority (78.40%) are agricultural labours followed by cultivators (13.03%) of the total marginal workers in the CSR zone.

**Figure 4.14: Detail of Marginal Workers in REL-CSR Zone**



**Figure 4.15: Overall Status of Marginal Workers in REL-CSR Zone**

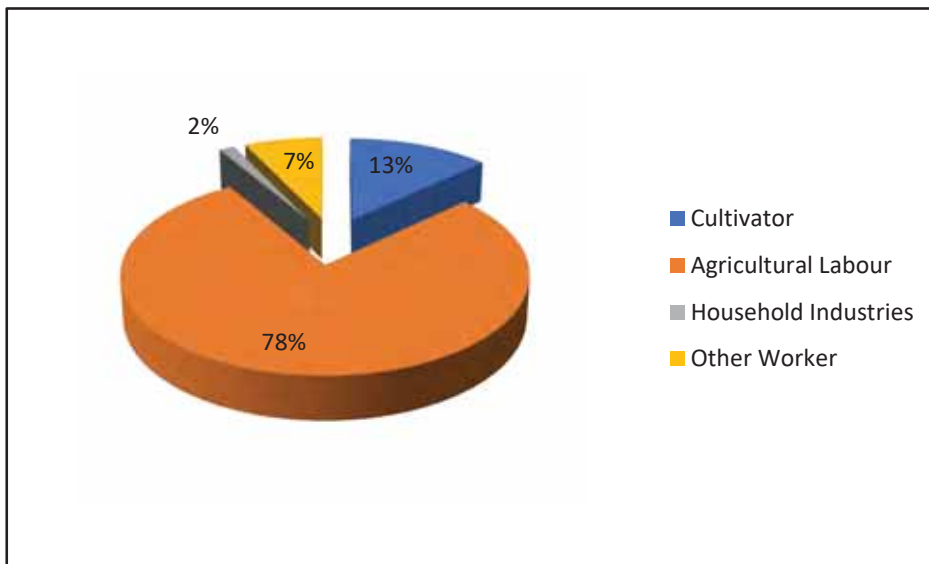


TABLE 4.3: WORKER PROFILE OF VILLAGES FALLING WITHIN REL-CSR ZONE

CSR Villages	TOT_P	TOT_WORK_P	TOT_WORK_M	TOT_WORK_F	MAIN_WORK_P	MAINWORK_ORK_IM	MAIN_WORK_F	MARG_WORK_P	MARGW_ORK_M	MARGW_ORK_F	NON_W_ORK_P	NON_W_ORK_M	NON_W_ORK_F
<b>Core Zone</b>													
Chicholi	1103	532	289	243	242	142	100	290	147	143	571	250	321
Gaitra	892	483	247	236	455	240	215	28	7	21	409	209	200
Raikheda	3541	1650	988	662	1189	906	283	461	82	379	1891	746	1145
<b>Sub-Total</b>	<b>5536</b>	<b>2665</b>	<b>1524</b>	<b>1141</b>	<b>1886</b>	<b>1288</b>	<b>598</b>	<b>779</b>	<b>236</b>	<b>543</b>	<b>2871</b>	<b>1205</b>	<b>1666</b>
<b>Buffer Zone-I</b>													
Amlitalab	528	226	145	81	101	98	3	125	47	78	302	130	172
Bangoli	1898	958	520	438	550	352	198	408	168	240	940	436	504
Deogaon	1245	549	318	231	48	41	7	501	277	224	696	295	401
Dhansuli 1	1241	560	310	250	346	248	98	214	62	152	681	297	384
Gaurkheda	853	394	247	147	250	194	56	144	53	91	459	178	281
Janjira	1265	642	335	307	285	232	53	357	103	254	623	279	344
Khamhariya	1252	633	322	311	470	253	217	163	69	94	619	290	329
Khapri	597	295	158	137	289	152	137	6	6	0	302	145	157
Khauna	3745	1695	994	701	1451	889	562	244	105	139	2050	900	1150
Kurra 1	1271	526	295	231	327	214	113	199	81	118	745	333	412
Madhi	2530	1006	632	374	694	483	211	312	149	163	1524	599	925
Mohrenga	2555	1087	659	428	169	140	29	918	519	399	1468	616	852
Mura	2359	1065	594	471	417	357	60	648	237	411	1294	594	700
Pikaridih	1067	515	286	229	514	285	229	1	1	0	552	257	295
Sontara	1084	517	305	212	56	48	8	461	257	204	567	238	329
Tarasiw	1460	654	413	241	425	290	135	229	123	106	806	313	493
<b>Sub-Total</b>	<b>24950</b>	<b>11322</b>	<b>6533</b>	<b>4789</b>	<b>6392</b>	<b>4276</b>	<b>2116</b>	<b>4930</b>	<b>2257</b>	<b>2673</b>	<b>13628</b>	<b>5900</b>	<b>7728</b>



CSR Villages	TOT_P	TOT_WORK_P	TOT_WORK_M	TOT_WORK_F	MAIN_WORK_P	MAINWORK_M	MAINWORK_F	MARG_WORK_P	MARGWORK_M	MARGWORK_F	NON_WORK_P	NON_WORK_M	NON_WORK_F
<b>Buffer Zone-II</b>													
Adsena	3364	1607	906	701	1306	836	470	301	70	231	1757	804	953
Asaunda	1759	812	464	348	528	336	192	284	128	156	947	409	538
Baheradih	427	215	113	102	212	112	100	3	1	2	212	101	111
Bahesar	1694	764	466	298	603	423	180	161	43	118	930	381	549
Baronda	2033	875	510	365	199	162	37	676	348	328	1158	484	674
Bartori	1202	467	305	162	251	178	73	216	127	89	735	301	434
Bartori 2	1573	848	450	398	247	163	84	601	287	314	725	319	406
Beldar Seoni	2726	1416	755	661	320	195	125	1096	560	536	1310	595	715
Bharuwadi h Kala	825	404	219	185	384	208	176	20	11	9	421	193	228
Bharuwadi h Khurd	738	346	179	167	340	174	166	6	5	1	392	194	198
Bhibhauri	1446	653	391	262	566	368	198	87	23	64	793	335	458
Bithiya	1325	613	355	258	385	315	70	228	40	188	712	316	396
Budgahan	1130	525	272	253	511	267	244	14	5	9	605	296	309
Chhataud	2219	1024	572	452	703	410	293	321	162	159	1195	498	697
Ganiyari	2045	1120	631	489	618	463	155	502	168	334	925	391	534
Hatband	769	449	247	202	185	149	36	264	98	166	320	160	160
Jalso	932	561	289	272	305	203	102	256	86	170	371	189	182
Kathiya 1	2410	1080	614	466	868	530	338	212	84	128	1330	589	741
Keotara	1469	746	392	354	491	286	205	255	106	149	723	366	357
Kesla	5188	2049	1392	657	1503	1169	334	546	223	323	3139	1192	1947
Khauli Dabri	422	213	116	97	148	89	59	65	27	38	209	86	123
Khudmudi	969	293	231	62	136	123	13	157	108	49	676	275	401



CSR Villages	TOT_P	TOT_WORK_P	TOT_WORK_M	TOT_WORK_F	MAIN_WORK_P	MAINWORK_M	MAINWORK_F	MARG_WORK_P	MARGW_ORK_M	MARGW_ORK_F	NON_W_ORK_P	NON_W_ORK_M	NON_W_ORK_F
Kirna	2863	1239	816	423	1069	733	336	170	83	87	1624	643	981
Kodawa	1382	476	369	107	166	157	9	310	212	98	906	328	578
Konari	772	348	201	147	340	197	143	8	4	4	424	202	222
Kundru	4016	1568	1126	442	1355	1072	283	213	54	159	2448	945	1503
Math	2501	1458	936	522	1110	866	244	348	70	278	1043	498	545
Mohadi 2	1256	656	354	302	647	349	298	9	5	4	600	280	320
Mudpar 1	1189	672	338	334	329	289	40	343	49	294	517	235	282
Nahardih	847	492	247	245	156	89	67	336	158	178	355	177	178
Nakti Khapri	735	216	174	42	92	82	10	124	92	32	519	191	328
Nakti Kumhari	1215	581	301	280	553	297	256	28	4	24	634	298	336
Pachdeori	394	216	106	110	179	85	94	37	21	16	178	82	96
Paraswani	427	200	112	88	190	109	81	10	3	7	227	97	130
Pathara Kundi	359	186	97	89	94	55	39	92	42	50	173	91	82
Rajiya	906	411	231	180	303	201	102	108	30	78	495	204	291
Sirwe	1172	594	312	282	325	270	55	269	42	227	578	268	310
Tildadih	1009	563	291	272	187	119	68	376	172	204	446	241	205
Tulsi 3	600	350	185	165	8	7	1	342	178	164	250	116	134
Malaud	1818	665	438	227	522	380	142	143	58	85	1153	479	674
Mangasa	914	384	258	126	322	218	104	62	40	22	530	211	319
Mauhagao n	1255	425	298	127	156	130	26	269	168	101	830	330	500
Nilja	2476	1124	687	437	390	303	87	734	384	350	1352	563	789
Pathari(Pat hari Khudmudi)	2976	1371	870	501	1221	837	384	150	33	117	1605	651	954



CSR Villages		TOT_P	TOT_WORK_P	TOT_WORK_M	TOT_WORK_F	MAIN_WORK_P	MAIN_WORK_M	MAIN_WORK_F	MARG_WORK_P	MARG_WORK_M	MARG_WORK_F	NON_WORK_P	NON_WORK_M	NON_WORK_F
Pawani	Rural	2310	1085	634	451	853	523	330	232	111	121	1225	530	695
Saragaon	Rural	3947	1729	1070	659	1565	1014	551	164	56	108	2218	916	1302
<b>Sub-Total</b>		<b>74004</b>	<b>34089</b>	<b>20320</b>	<b>13769</b>	<b>22941</b>	<b>15541</b>	<b>7400</b>	<b>11148</b>	<b>4779</b>	<b>6369</b>	<b>39915</b>	<b>17050</b>	<b>22865</b>
<b>Grand Total</b>		<b>104490</b>	<b>48076</b>	<b>28377</b>	<b>19699</b>	<b>31219</b>	<b>21105</b>	<b>10114</b>	<b>16857</b>	<b>7272</b>	<b>9585</b>	<b>56414</b>	<b>24155</b>	<b>32259</b>



TABLE 4.4: TYPES OF MAIN WORKER OF VILLAGES FALLING WITHIN REL-CSR ZONE

CSR Villages	MAINWORK_ P	MAIN_C L_P	MAIN_CL _M	MAIN_ CL_F	MAIN_ AL_P	MAIN_ AL_M	MAIN_ AL_F	MAIN_H H_P	MAIN_H H_M	MAIN_H H_F	MAIN_OT_ P	MAIN_OT_ M	MAIN_OT_ F
<b>Core Zone</b>													
Chicholi	242	26	17	9	159	79	80	1	1	0	56	45	11
Gaitra	455	148	78	70	234	110	124	5	3	2	68	49	19
Raikheda	1189	480	331	149	388	287	101	3	3	0	318	285	33
<b>Sub-Total</b>	<b>1886</b>	<b>654</b>	<b>426</b>	<b>228</b>	<b>781</b>	<b>476</b>	<b>305</b>	<b>9</b>	<b>7</b>	<b>2</b>	<b>442</b>	<b>379</b>	<b>63</b>
<b>Buffer Zone-I</b>													
Amilalab	101	37	37	0	47	44	3	0	0	0	17	17	0
Bangoli	550	103	49	54	249	153	96	25	15	10	173	135	38
Deogaon	48	12	12	0	2	0	2	0	0	0	34	29	5
Dhansuli 1	346	61	44	17	195	120	75	1	1	0	89	83	6
Gaurkheda	250	162	123	39	64	52	12	11	10	1	13	9	4
Janjira	285	90	77	13	50	16	34	8	8	0	137	131	6
Khamhariya	470	95	54	41	166	69	97	9	3	6	200	127	73
Khapri	289	117	47	70	118	55	63	4	2	2	50	48	2
Khauna	1451	283	183	100	954	521	433	7	5	2	207	180	27
Kurra 1	327	58	40	18	186	101	85	4	2	2	79	71	8
Madhi	694	157	117	40	417	255	162	3	3	0	117	108	9
Mohrenga	169	91	72	19	10	8	2	0	0	0	68	60	8
Mura	417	49	44	5	95	64	31	2	2	0	271	247	24
Pikaridih	514	76	46	30	411	218	193	0	0	0	27	21	6
Sontara	56	21	19	2	1	1	0	2	1	1	32	27	5
Tarasiw	425	153	94	59	127	67	60	0	0	0	145	129	16
<b>Sub-Total</b>	<b>6392</b>	<b>1565</b>	<b>1058</b>	<b>507</b>	<b>3092</b>	<b>1744</b>	<b>1348</b>	<b>76</b>	<b>52</b>	<b>24</b>	<b>1659</b>	<b>1422</b>	<b>237</b>
<b>Buffer Zone-II</b>													
Adсна	1306	376	262	114	799	462	337	0	0	0	131	112	19



CSR Villages	MAINWORK_ P	MAIN_C L_P	MAIN_CL _M	MAIN_ CL_F	MAIN_ AL_P	MAIN_ AL_M	MAIN_ AL_F	MAIN_H H_P	MAIN_H H_M	MAIN_H H_F	MAIN_OT_ P	MAIN_OT_ T_M	MAIN_OT_ F
Asaunda	528	121	96	25	375	216	159	11	11	0	21	13	8
Baheradih	212	31	29	2	179	81	98	0	0	0	2	2	0
Bahesar	603	105	52	53	179	89	90	5	5	0	314	277	37
Baronda	199	44	36	8	66	49	17	5	4	1	84	73	11
Bartori	251	17	12	5	142	78	64	3	3	0	89	85	4
Bartori 2	247	93	53	40	90	55	35	10	10	0	54	45	9
Beldar Seoni	320	85	43	42	135	67	68	3	2	1	97	83	14
Bharuwadih Kala	384	141	75	66	218	115	103	2	1	1	23	17	6
Bharuwadih Khurd	340	159	80	79	173	89	84	0	0	0	8	5	3
Bhibhauri	566	169	102	67	247	144	103	5	2	3	145	120	25
Bithiya	385	217	185	32	74	42	32	4	4	0	90	84	6
Budgahan	511	155	80	75	332	168	164	0	0	0	24	19	5
Chhataud	703	192	102	90	325	145	180	13	7	6	173	156	17
Ganiyari	618	170	109	61	363	285	78	3	2	1	82	67	15
Hatband	185	89	71	18	64	46	18	0	0	0	32	32	0
Jalso	305	75	59	16	135	59	76	0	0	0	95	85	10
Kathiya 1	868	324	216	108	437	218	219	0	0	0	107	96	11
Keotara	491	140	75	65	266	143	123	9	6	3	76	62	14
Kesla	1503	157	138	19	286	199	87	100	84	16	960	748	212
Khauri Dabri	148	61	37	24	52	30	22	0	0	0	35	22	13
Khudmudi	136	61	56	5	24	20	4	2	2	0	49	45	4
Kirna	1069	117	106	11	578	294	284	6	6	0	368	327	41
Kodawa	166	16	16	0	80	76	4	6	6	0	64	59	5
Konari	340	112	52	60	146	70	76	5	4	1	77	71	6
Kundru	1355	25	19	6	423	247	176	6	5	1	901	801	100
Math	1110	167	116	51	435	259	176	66	60	6	442	431	11





CSR Villages	MAINWORK_ P	MAIN_C L_P	MAIN_CL _M	MAIN_ CL_F	MAIN_ AL_P	MAIN_ AL_M	MAIN_ AL_F	MAIN_H H_P	MAIN_H H_M	MAIN_H H_F	MAIN_OT_ P	MAIN_OT_ T_M	MAIN_OT_ F
Mohadi 2	647	279	139	140	282	137	145	2	0	2	84	73	11
Mudpar 1	329	105	95	10	188	165	23	12	9	3	24	20	4
Nahardih	156	128	72	56	18	10	8	2	1	1	8	6	2
Nakti Khapri	92	39	38	1	1	1	0	2	2	0	50	41	9
Nakti Kumhari	553	121	72	49	397	198	199	0	0	0	35	27	8
Pachdeori	179	17	11	6	152	66	86	0	0	0	10	8	2
Paraswani	190	58	36	22	122	67	55	0	0	0	10	6	4
Pathara Kundi	94	80	43	37	5	4	1	0	0	0	9	8	1
Rajliya	303	56	40	16	190	105	85	1	1	0	56	55	1
Sirwe	325	100	76	24	74	52	22	0	0	0	151	142	9
Tildadih	187	44	26	18	75	40	35	9	4	5	59	49	10
Tulsi 3	8	1	1	0	0	0	0	0	0	0	7	6	1
Malaud	522	151	97	54	171	101	70	6	6	0	194	176	18
Mangasa	322	89	57	32	104	49	55	2	2	0	127	110	17
Mauhagaon	156	32	26	6	30	22	8	0	0	0	94	82	12
Nijja	390	99	83	16	122	72	50	29	27	2	140	121	19
Pathari(Pathari Khudimudi)	1221	342	245	97	587	333	254	10	6	4	282	253	29
Pawani	853	97	69	28	496	218	278	7	5	2	253	231	22
Saragaon	1565	158	125	33	834	372	462	47	42	5	526	475	51
<b>Sub-Total</b>	<b>22941</b>	<b>5415</b>	<b>3628</b>	<b>1787</b>	<b>10471</b>	<b>5758</b>	<b>4713</b>	<b>393</b>	<b>329</b>	<b>64</b>	<b>6662</b>	<b>5826</b>	<b>836</b>
<b>Grand Total</b>	<b>31219</b>	<b>7634</b>	<b>5112</b>	<b>2522</b>	<b>14344</b>	<b>7978</b>	<b>6366</b>	<b>478</b>	<b>388</b>	<b>90</b>	<b>8763</b>	<b>7627</b>	<b>1136</b>



TABLE 4.5: TYPES OF MARGINAL WORKER OF VILLAGES FALLING WITHIN REL-CSR ZONE

CSR Villages	MARG WORK_P	MARG _CL_P	MARG _CL_M	MARG _CL_F	MARG _AL_P	MARG _AL_M	MARG _AL_F	MARG _HH_P	MARG _HH_M	MARG _HH_F	MARG _OT_P	MARG _OT_M	MARG _OT_F
<b>Core Zone</b>													
Chicholi	290	64	32	32	216	107	109	0	0	0	10	8	2
Gaitra	28	12	4	8	13	2	11	0	0	0	3	1	2
Raikheda	461	109	41	68	336	31	305	0	0	0	16	10	6
<b>Sub-Total</b>	<b>779</b>	<b>185</b>	<b>77</b>	<b>108</b>	<b>565</b>	<b>140</b>	<b>425</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>29</b>	<b>19</b>	<b>10</b>
<b>Buffer Zone-I</b>													
Amlitalab	125	53	9	44	71	37	34	0	0	0	1	1	0
Bangoli	408	13	2	11	362	149	213	9	3	6	24	14	10
Deogaon	501	62	33	29	426	235	191	6	3	3	7	6	1
Dhansuli 1	214	12	5	7	193	49	144	0	0	0	9	8	1
Gaurkheda	144	3	2	1	140	50	90	0	0	0	1	1	0
Janjira	357	2	0	2	347	97	250	1	1	0	7	5	2
Khamhariya	163	2	0	2	157	66	91	0	0	0	4	3	1
Khapri	6	1	1	0	1	1	0	0	0	0	4	4	0
Khauna	244	76	19	57	151	77	74	0	0	0	17	9	8
Kurra 1	199	14	5	9	76	32	44	4	3	1	105	41	64
Madhi	312	65	34	31	239	109	130	0	0	0	8	6	2
Mohrenga	918	90	65	25	711	345	366	7	4	3	110	105	5
Mura	648	41	24	17	543	172	371	0	0	0	64	41	23
Pikaridih	1	1	1	0	0	0	0	0	0	0	0	0	0
Sontara	461	14	13	1	444	241	203	1	1	0	2	2	0
Tarasiw	229	61	21	40	160	94	66	0	0	0	8	8	0
<b>Sub-Total</b>	<b>4930</b>	<b>510</b>	<b>234</b>	<b>276</b>	<b>4021</b>	<b>1754</b>	<b>2267</b>	<b>28</b>	<b>15</b>	<b>13</b>	<b>371</b>	<b>254</b>	<b>117</b>
<b>Buffer Zone-II</b>													
Adsena	301	10	4	6	288	64	224	0	0	0	3	2	1



CSR Villages	MARG_WORK_P	MARG_CL_P	MARG_CL_M	MARG_CL_F	MARG_AL_P	MARG_AL_M	MARG_AL_F	MARG_HH_P	MARG_HH_M	MARG_HH_F	MARG_OT_P	MARG_OT_M	MARG_OT_F
Asaunda	284	54	26	28	222	97	125	5	5	0	3	0	3
Baheradih	3	0	0	0	0	0	0	0	0	0	3	1	2
Bahesar	161	37	7	30	84	3	81	0	0	0	40	33	7
Baronda	676	93	51	42	563	279	284	3	2	1	17	16	1
Bartori	216	0	0	0	210	121	89	0	0	0	6	6	0
Bartori 2	601	12	8	4	573	266	307	3	2	1	13	11	2
Beldar Seoni	1096	297	176	121	771	364	407	2	1	1	26	19	7
Bharuwadih Kala	20	0	0	0	5	2	3	9	5	4	6	4	2
Bharuwadih Khurd	6	1	1	0	5	4	1	0	0	0	0	0	0
Bhibhauri	87	13	4	9	65	12	53	2	2	0	7	5	2
Bithiya	228	63	4	59	103	10	93	1	0	1	61	26	35
Budgahan	14	1	0	1	12	5	7	0	0	0	1	0	1
Chhataud	321	29	13	16	268	130	138	7	4	3	17	15	2
Ganiyari	502	28	7	21	466	155	311	2	2	0	6	4	2
Hatband	264	121	43	78	128	50	78	0	0	0	15	5	10
Jalso	256	73	10	63	165	62	103	0	0	0	18	14	4
Kathiya 1	212	27	8	19	124	55	69	0	0	0	61	21	40
Keotara	255	42	16	26	204	83	121	1	1	0	8	6	2
Kesla	546	24	16	8	354	119	235	42	21	21	126	67	59
Khauli Dabri	65	35	15	20	24	8	16	0	0	0	6	4	2
Khudmudi	157	1	1	0	152	103	49	0	0	0	4	4	0
Kirna	170	9	9	0	130	48	82	1	1	0	30	25	5
Kodawa	310	28	25	3	277	184	93	1	0	1	4	3	1
Konari	8	0	0	0	7	3	4	0	0	0	1	1	0
Kundru	213	9	2	7	162	25	137	3	1	2	39	26	13



CSR Villages	MARG_WORK_P	MARG_CL_P	MARG_CL_M	MARG_CL_F	MARG_AL_P	MARG_AL_M	MARG_AL_F	MARG_HH_P	MARG_HH_M	MARG_HH_F	MARG_OT_P	MARG_OT_M	MARG_OT_F
Math	348	51	6	45	287	57	230	4	2	2	6	5	1
Mohadi 2	9	2	1	1	7	4	3	0	0	0	0	0	0
Mudpar 1	343	102	21	81	235	25	210	0	0	0	6	3	3
Nahardih	336	36	18	18	297	138	159	0	0	0	3	2	1
Nakti Khapri	124	4	1	3	79	55	24	0	0	0	41	36	5
Nakti Kumhari	28	7	2	5	17	2	15	0	0	0	4	0	4
Pachdeori	37	3	2	1	32	19	13	2	0	2	0	0	0
Paraswani	10	3	0	3	5	2	3	0	0	0	2	1	1
Pathara Kundi	92	8	4	4	83	38	45	0	0	0	1	0	1
Rajiya	108	33	9	24	71	20	51	1	0	1	3	1	2
Sirwe	269	23	3	20	235	31	204	3	2	1	8	6	2
Tildadh	376	66	31	35	285	123	162	9	4	5	16	14	2
Tulsi 3	342	62	57	5	276	120	156	1	1	0	3	0	3
Malaud	143	11	4	7	117	46	71	7	4	3	8	4	4
Mangasa	62	5	4	1	26	9	17	1	1	0	30	26	4
Mauhagaon	269	35	24	11	209	122	87	0	0	0	25	22	3
Nilija	734	11	7	4	582	247	335	92	89	3	49	41	8
Pathari(Pathari Khudmudi)	150	11	0	11	97	19	78	5	0	5	37	14	23
Pawani	232	6	1	5	211	100	111	0	0	0	15	10	5
Saragaon	164	15	7	8	117	26	91	4	0	4	28	23	5
<b>Sub-Total</b>	<b>11148</b>	<b>1501</b>	<b>648</b>	<b>853</b>	<b>8630</b>	<b>3455</b>	<b>5175</b>	<b>211</b>	<b>150</b>	<b>61</b>	<b>806</b>	<b>526</b>	<b>280</b>
<b>Grand Total</b>	<b>16857</b>	<b>2196</b>	<b>959</b>	<b>1237</b>	<b>13216</b>	<b>5349</b>	<b>7867</b>	<b>239</b>	<b>165</b>	<b>74</b>	<b>1206</b>	<b>799</b>	<b>407</b>



## 5.0 DETAIL OF CSR ACTIVITIES UNDERTAKEN

### 5.1 THRUST AREA OF CSR ACTIVITIES

GMR Chhattisgarh Energy Limited (GCEL) a 2X685 MW supercritical thermal Power plant has been acquired by Adani Power Limited in July 2019 and acknowledged as Raipur Energen Limited (REL). GCEL had run CSR activities through GMR-Varalakshmi Foundation (GMR-VF) a CSR arm of GMR group since from 2009. Although the rapport building activities in the project area started in March 2009, the actual work began in June 2009. CSR activities in Railway Siding and other nearby villages had started in the year 2015. Raipur Energen Limited-Adani Foundation (REL-AF) a CSR arm of Adani Group, has taken over CSR activities from GMR-VF in Oct 2019 and decided to continue all the running activities as usual till March 2020.

Adani Foundation (AF) was established in 1996 and is situated in Ahmedabad. It was set up to enhance the socio-economic condition of backward rural community under Corporate Social Responsibility (CSR) near the vicinity of the plant premises. It is a part of the prestigious Adani Group and looks after the CSR related activities of the group, which has now become synonymous with creating wealth for the people. Foundation was established with the vision to “accomplish passionate commitment to the social obligations towards communities, fostering sustainable and integrated development, thus improving quality of life”. Currently AF is working in Gujarat, Himachal Pradesh, Madhya Pradesh, Chhattisgarh, Maharashtra and Rajasthan, etc.

As per the APL CSR policy AF-REL has undertaken various activities for providing sustainable livelihood and strengthening basic amenities & infrastructural facilities at villages of CSR zone REL.

The major emphasis is being given in sustainable livelihood development and strengthening the educational facilities in terms of providing infrastructural supports at primary as well as the secondary schools of REL CSR zone. Besides improving the infrastructural facilities at educational institutions, the study materials, scholarships, etc. were also provided. For undertaking the CSR activities at CSR zones, the emphasis were also given in improving drinking water and health, hygiene & sanitation facilities, etc. for villages of CSR zone.

As mentioned earlier, AF-REL has already initiated the various social mitigation and development activities in core as well as buffer zone villages within the 10 km radius of the TPP. Initially, AF-REL has identified 13 PAVs/RAVs namely Raikheda, Chicholi, Gaitra, Gourkheda, Sontara, Murra, Tulsi, Khamharia, Konari, Bartori, Tarashiv Chatod and Samoda under 12 Gram Panchayats of Tilda and Aarang block of Raipur District in Chhattisgarh. Subsequently, all the villages falling within 10 km radius of TPP i.e. 65 have been classified into



3 zones for undertaking CSR activities. The zone wise detail of villages along with their demographic profile is already presented in earlier chapters. The AF-REL is primarily focusing in four major thrust areas for socio-economic development in the vicinity of TPP under Raipur District:

1. Education Facilities,
2. Community Health, Hygiene & Sanitation
3. Sustainable Livelihood Development, and
4. Rural Infrastructure Development.

The need based annual action plan for undertaking CSR activities in the vicinity of TPP area is being formulated. The social process being followed for formulation of annual action plan as mentioned in subsequent section.

At village level first AF-REL representatives attend Gram Panchayat meeting and introduce AF-REL and its objectives and societal commitment. Social development process requires basic information of village which is being collected through baseline survey and PRA which is the best practice for the purpose and the same is being followed. The baseline survey includes all information about village demographic profile, natural resources, geographical knowledge, etc. Some key information and primary social issues are captured through PRA like social mapping, resource mapping, matrix ranking, etc.

Matrix Ranking is very important tool to find out problems and solutions by village community. As per need, AF-REL prepares project with guideline like project planning, concept note, implementation strategy and outcome. This is in house process, then proposed developmental project is taken through Government Administration / Gram panchyat / Education Dept. / Health Dept. / Agriculture Dept. as per requirement of project nature and type before implementation of the same.

At village level, Village Development Committee (VDC) is being formed with the approval of Gram Panchyat. VDC members are selected by village community and give them rights and power for planning and decision making regarding social development of the village. They help in project implementation and look after which project(s) going in right direction or not and monitor and evaluation of CSR activities. VDC's role is very effective in undertaking need based CSR Activities in the vicinity of TPP.



The major CSR activities undertaken by AF-REL includes:

#### **Education Facilities-**

- Navodaya coaching for 4<sup>th</sup> & 5<sup>th</sup> std students.
- E-Learning package distribution programme to Government schools.
- E-learning kit with Education Software provided to Anganwadis and primary School.
- Workshop for Anganwadi Sevika on using the software provided for E-learning kit.
- UDAAN Programme- Educational exposure visit to Adani Power Plant.
- English & Maths coaching classes.
- Goal setting workshop for High school students.
- Software module development training programme for Anganwadi.
- Road Traffic safety Awareness Programme in Schools.
- Sports Material Distribution to youth group
- Employee volunteering under education enhancement Programme
- Fire safety week Celebration with Schools
- Environment Day Celebration

#### **Medical Facilities-**

- Medical Dispensaries & MHCU
- General Medical Health camp in CSR villages
- Upgradation of Government Hospitals
- Poor Patient Assistance Programme
- Homeopathic Medical Treatment Camp
- Pulse polio vaccination camp support
- Street play on De-addiction awareness programme
- TSC (Total Sanitation Campaign) material support to CSR villages

#### **Sustainable Livelihood Development-**

- Sewing training center in CSR villages
- SRI cultivation in Kharif and Rabi season
- Vanmahotsav
- Cow based livelihood training programme
- Advance Tailoring Programme for Women
- Computer Training Programme
- Fly ash utilization training programme
- Seminar on opportunities in abroad for ITI Job aspirants
- Felicitation of women for promoting de-addiction in village
- Self-help group meeting in villages
- SAKSHAM- Adani skill development center



- Catering services training programme for sustainable development
- Livestock development Centre
- Kitchen Garden Seeds distribution programme
- Installation of Pre-Fabricated Bio-gas systems
- Improved Chulha programme.
- Water conservation

#### **Rural Infrastructure Development-**

- Pond Deepening and Stream Cleaning Work
- Construction of low cost house.
- Provide drinking water facility in CSR villages
- Installation of seating benches at CSR villages
- Construction of farm pond at CSR villages
- Construction of classroom in CSR villages Schools

## **5.2 DETAIL OF CSR ACTIVITIES UNDERTAKEN**

AF-REL mainly works in 13 PAVs/RAVs namely Raikheda, Chicholi, Gaitra, Gourkheda, Sontara, Murra, Tulsi, Khamharia, Konari, Bartori, Tarashiv Chatod and Samoda under 12 Gram Panchayats of Tilda and Aarang block of Raipur District in Chhattisgarh. Approximately 37,000 individuals were covered in all the villages. The region is heavily dependent on agriculture. Majority of the population belongs to the other Backward Caste and Scheduled Caste community. Around 80% of landowners are marginal farmers with less than 2 acres of agricultural land. They depend on single Kharif crop of Paddy.

As per law, CSR Committee has been set by GCEL. Though there was no mandatory spend during the year 2017-18 to 2019-20, as part of the philosophy of the Group, CSR activities were carried out with the approval of the CSR Committee during the financial year 2017-18 and 2018-19. Whereas during the financial year 2019-20, first 3 months, minimal CSR activities were carried out with the approval of the CSR Committee of GMR-VF, another 3 months same were continued with the approval of Adani Power Ltd. and for further 6 months with approval of Adani Foundation.

The GMR-VF Team at Raipur, Chhattisgarh comprises of a One Program Executive, 3 Jr. Assistants, and 22 field volunteers during the financial year 2017-18 and 2018-19. Whereas, During the financial year 2019-20, the REL-AF team at Raipur, Chhattisgarh comprises of a One Unit CSR Head and Sr. Project Officer with 3 Project Officers. Concurrently, 27 field volunteers with 2 faculties were also engaged in the surrounding villages as per activities. While under Adani Skill Development program 3 volunteers and 3 faculties were giving their





services at the ASDC. The various interventions implemented in the project area are depicted in the following section.

The REL-AF follows the philanthropic scope of activities for sustainable community development. The Table 5.1 presents the CSR Programme matrix with sectors vis-à-vis the stakeholders covered under them.

**TABLE 5.1: CSR PROGRAMME MATRIX - INTERVENTION AND RELEVANT STAKEHOLDERS**

Sector	Strategic Focus	Interventions	Stakeholders
EDUCATION	Quality Improvement	MLS Design and Implementation, Navodaya Entrance Coaching , Tutions for children , Pratibha Coaching , Kids Smart Centre, Saksham Scholarship, Para Teachers (Vidya Volunteers) , Training on Creative Learning	Children- Students , College going girls, Anganwadi Children and Staff, Parents, School Staff, School Management , Village Panchayat Representatives
	Infrastructure Supplementation	Transportation Facility for College going Girls, School Infrastructure Improvement, Drinking Water for School, Anganwadi Improvements.	
HEALTH, HYGIENE & SANITATION	Preventive Health and Diagnostics AND Hygiene & Sanitation	Health Awareness Camps, Community Dispensaries, X Ray Machine at CHC Kharora, Blood Bank at Mission Hospital Tilda, Tiles under Swachh Bharat Abhiyan Individual Toilets, Maintenance of Public Toilet	Villagers , Children, Pregnant Women, School Children, Doctors, Mitanin, Victims of accidents, Patients, Village Panchayat Representatives



Sector	Strategic Focus	Interventions	Stakeholders
	Curative Health and Emergency Services	Mobile Medical Unit Services, In Patient referral arrangement with Tilda Mission Hospital, Malnutrition Intervention	
EMPOWERMENT & LIVELIHOODS	Empowerment	Individual Income Generation Activities, SHG Development, Vocational Training ( Mobile, TV Repairing and domestic electrical works ), Computer Training, Farmers' Training, Animal Husbandry, Tailoring Training, Recruitment Camps, Banking Awareness., Pratibha Coaching Centre, Community Library	Women, Unemployed Youth , Unemployed men, Farmers , Disabled Individuals

### 5.2.1 Education Facilities

The prime focus of education programme includes:

- a) Providing/ Ensuring quality education for all the school students.
- b) Building environment which supports school students in their study.
- c) Creating environment in the School for students through different co-curricular activities which engage students in their integrated development.
- d) Making Efforts for 100% enrolment & retention of eligible children in Government Primary Schools.
- e) Providing conducive & healthy environment in the Government Schools.



Under this Programme GMR-VF/REL-AF conducted various educational support programmes in selected CSR villages during 2017-18 to 2019-20 which includes:

- **Support to Government Schools and Anganwadis**
  - Vidya Volunteers/ Guru Sangis
  - Minimum Learning Standards
  - Support to Government School
  - Support to Anganwadi Centres
  - Awareness Programs for Children and Teachers
  - Community Libraries
  - Infrastructure Support
  
- **Direct Support to Children**
  - Saksham Scholarship
  - Navodaya Coaching
  - Kid Smart Centers
  - Kid smart express
  - Noni Laari -Transport Facility for College Going Girls

The detail of CSR activities undertaken during 2017-18 to 2019-20 to support Government Schools and Anganwadis as well as directly support to school children is presented in Table 5.2.

### **Vidya Volunteers/Guru Sangis**

During financial year 2017-18, GMR-VF extended support to 15 Govt. schools by providing 25 Vidya volunteers, based on the request by the respective Panchayats. The honorarium was paid through a joint agreement between the Panchayats, school committee and GMR-VF. The Vidya volunteers were trained to support the regular teachers in the school. This initiative has benefited 1,675 students. The volunteers also supported the school committees in conducting various cultural activities.

Despite of many challenges, GMR-VF supported to 14 Govt. schools during financial year 2018-19 where approximately 1568 children at PAVs & RAVs have been benefitted with teacher supports by use of existing volunteers whose were committed to serve on GMR-VF's different activities without any obligations as GMR-VF have withdrawn Vidya volunteers for the schools support. Simultaneously conducted health awareness camps to each schools and career counseling to higher secondary students by GCEL employees.

During financial year 2019-20 on request of Block Education Officer REL-AF recruited 12 "Guru Sangis" (subject teachers support) to support to 11 Govt. schools where about 1329 children out of which 452 were in Primary, 712 were in Middle & 165 were in High school at our PAVs &



RAVs have been benefitted. Concurrently health awareness programs on cleanliness, hygiene & seasonal diseases also conducted in each school.

### **Minimum Learning Standards**

While working with the government schools in the project area, it was observed that about 50% of the students studying in these schools do not have the understanding on the basic writing, reading and arithmetic skills as per their standard and age. Considering this situation, during financial year 2017-18, Foundation initiated Minimum Learning Standards program with the students of Govt. schools from 6 villages. About 375 students were benefitted from this program which focuses on improving their learning levels through special classes, regular tests and continuous comprehensive evaluation.

### **Support to Government School**

For the past 5 years, GMR-VF provided financial assistance to Raikheda Higher Secondary School by providing 50% of the salary for 10 teachers. This has helped in the retention of quality teachers.

### **Support to Anganwadi Centres**

School uniforms and water bottles were distributed to 100 children from 4 anganwadis during financial year 2017-18.

### **Awareness Programs for Children and Teachers & Others**

World Environment Day, Children's Day and Road Safety Week, etc. were celebrated in the government schools at Murra, Raikheda and Tulsi. The celebration included poster & rangoli competitions for school children and debate competition for women. The winners of various competitions were given attractive prizes. More than 780 students and women participated in the programs during financial year 2017-18.

During the financial year 2018-19 World Environment Day, children's Day, Road Safety Week, Yoga Day ((900 students participated), was celebrated in the government schools at Chicholi, Tarashiv, Raikheda and Chhatod. Poster & essay competition for school children and Rangoli competition for women was also organized. The winners of various competitions won attractive prizes. More than 342 students and women have participated in the programs.

During the financial year 2019-20, World Environment Day and Road Safety Week were observed in the foundation office. 68 students participated on drawing competition. Similarly, world Yoga day observed at the plant main gate where 220 people of surrounding villages comprising stakeholders have given their stint towards the healthiness drive on the day.



### **Community Libraries**

Five community libraries located at Raikheda, Bhatapara, Gaitera, Gaurkheda & Chicholi inaugurated in 2009. As on financial year 2019-20, about 21600 beneficiaries comprises with community men, women, kids and drop out youths visited and read the magazines, newspapers, comics & subjective books as per their interests. Besides it several programs like painting and Quiz competitions and important days celebrations were also organized at the libraries. Youths in the village have used the library to read periodicals to prepare for competitive examinations. 62 college students on which 40 girls & 22 boys have completed their graduate and post graduate courses with the help of the library services.

### **Infrastructure Support**

GECL supported the Middle school, Gaitara for the construction of "Toilet" during financial year 2018-19.

### **Noni Laari -Transport Facility for College Going Girls**

Students from the Project Affected Villages (PAV) who want to pursue their college education have to go to college, which is 15-22 km away from PAV in Tilda city. Due to the lack of transportation facility, commuting to college is difficult particularly for girls. To address this issue, GMR-VF has been providing transportation facility since 2010, exclusively for girls from the PAV, who attend college in Tilda. For the purpose a bus has been purchased with financial support from TIM Delhi Airport Advertising Pvt. Ltd. (TIMDAA) and during the financial year 2017-18, 99 girls from 6 villages and during the financial year 2018-19, around 87 girls from 7 villages benefited from this facility. TIMDAA has also supported towards operational expenses of the bus.

As on financial year 2019-20, 200 girls from PAVs have completed their graduation so far. REL-AF have hired school bus to extend the facilities, around 63 girls from 7 villages availed the facility to attend the college during 2019-20. Not only the regular students but also the girls who opted to appear in annual examination as a private students may also avail the bus facility to commute the college. This year total 111 students of which 63 regular & 48 private college girls have been benefited with 'Noni Laari'.



### **TOMS Shoe Distribution**

During the financial year 2017-18, GMR-VF distributed over 2,860 pairs of TOMS shoes in 12 villages. TOMS is a U.S. based shoe company, which works with a mission of One for One. For every pair of shoes purchased, TOMS will give a pair of new shoes to a child in need.

### **Alumni meet for Navodaya Coaching**

In the view of motivation and experience sharing about the quality education of Jawahar Navodaya school, during the financial year 2019-20, AF-REL organized Alumni meet event for AF-REL's Navodaya coaching class students in June 19. 185 students, with their parents, teachers were participated the function in the chairmanship of BEO Tilda, with Principal of schools and other dignitaries. The students & parents who were studying in the Navodaya School have shared their experiences in the meet. Chief guests has appreciated the effort of coaching and advised to open the center at the leftover villages of his block. The teachers, & alumni were rewarded with beautiful mementos at the end of program by the guests.

### **Celebration of Shree Krishna Janamastami**

During the financial year 2019-20, on the occasion of Janamastami Adani Foundation conducted sports & fancy dress competition between the SHG groups of village Chicholi where 50 women of 13 SHG's have participated in the event. Winners were rewarded by station head Shri Rambhav Gattu on 5<sup>th</sup> Sep 19.

### **Navodaya Coaching Center Cup cricket & Kabaddi tournament**

During the financial year 2019-20, NCC cup (Navodaya coaching Centre) cricket and Kabaddi tournament conducted at village Chicholi for AF-REL's 72 Navodaya coaching students, 2 teams of Raikheda and Chicholi have taken part on 8 over cricket match, Chicholi team won the match, at the same time girls played Kabaddi game, 4 teams were participated in the game and team Chicholi won the match. Through the game, children learned about unity, friendship and to being healthy.

### **Say No to Single Use Plastics**

This Swachhagraha 'campaign on, "SAY NO TO SINGLE USE PLASTIC", have launched from the core village Raikheda during the financial year 2019-20. 60 women officers of 15 self-help groups, with sarpanchs, REL colleague, panchs, villagers and foundation volunteers were presents in the program. They have pledged to move this campaign and keep spreading to



every villages and make the villages plastic free to save the Environment. Total 700 cloth Thailas stitched in AF-REL's tailoring center by women of 4S group were distributed to the women of SHG's in 5 villages. The campaign concluded on Dec 30th in village Samoda.

**TABLE 5.2: DETAIL OF CSR ACTIVITIES UNDERTAKEN UNDER EDUCATION PROGRAMME**

2017-18	2018-19	2019-20
25 Vidya Volunteers were provided to 15 schools benefiting 1675 students	-	-
Provided 50% of the salary for 10 teachers at Raikheda Higher Secondary School	Supported 50% salary of 10 teachers at Raikheda Higher Sec. School that benefitted 125 students	-
5 students benefitted from the Saksham Scholarship Scheme	3 students benefitted from the Saksham Scholarship Scheme	-
TOMS Shoes distributed to 2,860 school children from 12 villages	-	-
Provided coaching to 55 students attending Navodaya Entrance Examination	Provided coaching for 53 students of Navodaya Entrance Examination	4 Navodaya Coaching centers for Navodaya Entrance Examination
Running Kid Smart Early Learning Centers at Raikheda, Chicholi and Gaitera, benefiting 123 children	Running Kid Smart Early Learning Centers at Raikheda, Chicholi and Gaitra benefiting 149 children	-
Provided transportation facility for 99 girls from the project affected villages to attend college in Tilda	Provided transportation facility for 87 girls from the project affected villages to attend college in Tilda	Transportation facility to the girls from the project affected villages to attend the college
Provided school uniform and Tie, Belt to 100 children of 4 Anganwadis	-	-
-	5 library centers in 5 villages were operational. 32867 people used library facility	5 Community library centers in 5 villages for the benefit of communities
-	Through library, Books support to College & D-Led students	-
-	-	Prayas career counselling & coaching center for the youths, who were perusing for further professional courses or recruitment in entrance exams



FIGURE 5.1: CSR ACTIVITIES OF REL-AF FOR STRENGTHENING EDUCATIONAL FACILITIES





### 5.2.2 Health, Hygiene and Sanitation

People are usually not much aware about healthy sanitation practices in the rural areas. They generally do not use safe water, food & care less about cleanliness. Because of that a large part of their income goes as expenditure during illness. If people will make habit of using safe water, food & start cleaning the surroundings of their niche most of the diseases can be controlled very easily. Looking into the severity of the issue in the villages realizing the fact that villages are declared as Nirmal on paper, REL-AF started spreading awareness on Hygiene & Sanitation.

The prime objectives of community health programme include:

- Making community aware on different diseases, general health and sanitation;
- Motivating community for total sanitation;
- Promoting free medical care services for complete wellbeing of community;
- Assisting poor patients in secondary treatment.

Under this Programme GMR-VF & REL-AF conducted various community health support programmes in working villages the detail list is as follows:

- Community Dispensaries
- Mobile Medical Unit
- Nutrition Center
- Weekly Health Awareness
- Suposhan cum Nutrition program
- X-Ray Machine at CHC, Kharora and Blood Bank in Tilda
- Prayas
- Poor Patient Assistance Programme
- School Health Camps
- Individual Sanitary Lavatories (ISL) and School Toilets
- Maintenance of Public Toilets
- Homeopathic Medical Treatment Camp
- Street play on deaddiction awareness programme
- TSC (Total Sanitation Campaign) Material Support
- Especial measures initiated for relief on pandemic COVID – 19

GMR-VF partnered with Mission Hospital in Tilda to provide preventive and curative health services to people in the Project Affected Villages. GMR-VF was also running a Mobile Medical



Unit in association with *Jan Jagran Sansthan*, Tilda for the health services at Railway affected villages. During financial year 2019-20, Adani Foundation-REL provides preventive and curative health care services to the people of 13 Project and Railway affected villages. The detail of CSR activities undertaken during 2017-18 to 2019-20 to strengthen health and hygiene and Sanitation facilities in REL's CSR zone is presented in Table 5.3. The prime focus of Health, Hygiene and Sanitation programme include:

### **Community Dispensaries**

GMR-VF started its first dispensary in October 2009 at Village Development Center (VDC), Raikheda. Later, 5 more dispensaries were started in 5 other villages. Team of Doctors is visiting the dispensaries every week from Mission Hospital, Tilda. The MoU signed during first year has been renewed for operating all the dispensaries this year. Medicines were provided to all the patients for seasonal ailments free of cost. Average OPD was observed as 615 per month as on financial year 2017-18, whereas the figure was 423 patients per month as on financial year 2018-19.

### **Mobile Medical Unit**

The MMU is run by a professional team which includes a doctor, nurse and pharmacist who visit 9 villages once a week. The MMU covers 8 villages in Tilda block and 1 village in Aarang block. The MMU has been beneficial mainly to the elderly, women and children. About 1,600 people benefited from the MMU every month as on financial year 2017-18, whereas the figure was 1,016 people as on financial year 2018-19. The MMU doctor also visited schools on a regular basis and educated children on health and personal hygiene. The MMU activity has been implemented with the support from TIM Delhi Airport Advertising Pvt. Ltd.

During the financial year 2019-20, Adani Foundation – REL has signed MOU with Jan Jagran Sansthan, Tilda for the free health services on the Mobile Medical Healthcare Unit (MMHU) in all 13 villages. The MMHU is run by a professional team which includes a qualified MBBS doctor, nurse and pharmacist who visits 13 villages mostly in weekly. The MMU covers 12 villages in Tilda block and 1 village in Aarang Block. The MMHU is beneficial mainly to the elderly, women and children. About 15559 persons of which 8881 old age, 4517 youths & 2161 children have been benefitted from Mobile Medical healthcare services. During all visits around 5034 Hypertensive, 1655 Diabetics, 679 Asthmatic and 8191 General patient have taken health consultation and regular medicines by MMHU doctor.

### **Nutrition Center**

To provide proper nutrition and ante-natal services to pregnant and lactating women, Nutrition Centers have been initiated in 4 villages as on financial year 2017-18, which has been extended



to 5 villages as on financial year 2018-19. Daily nutrition menu has been worked out and nutrition supplements were provided to 117 women regularly at the center as on financial year 2017-18, whereas the figure was 100 women as on financial year 2018-19. Apart from provision of nutrition supplements and regular health check-ups, the women were also given awareness on the precautions to be taken up during pregnancy and lactating stage.

### **Weekly Health Awareness**

Health awareness classes were organized on a weekly basis for women. Students from the Nursing School of Mission Hospital facilitated the awareness sessions in the community dispensaries targeting pregnant and lactating women. Sessions focused on personal hygiene, diarrhea, seasonal ailments, pregnancy complications and precautions, cancer and malnourishment. Several programs on screening of breast cancer were also organized in support with the mission hospital. More than 450 women during financial year 2017-18 and More than 338 women during financial year 2018-19 from the villages of Raikheda, Chicholi and Gaitera participated in the program.

### **Fitness Talk program**

The MMHU doctor also visits to school on regular basis to educate children on health and personal hygiene. During the financial year 2019-20, Health awareness on many topics e.g. Diarrhea, Scabies, Typhoid and Seasonal Diseases along with health checkups were being conducted every week at surrounding govt. schools by team of MMHU. About 1820 students of 23 schools benefitted with the health advice. As per health consultations, medicines also given to 512 students.

### **School Health Camps**

16 school health awareness programs were organized in schools covering 1,718 students during the financial year 2017-18, whereas during the financial year 2018-19 and 2019-20, total 48 and 20 Health Awareness Programs respectively have been organized in schools and have covered 2,460 and 1712 students respectively.

### **Suposhan cum Nutrition program**

To provide proper nutrition and ante-natal services to pregnant and lactating women, suposhan cum nutrition program have been initiated during the financial year 2019-20 in 5 villages by Adani Foundation-REL. Door to door visits taken up for the proper follow-up on nutrition supplements, immunization and safety precautions to 121 beneficiaries on which 49 pregnant



& 72 lactating regularly this year. The beneficiaries have ensured regular health check-ups by experienced gynecologist and also been encouraged for the institutional delivery.

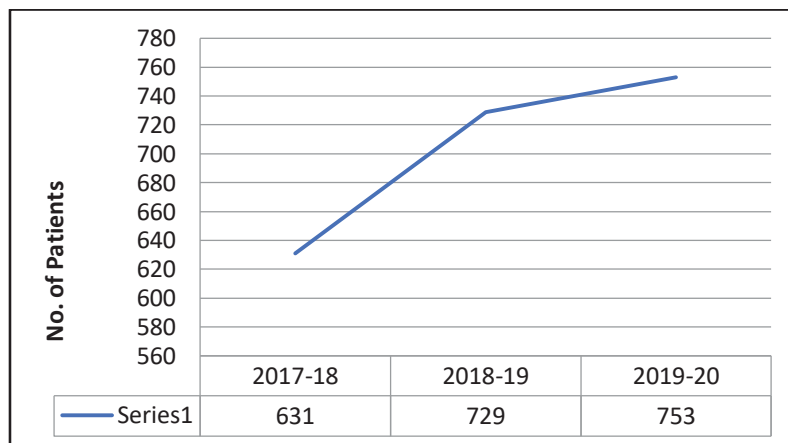
**Gynecological Cognizance**

Cognizance on Gynecological complications, menstrual hygiene, malnourishment, cancers have also been organized during the financial year 2019-20 within the community & school girls at project affected villages by the team of mobile medical healthcare unit of Adani Foundation. About 349 beneficiaries on which 169 adolescent girls and 180 women from the villages of Raikheda, Chicholi and Gaitra were participated in the program.

**X-Ray Machine at CHC, Kharora and Blood Bank in Tilda**

GCEL provided an X-Ray unit to the Community Health Centre in Kharora in 2014. The X-Ray machine benefitted 631 patients during the financial year 2017-18, whereas the number of beneficiaries has been increased to 729 and 753 during the financial year 2018-19 and 2019-20 respectively. Figure 5.2 shows that a greater number of patients get benefitted by X-ray machine during financial year 2019-20 as compared to 2017-18 and 2018-19.

**FIGURE 5.2: NUMBER OF PATIENTS BENEFITTED BY X-RAY MACHINE PROVIDED AT CHC, KHARORA UNDER CSR PROGRAMME**



**Blood Donation Camp**

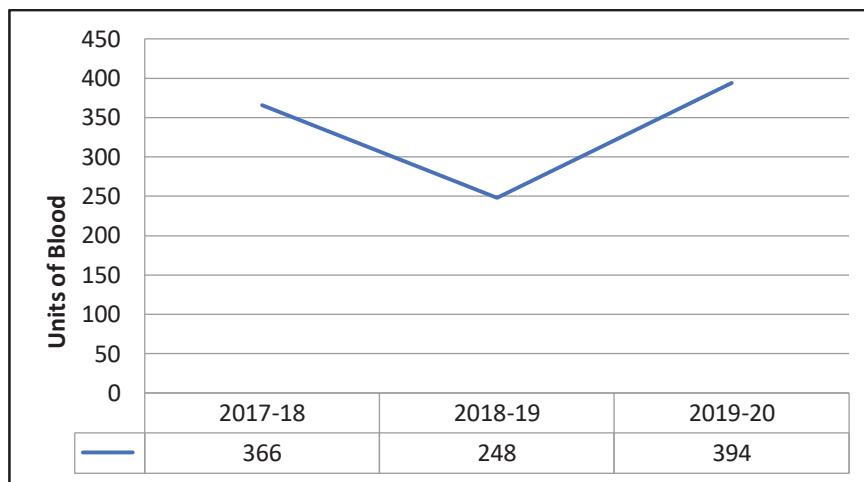
A blood bank was established by GMR-VF four years ago at Mission Hospital, Tilda. During the financial year 2017-18, the bank collected 366 units of blood, whereas during the financial year 2018-19 and 2019-20, the respective figures were 248 and 394 units. During the financial year



2018-19, One-day blood donation camp organized by GCEL. More than 208 units of blood collected with the help of Raipur Red Cross Society Blood Bank in the eve of 72 Independence Day. GMR officials, CSR Team, RAXA Security Services and members of the neighbourhood community and Contract workers donated their blood in the event.

Figure 5.3 shows that there is steep increase of units of blood collected by Bank during financial year 2019-20 as compared to 2018-19.

**FIGURE 5.3: UNITS OF BLOOD COLLECTED BY BANK ESTABLISHED AT MH TILDA UNDER CSR PROGRAMME**



### Special Measures Initiated for Relief on COVID – 19 Pandemic

The spread of Novel Corona Virus (COVID-19) across many countries of the world, including India, has caused immense loss to the lives of people and resultantly impacted world economy as a whole. In view of the emergent situation and challenges faced by fellow countrymen, Adani Foundation-Raipur Energen Ltd. (AF-REL) has once again risen to the occasion and undertook the following initiatives to arrest the spread of the pandemic during the financial year 2019-20.

- 35 quintal daal worth Rs. 3.00 lakh contributed for food support to Raipur Smart City Ltd.
- Nose mask stitching started by the women of Saheli Shashakt Silai Samuh from 31<sup>st</sup> March 2020. They sewed about 200 nose masks in a day and planned to sew 2500 masks in a coming weeks.



- 150 masks disseminated to surrounding police thanas at Tilda & Kharora.
- Chemical sanitization scheduled in all 13 villages along with headquarters of Janpad & Nagar panchayats surrounding to AF-REL's interventions area.
- Testing of body temperature of 700 plant workers and villagers conducted successfully and further to be continued.
- Awareness banners of COVID-19 displayed at prominent locations with live demonstration of 13 villages.

### Maintenance of Public Toilets

GMR-VF constructed 2 Public Toilet in Bhatapara and Gaitra Village. As on the financial year 2017-18, Public Toilets were being used by 112 poor families in both the villages, whereas as on the financial year 2018-19, the beneficiaries were 104. The use of Public toilet in villages has encouraged that family to use, who cannot afford for individual private toilet. Women from the same villages were engaged for cleaning and record keeping purposes. The public toilets remain open for 2 hours respectively during the morning & evening. Various awareness programs have also been conducted in the villages to ensure proper usage of toilets. The maintenance expenses of these 2 public toilets were provided by Delhi International Airport Ltd. In the financial year 2018-19, maintenance of toilet was done by GMR-VF and GMR-VF provided support of sweeper, cleaning materials and repair and maintenance. The Public Toilet is useful in reducing open defecation in both Villages.

### Individual Sanitary Lavatories (ISL) and School Toilets

GMR-VF provided partial support towards construction of ISL for about 1000 families during the financial year 2017-18. Repairs were conducted to the toilets in 4 Government Schools. This activity has been supported by Delhi International Airport Ltd.

**TABLE 5.3: DETAIL OF CSR ACTIVITIES UNDERTAKEN UNDER HEALTH, HYGINE & SANITATION PROGRAMME**

2017-18	2018-19	2019-20
4 dispensaries were operational catering to an average of 615 patients per month	4 dispensaries were operational catering to an average of 423 patients per month	-
Mobile Medical Unit services reached out to 1615 patients	Mobile Medical Unit Services reached out to 1016 patients	Mobile Medical Unit Services reached out to 13 PAVs &



2017-18	2018-19	2019-20
per month from 9 villages	per month from 9 villages	RAVs villages
Provided door to door medical services for 65 elderly people	Provided door to door medical services for 212 elderly people	Provided door to door medical services to elderly people too
Provided support for 117 pregnant women through nutrition centers in 3 Panchayats	Provided support for 100 pregnant and lactating women through nutrition center in 3 Panchayats	Provided support to pregnant and lactating women through 5 nutrition center in 3 Panchayats under Suposhan
Conducted weekly community health awareness programs	-	Health Awareness Programs organized in schools
Conducted seasonal school health awareness/education programs	-	-
Organized 16 health awareness programs in schools covering 1718 students	48 Health Awareness Programs organized in schools covering 2460 students	Conducted awareness camps on personal hygiene and sanitation
Public Toilets at Gaitera and Bhatapara benefitted 112 families	Public Toilets at Gaitera and Bhatapara benefitted more than 104 families	-
Conducted awareness camps on personal hygiene and sanitation for 875 women	Conducted awareness camps on personal hygiene and sanitation for over 920 women	-



**FIGURE 5.4: CSR ACTIVITIES OF REL FOR STRENGTHENING HEALTH, HYGIENE & SANITATION FACILITIES**





### 5.2.3 Empowerment and Livelihoods

GMR-VF/REL-AF emphasizes on channelizing the skills of youth and women to enhance the income level of all the families in the project affected area through different empowerment and livelihoods programs. The prime focus of Empowerment and Livelihoods programs include:

- Saksham a Vocational Training -Digital Literacy Center (DLC)
- Computer Literacy Center
- Tailoring Training cum Production center
- Electrical & House wiring Trainings
- Prayas Career Counseling cum Coaching Center
- Farmers Training
- Pratibha Library
- Community Libraries
- Self Help Group Support
- Support to Micro-enterprises and Other Livelihood Activities
- Animal Husbandry Camps
- SWA - DAN by Trainees of Production Center
- Convergence with ongoing government programs
- Linking SHG and other programs with other NGO/Govt programs
- Marketing linkages

The detail of CSR activities undertaken during 2017-18 to 2019-20 under empowerment and sustainable livelihood development in REL's CSR zone is presented in Table 5.4.

**TABLE 5.4: DETAIL OF CSR ACTIVITIES UNDERTAKEN UNDER EMPOWERMENT & SUSTAINABLE LIVELIHOOD DEVELOPMENT PROGRAMME**

2017-18	2018-19	2019-20
Trained 152 youth in 3 courses (Mobile, TV repairing and domestic electrical works) at Vocational Training Center and 60 youth were now self-employed	Trained 50 youth in 2 courses (Mobile and RAC repairing) at VTC and 07 youth were now self-employed	-
Provided computer training to 45 youth at the Computer Literacy Center	Provided support to 106 youth in computer training at the Computer Literacy Center	Provided support to youth in computer training at the Computer Literacy Center
Trained 62 women in advanced tailoring course	Trained 87 women on advanced tailoring course. 4 <sup>th</sup> Batch of 27 women & girls were near to be concluded	Women & Girls skilled with an advanced tailoring course runs under ASDC Saksham



2017-18	2018-19	2019-20
Trainees of production center got a big order to make 5000 bags. They also stitched 400 school uniforms this year	30 women received bulk order to stitch school bags, pants, shirts and blouses etc	Women received bulk order to stitch petticoats & nighties from wholesaler of Raipur
Provided support to youth through Pratibha coaching center	18 students have been achieved success in this session at Pratibha Center	-
-	3 youth group, which has 36 members, was supported with Volley Ball kit	-
Provided capacity building support to 32 Women Self Help Groups	-	Women of 4 SHGs supported under IGA for the sustainable livelihood
Provided livelihood support to 21 families of which 11 families earn an average of Rs 4500 per month	-	-
-	18 women of VO- SHG at Raikheda have laid fly ash brick manufacturing plant from Dec 2018	-
-	Approximately 80 tons fly ash have been delivered to the group from GMR-VF's plant free of cost for the brick	-
-	Around 60000 bricks have been sold by them so far	-
1 youth group with 6 members was supported with musical instruments for income generation	-	-
Organized Animal Husbandry Camps before monsoon. Vaccination and de-worming services were provided to 1200 cattle from 4 villages	-	-



### Vocational Trainings

GMR-VF started village based vocational training (short term General Electrical Works for 90 days) at Raikheda in July 2011. Domestic Electrical Works, TV Repairing and Mobile Repair courses were run in the center during the financial year 2017-18 (Table 5.5). These training programs were supported by Delhi Duty Free Services Pvt. Ltd as part of its Corporate Social Responsibility.

GMR-VF started village based vocational training (Mobile repairing and RAC repairing course for 90 days) at Kharora in January 2019. Mobile Repair courses were run in the center during the financial year 2018-19. These training programs were funded by DDFS and Govt. Mahila Polytechnic College, Raipur.

**TABLE 5.5: DETAIL OF SKILL DEVELOPMENT TRAINING ORGANISED UNDER EMPOWERMENT & SUSTAINABLE LIVELIHOOD DEVELOPMENT PROGRAMME**

Name of the course	Number of batches	Number of Youth trained	Number of youth settled
<b>2017-18</b>			
TV Repairing	04	60	40
Domestic Electrical	02	42	08
Mobile repairing	03	50	12
<b>Total</b>	<b>09</b>	<b>152</b>	<b>60</b>
<b>2018-19</b>			
Mobile repairing	02	34	07
RAC repairing	01	16	00
<b>Total</b>	<b>03</b>	<b>50</b>	<b>07</b>

### Digital Literacy Center (DLC)

DLC was established at foundation office premises in 2016 and the program is affiliated by the Govt. Women Polytechnic College (GWPC) Raipur under their CDTP scheme. The crash course on basic computer skill has continued in DLC for all students of Std. X to XII. In past 4 years total 500 youths have been trained from DLC on basics of computer & professional course of Tally. During the financial year 2019-20, 120 students have taken admission and out of this 90 have successfully completed the course so far and 30 students of 4th batch were continued on course of tally. Monthly test examination has been organized at the end of month. Students were getting certificates after completion from the affiliated college.



### Computer Literacy Center

45 youth completed the 'Basic Computer Skills' course at the computer literacy center in Raikheda village during the financial year 2017-18.

The crash course on basic computer skill has continued in Computer Center for all students of Std. X to XII. 106 students have been benefited from 2018-19 session so far. 37 students benefited in 4<sup>th</sup> batch of Computer Literacy Center at nearby villages. Monthly test examination has been organized at the end of month.

### Tailoring Training cum Production Center

Foundation was running 6 community based tailoring training centres affiliated from GWPC, Raipur in project affected villages with 15 industrial & 15 normal sewing machines in which more than 710 women were trained on basic tailoring till March 2017. Another 62 women were trained in tailoring during the financial year 2017-18, whereas 87 women were trained in tailoring skill during the financial year 2018-19. Number of women completed training in tailoring has reached to more than 200 as on the financial year 2019-20. 30 members were regularly visiting the tailoring cum production centre and learning advance tailoring for their income generation as on financial year 2017-18, whereas the figure was 15 as on financial year 2018-19. 60 trainees have taken admission during the financial year 2019-20. New batch of 3<sup>rd</sup> Qtr. for tailoring training is continued with 7 students. Various groups have been formed for stitching and specialised trainings like bag making and designing work in blouse were provided. This training has given an special confidence and skills to fashion different types of designer bags to the trainees. Most of the trained students have started the sewing works of petticoats, blouses, Salwar suits for the livelihood at their respective villages. Suzanne Sales Agency gave an order for 5000 sling bags to the women at the production center. 30 women delivered the bags in 15 days and earned an income of Rs 65,000/- from this order as on financial year 2017-18, whereas earning of women from the centre has been increased to Rs. 182,000/- as on financial year 2018-19.

During the financial year 2018-19, Chhattisgarh Government has organized "Saras Mela" in Raipur, where various types of stitched bags by GMR-VF's trainees of production center have been displayed on exhibition for selling purpose.

During the financial year 2019-20, Adani skill development center in association with Adani Foundation runs tailoring production center on its 15 highly advanced sewing machines at the office premises. The group of 15 women of "Saheli Shashakt Silai Samooh" (4S) & 10 trainee girls were engaged in sewing work in the center. The group is stitching and designing various designs of School, College & luggage bags along with their individual work for sewing of pants, shirts and blouses received from villages.



A big vendor of readymade garment supplier has agreed long term order of sewing of petticoats & nighties to the center and all the women of group were now busy with stitching and earning around 1000/- monthly. ASDC is supporting them for food and conveyance allowance worth Rs. 1500/- additionally against visiting at the center for the sustenance. The group has sewed about 10500 nos. of fabrics with bags etc. and earned Rs.2.35 Lac including AF-REL's contribution towards food and conveyance so far since from Oct 19 to Mar 20.

During the financial year 2019-20, Certificate distribution program conducted for DLC & Tailoring students of Adani Skill Development Centers. 45 students of 3rd batch have received the certificates on successful completion of training on basics of computers & Tailoring training. This has bestowed by the chief guest, Shri Jaydeb Nanda, COO Adani power and Shri Rambhav Gattu station head REL. Shri Nanda appreciated the way of training and procedures of assessment for the certificates which is affiliated from govt. women polytechnic college

### **Electrical & House wiring Trainings**

Adani skill development center has started village based vocational training on Electrical & House wiring trade affiliated from GWPC, Raipur at village Samoda from Feb 2020. 20 students of surrounding villages have taken admission. This batch was continued till April 2020.

### **Prayas Career Counseling cum Coaching Center**

In the view of career guidance foundation had established "PRAYAS" career counselling cum coaching center for the youths at village Tarashiv in 2013. Free coaching on various recruitments & competitive examinations along with English spoken & personality development class were being run in the center under the guidance of expert faculties. Newspapers, Employment news periodicals, competitive and current affairs books etc. were also available at library of Prayas Centre for the benefits of students. A separate batch for the competitive exam had started and 23 students succeeded in various privates as well as govt. Jobs in past 6 yrs. During the financial year 2019-20, 28 students have taken admission for preparation of RRB, CGPSC, Teacher, SSC, CG Paramilitary forces, CG Armed Forces for the written examination. Total 5 students out of which 3 were in RRB group C, 1 in pvt. company and 1 in B.Ed. have been selected this year.

### **Pratibha Library-cum-Career Counseling Center**

GMR-Varalakshmi Foundation was running Pratibha library-cum-career counseling center for the youth at village Raikheda. The center has internet equipped library and provides coaching for competitive exams and counseling services. The center was started in April 2013 and during



the financial period 2017-18, coaching support has been provided for 56 students for different entrance/competitive exams. A separate batch for competitive exam has started with 38 students during the financial period 2018-19. One student from this center cleared Teachers' Eligibility Test.

As on financial year 2017-18, 28 students were preparing for the entrance examinations related to the security force, out of which 12 students have achieved success in Physical Examination. Now, they were preparing for a written examination. As on financial year 2018-19, 22 students have been successful in "Chhattisgarh Armed Forces" physical examination, now focused on preparing for the written examination. Out of which 3 students have been selected in Chhattisgarh Force (Physical Examination and written exam) and were awaiting medical test.

As on financial year 2017-18, 25 students of Pratibha coaching center have filled examination forms of banking and state services. As on financial year 2018-19, 18 students have been selected in various state level competitions from the center yet. Like 1 has joined in department of C.G. Power Distribution Company limited, Suhela, DC Bhatapara Division and 1 has joined as a Technician in C&I Department in Private Company. 3 in CAF, 1 in Awas-Mitra, 1 as a assistant fitter in private company, 1 student has joined as a conveyer operator in private company, 2 students cleared written exam in Railway group "D", 1 student cleared written exam in RPF, and 7 students cleared in railway "ALP" 1<sup>st</sup> stage. Considering the usefulness of this activity, GCEL employee Shri Sreekanth Pai (Head - BTG) has committed to give 1 day in a week to conduct classes on "Spoken English".

Free books, newspaper, Rojgar Samachar news periodicals were available at Pratibha Centre for Local youths. Pratibha coaching center is equipped with competitive examination books, model papers, computers, internet, English newspapers and magazines. 3 candidates were selected for private jobs with the support of Pratibha center.

### **Community Libraries**

GMR-VF operated 7 libraries located at Raikheda, Bhatapara, Gaitera, Sontara, Gaurkheda, Chicholi and Murra during the financial year 2017-18 and approximately 2,150 users visit these 7 libraries every month, whereas GMR-VF operated 5 libraries located at Raikheda, Bhatapara, Gaitera, Gaurkheda & Chicholi during the financial year 2018-19.

Several programs like painting and rangoli competitions were organized in the libraries during the financial year 2017-18 and 2018-19. Youth in the village were also using the library to read periodicals to prepare for competitive examinations. 55 people completed their graduate and post graduate courses with the help of the library services as on financial year 2018-19.



### Self Help Groups (SHGs)

Foundation promoted 41 women Self Help Groups in this location. The 41 groups have a membership base of 488 members. These SHGs were working on women social, economic and political development. Monthly meetings, record keeping, inter-lending was being done by SHGs on regular basis. Total savings with interest of the groups was about Rs. 16.5 lakhs as on financial year 2017-18. 25 groups have been federated into an apex registered society named as CHIRAG in the year 2013. 16 groups have received Cash Credit Limit of Rs 1.5 lakh each during the financial year 2017-18 from the banks and till date each group received a fund of 15,000 rupees. 50 SHGs comprised of 577 members were being supported by foundation during the financial year 2019-20.

42 SHG Members were engaged in income generation activities and earning the income from following activities during the financial year 2018-19 and 2019-20:

- 8 women were making baby set which was being sold at nearby local hospitals. Earns Rs. 1700/- monthly by each one.
- 10 Members of various groups were engaged in Papad making and earning their livelihood. Earns Rs. 1500/- monthly by each one.
- 7 members of SHG were working to make Murra Laddu. Earns Rs. 1000/- monthly by each women.
- 6 members of SHG were making "Ready to Eat" meals. Earns Rs. 600/- monthly by each women.
- 11 members of Annapurna SHG were making Dona-Pattal. Earns Rs. 9000/- by all women.
- 18 members of Village Organization, Raikheda were making Bricks. Earns Rs. 2400/- by each one.

### Individual IGA Support

In order to enhance the income levels of poor families, small scale Income Generation Activities like exposure & training were being promoted among project affected families to upkeep of livelihood. Till last year, 250 families were supported for the same and during the financial year 2017-18, 21 families have been supported. Till the financial year 2019-20, around 300 families were supported by the GMR-VF & AF-REL for the same.



### Group Income Generation Activity Support

During the financial year 2019-20, Adani Foundation Raipur has supported to 4 SHGs with Rs. 1.00 Lakh for the start-up & Raw Material for their sustenance of livelihood like Dona Pattal, Papad, Utensils on rental & sleeper making machines (Table 5.6).

**TABLE 5.6: DETAIL OF FINANCIAL SUPPORT EXTENDED TO SHGs UNDER EMPOWERMENT & SUSTAINABLE LIVELIHOOD DEVELOPMENT PROGRAMME**

Sl. No.	SHG	GP	Support with Amount (Rs.)
1	ANNAPURNA SWASAHAYATA SAMUH	Raikheda	25,000/-
2	MAA GAYATRI SWASAHAYATA SAMUH	Raikheda	20,000/-
3	JAI LAXMI MAA SWASAHAYATA SAMUH	Raikheda	20,000/-
4	JAI LAXMI MAA SWASAHAYATA SAMUH	Chicholi	35,000/-

### Farmers Training

55 farmers from 3 villages were trained on vegetable cultivation during the financial year 2017-18. The objective of providing this training is to orient the farmers on advanced methods of vegetable cultivation and also to sensitize them on the marketing avenues for vegetables to maximize their profits.

### Animal Husbandry Camps

During the financial year 2017-18, Veterinary camps for vaccination and general treatment were organized in 4 villages namely Raikheda, Gaitara, Gaurkheda and Chicholi in partnership with Govt. Animal husbandry dept. Vaccination, first aid, de-worming services were provided to over 1200 cattle.

### Agriculture Program

During the financial year 2017-18, 35 GCEL employees participated in the plantation and sowing of vegetable seeds in Chatod Village alongside members of women Self Help Group.

### SWA – DAN by Collage Going Girls

During the financial year 2018-19, the college going girls, who were getting benefit from GMR-VF's School Bus facility, were given the awareness about the "SWA-DAN" program. Under the





"SWA-DAN" program, free tuition classes have been introduced in village Gaurkhehda and Raikheda, by GMR-VF's school bus beneficiaries. 48 college going girls have given free tuition to more than 250 students at their home. Whereas as on financial year 2019-20, 63 college going girls have given free tuition to more than 350 students at their home this year.

#### SWA - DAN by Trainees of Production Center

During the financial year 2018-19, the trainees of tailoring, who were getting benefit from GMR-VF's Training cum Production center, were given the awareness about the "SWA-DAN" program. Under the "SWA-DAN" program, free Uniform repairing work was introduced in Primary School, at village Bhatpara, Raikheda, Gaitra, Tarashiv & Gaurkhrda by GMR-VFs/AF-REL Training cum Production center beneficiaries. During the financial year 2018-19, Approx. 209 students were getting benefit by GMR-VF's 30 Trainees at Primary School Bhatpara, Raikheda, Gaitra, and Tarashiv & Gaurkhrda, whereas during the financial year 2019-20, 56 students benefitted by swa-daan done by AF-REL's 30 Trainees at Primary School, Gaitra.

#### Employee Involvement

Employees of GMR Chhattisgarh Energy Ltd. have actively participated in community development programs. During the financial year 2017-18, 243 employees participated in 14 different programs organized by GMR-VF, whereas During the financial year 2018-19, 221 employees participated in 15 community development programs and contributed 467 voluntary hours which benefitted more than 7,000 people. During the financial year 2019-20, 40 employees participated in 8 community development programs and contributed 257 voluntary hours which benefitted more than 1500 people in 8 months (Table 5.7).

**TABLE 5.7: DETAIL OF EMPLOYEE ENGAGEMENT IN COMMUNITY DEVELOPMENT PROGRAMME**

Employee Engagement	Total
<b>During the last 6 months of 2017-18</b>	
No. of Programs	14
No. of beneficiaries	1356
No. of family members and employee volunteers	243
Hours of involvement of employees and family members (person hours).	1768
<b>2018-19</b>	
No. of Programs	15
No. of beneficiaries	7065



Employee Engagement	Total
No. of family members and employee volunteers	221
Hours of involvement of employees and family members (person hours).	467
<b>2019-20</b>	
No. of Programs	8
No. of family members and employee volunteers	40
Hours of involvement of employees and family members (person hours).	257

### Daan Utsav (Joy of Giving)

During the financial year 2017-18 on Daan Utsav, about 100 GCEL employees contributed around Rs. 87,000 towards the purchase of crackers, clay lamps and sweets which were distributed to 50 deserving people in nearby village. Stationery, toys and school bags were also distributed to over 150 anganwadi children from 4 villages.

During the financial year 2018-19, 4 event were planned under Daan Utsav program in which 118 Employees contributed Rs.72224/- and touched the gut of philanthropic turns. This has made outstanding smiles on the face of 352 Children & Women of the surrounding communities.

### Social Volunteering Projects

One team of employees from GCEL implemented a Social Volunteering Project named "Digitalization of Raikheda Village" during the financial year 2017-18.

### Community Infrastructure Development

During the financial year 2017-18, GCEL supported the Raikheda Gram Panchayat for the construction of "Rangmanch" for conducting cultural and other village activities.

State Government has established Gothan under the "Narwa, Garua, Ghurwa, Badi project aggressively at each gram panchayats where stray cattle's will be accommodated and accordingly many products will be produced by manure and go-mutra with the help of SHG groups. On the request of distt. administration tube well digging in two villages at Nakti-Kumhari & Chhadiya surrounding to REL plant initiated by Adani Foundation under the business CSR scope during the financial year 2019-20. The work has completed in both villages worth Rs. 1.90 lacs expenditures.



### **LED Bulbs Distribution**

To support energy saving campaign of Indian govt., LED bulbs were distributed in Gaitra and Bhatapara villages. During the financial year 2017-18, over 300 families received the bulbs which were procured on subsidized rates from Chhattisgarh Electricity Board. Mr. Ravi Shankar, COO-GCEL, Mr. Sandeep Pachpor, Head-O&M participated in the distributed program along with 8 other senior colleagues from GCEL.

### **Deewali Milan**

During the financial year 2019-20, a meet conducted under the chairmanship of Unit CSR Head at the Adani Foundation office premise on the occasion of Deewali. All AF staffs with associated volunteers were invited in the meet. He wished all the team & staffs for lightful and successful deepawali with a packet of sweets.

### **Dignitaries Social Calls**

During the financial year 2019-20, CEO of Adani Power, Shri Vneet Jaain visited in Adani Foundation premises and appreciated the activities of Adani Foundation – REL runs in surroundings of the REL plant.

Shri R V Shahi visited at Adani Foundation – REL and appreciated the efforts for community development.

Set of utensils and toys have been donated to newly opened Anganbadi School at village Chicholi worth Rs. 25 K by Station Head – REL, Shri Rambhav Gattu. The school has been provided a dozen of Thaalies, Quarter plates, glasses & spoons with four nos. of Ganjas, and a Kadahi, Serving Spoons, Baltis, and many more useful items for the kitchen of mid-day meal.

COO Adani Power Ltd., Shri Jayadeb Nanda visited to AF-REL's village development center, Raikheda and saw all the activities closely which runs in the villages. He met to villagers cum volunteers who were associated with AF and asked about the program which were being taken care by them. He appreciated Adani Foundation team to run the quality activities & programs in the villages.

### **Special Achievements, Challenges & Learnings**

During the financial year 2017-18, appreciation letter was received from the Government of Chhattisgarh for providing support in the "Maha Kumbha Mela Rajim". In the "Rajim Kumbh", "Deep Festival" was organized to create awareness on water conservation. About 3.26 million lamps were illuminated and this feat has been registered in Guinness Book of World Records.



All the 3 Project affected Panchayats were declared 'Open Defecation Free' villages with the support of GMR-VF during the financial year 2017-18.

4 students passed the Navodaya entrance examinations during the financial year 2017-18 and were now studying at Jawahar Navodaya Vidyalaya. During the financial year 2018-19, 7 students have been selected in Navodaya examinations and were studying.

Tailoring and production center has received an order from M/s Suzanne Sales Agency for making 5000 side bags during the financial year 2017-18. The order was completed by 30 women in 15 days.

INDIA CSR Leadership Award: The GCEL and GMR-VF has won the prestigious INDIA CSR Leadership accolades in the category of "Innovative Projects in Education" during the financial year 2018-19. Chhattisgarh CSR Leadership summit & awards was hosted by India CSR network on Friday, Aug 24, 2018 at Hotel Babylon international Raipur. Over 300 Corporates, CSR leaders, NGO's & consultants including NABARD and other govt. agencies took part in the summit. The award was handed over by Hon'ble minister of Water resources & Agriculture Development of Chhattisgarh Shri Brijmohan Agrawal.

Pratibha Selection: During the financial year 2018-19, 18 candidates have been selected in Government job/private job through GMR-VF's PRATIBHA center.

### Challenges Faced

- High expectations among community members
- Huge demands from local sarpanches despite plant being not in operation
- Since the activities of Foundation is getting close and reduce at the village level were losing the faith on us and this may lead huge unhappiness too.

### Strategic Plan for Coming Year

- Convergence with ongoing government programs and leveraging the available resources
- Marketing linkages for products made by SHG members and Training cum Production center
- Linking SHG and other programs with other NGO/Govt programs for its sustainability



FIGURE 5.5: CSR ACTIVITIES OF REL FOR EMPOWERMENT & SUSTAINABLE LIVELIHOOD DEVELOPMENT



### 5.3 EXPENDITURE DETAIL FOR CSR ACTIVITIES

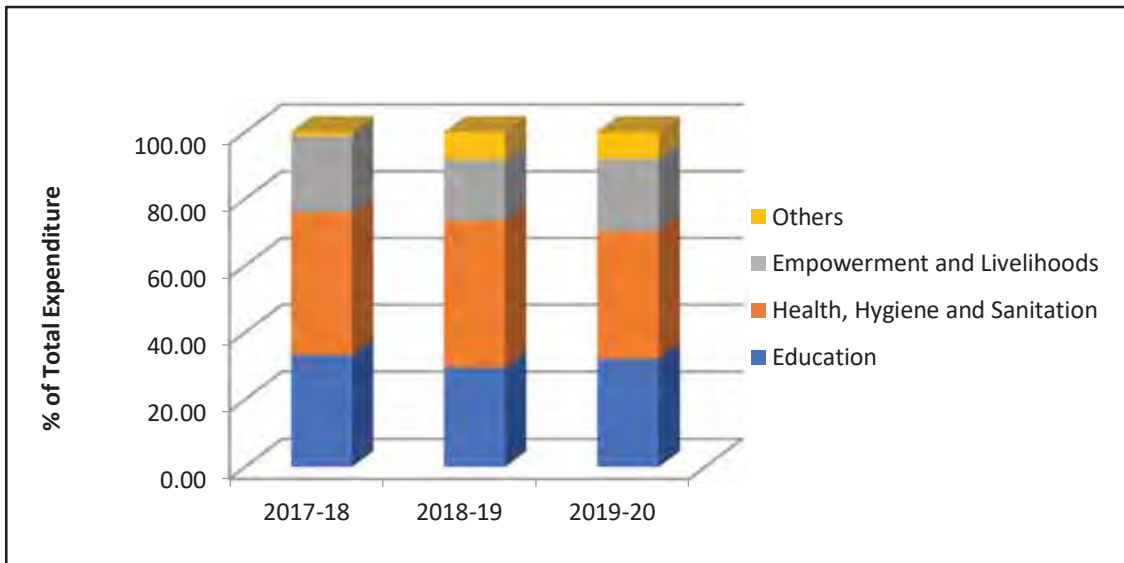
The expenditure incurred for CSR activities undertaken by GMR-Varalakshmi Foundation and REL-Adani Foundation for the last 3 years i.e. from 2017-2018 to 2019-20 is presented in Table 5.8. The total expenditure on various CSR activities has been varied from Rs 51.29 to 69.39 lakh during 2017-18 to 2019-20.

The analysis of sector wise expenditure incurred for CSR activities reveals that the maximum fund is being allocated for Health, Hygiene and Sanitation followed by Education. Out of total CSR fund, 38.25% of total fund have been spent by AF-REL in improving Health, Hygiene and Sanitation followed by 32.07% for improving the education facilities in selected CSR villages during 2019-20 (Figure 5.6). Whereas out of total CSR fund, 42.79% of total fund have been spent by GMR-VF in improving Health, Hygiene and Sanitation followed by 33.25% for improving the education facilities in selected CSR villages during 2017-18. It may be pertinent to mention here that for these three financial years, 18.29-22.86% of total fund have been spent for Empowerment and Livelihoods.

**TABLE 5.8: SECTOR WISE EXPENDITURE FOR CSR ACTIVITIES**

Thrust Area	Expenditure (in Rs.)		
	2017-18	2018-19	2019-20
Education	2306900	1725517	1645000
Health, Hygiene and Sanitation	2969000	2583248	1962000
Empowerment and Livelihoods	1586000	1072405	1107000
Others	77000	482490	415000
<b>Total</b>	<b>6938900</b>	<b>5863660</b>	<b>5129000</b>



**FIGURE 5.6: SECTOR WISE DISTRIBUTION OF EXPENDITURE TOWARDS CSR ACTIVITIES**

The activity wise detail of expenditure incurred for improving education facilities under CSR Programme during the last 3 years i.e. from 2017-18 to 2019-20 is presented in Table 5.9. The analysis shows that during 2017-18 out of total funds spent towards education facilities, the maximum (41.22%) fund is being allocated for Govt Schools, KIDS Smart and Tom's Shoe Program (viz., vidya volunteer, MLS, Navodaya, KidSmart, etc.) followed by Village Intensive Programme (37.93%) in the area of support of Dau Bal Dau Private High school in Raikheda, Transportation Facility for College Going Girls, etc (Figure 5.7). Whereas during 2019-20, the maximum (57.26%) fund is being allocated by AF-REL for Village Intensive Programme in the area of Transportation Facility for College Going Girls, support of Dau Bal Dau Private High school in Raikheda, etc followed by developing Tution Centres (19.45%) and developing Community Library (16.35%).

**TABLE 5.9: ACTIVITIES WISE DISTRIBUTION OF EXPENDITURE FOR IMPROVING EDUCATION FACILITIES UNDER CSR PROGRAMME**

Sl. No.	Description	Expenditure in Rs.		
		2017-18	2018-19	2019-20
a	Anganwadi		300	4000
b	Balabadi			
c	<b>Govt Schools, KIDS Smart and Tom's Shoe Program</b>			
	i. Vidya volunteer	277200	7025	
	ii. MLS	271200		

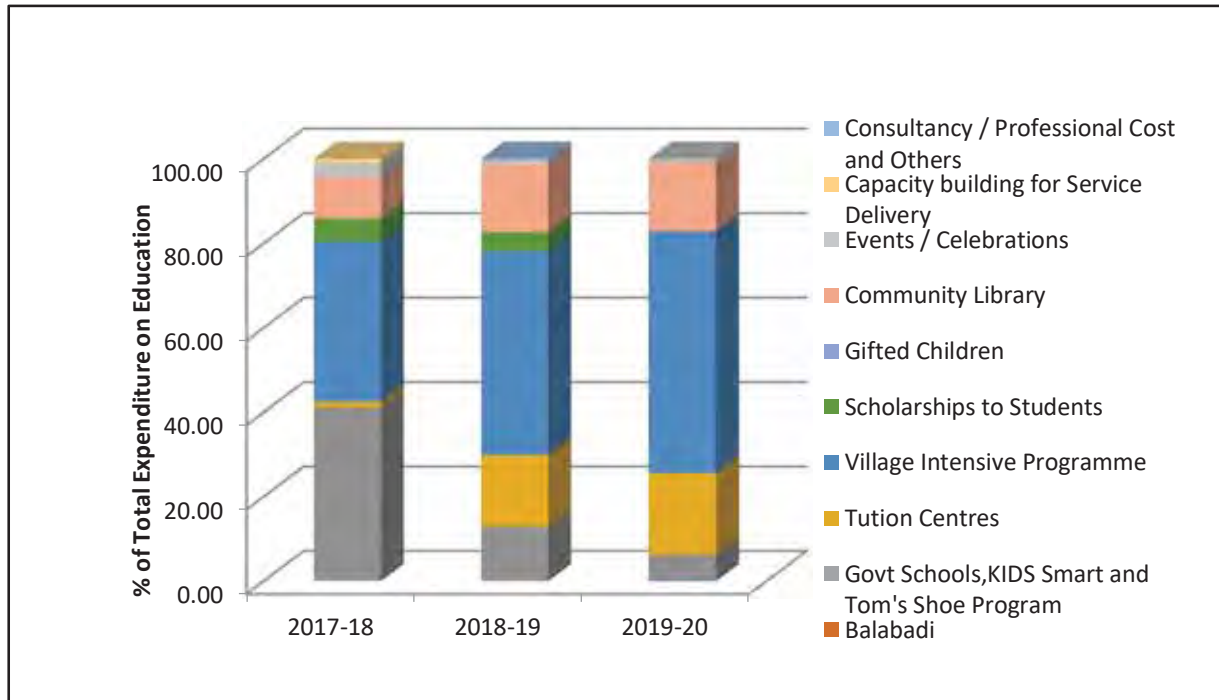


Sl. No.	Description	Expenditure in Rs.		
		2017-18	2018-19	2019-20
	iii. Stationary support for teachers.	10000		
	iv. Transport support in distribution of TOMS Shoe	15000		
	v. Navodaya	198000		
	vi. Books Support for Navodaya Student.	22000	5293	
	vii. Kidsmart	110000	211766	98000
	viii. Recurring for Kids Smart center Reduced to 2500 per month)	27500		
	ix. Support for repairing of VDC Raikheda pre monsoon.	20000		
	Sub-Total	950900	224084	98000
d	<b>Tuition Centres</b>			
	Tuition Center for Class X and XII	30000	291602	320000
	Sub-Total	30000	291602	320000
e	<b>Village Intensive Programme</b>			
	i. Transportation Facility for College Going Girls.	250000	474039	755000
	ii. Carrier Counselling and Exposure Visit for Youth and Teachers.	25000		
	iii. Support of Dau Bal Dau Private High school in Raikheda.	600000	360000	187000
	Sub-Total	875000	834039	942000
f	<b>Scholarships to Students</b>			
	SAKSHAM Scholarship	125000	77600	
	Sub-Total	125000	77600	
g	<b>Gifted Children</b>			
h	<b>Community Library</b>			
	Running 5 Library in village	226000	277057	269000
	Sub-Total	226000	277057	269000
i	<b>Events / Celebrations</b>			
	i. Teachers Day	30000	17570	12000
	ii. Childrens' Day	25000		
	iii. Sports Competitions in School	25000		
	Sub-Total	80000	17570	12000
j	<b>Capacity building for Service Delivery</b>			
	i. Teachers Training	20000		
	Sub-Total	20000		
k	<b>Consultancy / Professional Cost and Others</b>		3265	
	i. Technical Consultancy			
	ii. Any Survey Studies etc.			
	iii. Others			
	Sub-Total		3265	
	<b>Grand Total</b>	<b>2306900</b>	<b>1725517</b>	<b>1645000</b>





**FIGURE 5.7: ACTIVITIES WISE DISTRIBUTION OF EXPENDITURE TOWARDS IMPROVING EDUCATION FACILITIES UNDER CSR PROGRAMME**



The activity wise detail of expenditure incurred for improving health, hygiene and sanitation facilities under CSR activities during the last 3 years i.e. from 2017-18 to 2019-20 is presented in Table 5.10. The analysis shows that out of total funds spent towards health, hygiene and education facilities, maximum fund is spent towards providing services of Mobile Medical Unit and it is pertinent to mention here that expenditure towards providing services of Mobile Medical Unit is getting steeply increased from 2017-18 to 2019-20 i.e. from 49.21% to 84.35% (Figure 5.8).

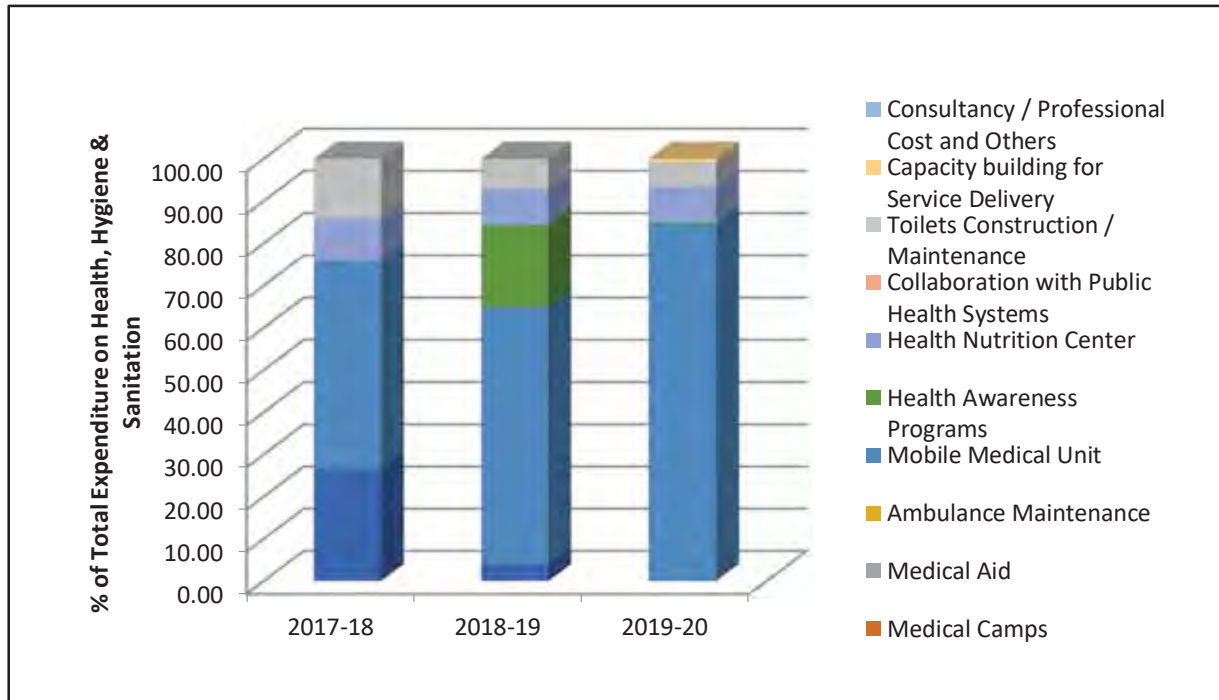


**TABLE 5.10: ITEM WISE DISTRIBUTION OF EXPENDITURE FOR IMPROVING HEALTH, HYGIENE & SANITATION FACILITIES UNDER CSR ACTIVITIES**

Sl. No.	Description	Expenditure in Rs.		
		2017-18	2018-19	2019-20
a	<b>Medical Clinics</b>			
	i. Medicine cost	288000		
	ii. Medical expertises	192000		
	iii. Health Volunteers	120000	2090	
	iv. Maintenance of clinics	48000	102247	4000
	v. Vehicle/POL for Team	144000		
	Sub-Total	792000	104337	4000
b	<b>Medical Camps</b>			
c	<b>Medical Aid</b>		3024	
d	<b>Ambulance Maintenance</b>			
e	<b>Mobile Medical Unit</b>			
	Monthly Recurring Cost discussion regarding 1 staff and Others	1461000	1571000	1655000
	Sub-Total	1461000	1571000	1655000
f	<b>Health Awareness Programs</b>		500549	8000
g	<b>Health Nutrition Center</b>			
	Nutrition for pregnant and Lactating Mothers	296000	219886	163000
	Sub-Total	296000	219886	163000
h	<b>Collaboration with Public Health Systems</b>			
i	<b>Toilets Construction / Maintenance</b>			
	i. Construction of Girls Toilet in Government school			
	ii. Maintenance of Public Toilets	240000	184452	100000
	iii. Strengthening of Individual Toilets.	150000		19000
	iv. Awareness Program for usage of Toilets.	30000		
	Sub-Total	420000	184452	119000
j	<b>Capacity building for Service Delivery</b>			13000
k	<b>Consultancy/Professional Cost and Others</b>			
	i. Technical Consultancy			
	ii. Any Survey Studies etc.			
	iii. Others			
	<b>Grand Total</b>	<b>2969000</b>	<b>2583248</b>	<b>1962000</b>



**FIGURE 5.8: ACTIVITIES WISE DISTRIBUTION OF EXPENDITURE TOWARDS IMPROVING HEALTH, HYGIENE & SANITATION FACILITIES UNDER CSR PROGRAMME**



The activity wise detail of expenditure incurred for empowerment & livelihood under CSR activities during the last 3 years i.e. from 2017-18 to 2019-20 is presented in Table 5.11. The analysis shows that during 2017-18 out of total funds spent towards empowerment & livelihood, the maximum (40.07%) fund is being allocated for Inhouse Vocational Training (viz., Honorarium for 3 tutors, TA & Refreshment for trainees, Workshop Material, etc.) followed by Community Level Training/ Support (22.19%) in the area of specialised training on tailoring, etc (Figure 5.9). Whereas during 2019-20, though the maximum (28.46%) fund is being allocated by AF-REL for Inhouse Vocational Training in the area of arranging Workshop, etc, significant (23.13%) amount has been spent towards developing Self Help Groups followed by Capacity building for Service Delivery and PRATIBHA (22.94%). Even significant amount (more than 10%) out of total funds spent towards empowerment & livelihood, has been spent during 2019-20 for developing computer literacy.



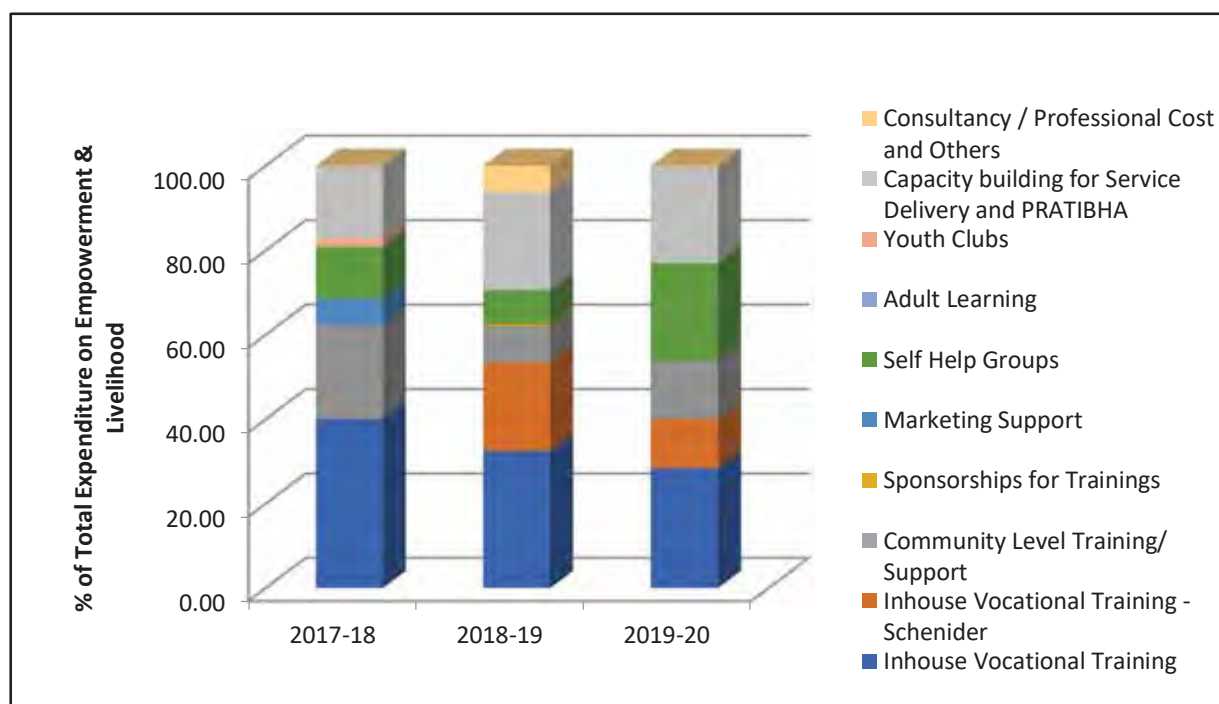
**TABLE 5.11: ACTIVITY WISE DISTRIBUTION OF EXPENDITURE FOR EMPOWERMENT & LIVELIHOOD UNDER CSR PROGRAMME**

Sl. No.	Description	Expenditure in Rs.		
		2017-18	2018-19	2019-20
a	<b>Inhouse Vocational Training</b>			
	i. Honorarium for 3 tutors	215000		
	ii. TA & Refreshment for trainees	287500		
	iii. Workshop Material	133000	348458	315000
	Sub-Total	635500	348458	315000
b	<b>Inhouse Vocational Training - Schenider</b>		223298	128000
c	<b>Community Level Training/ Support</b>			
	<b>A. Tailoring training</b>			
	i. Tutor's honorarium	36000		
	ii. Recurring expenses	24000		36000
	iii. Specialised training	204000		
	<b>B. Farmer's Trainings</b>			
	i. Training cost			
	ii. Honorarium for Farmers training center			
	iii. Demonstration of agriculture work	58000		
	iv. Veterinary camps	30000		
	v. Provide Cattle Crush			
	<b>C. Computer Literacy</b>		94870	117000
		Sub-Total	352000	94870
d	<b>Sponsorships for Trainings</b>		4915	
e	<b>Marketing Support</b>			
	Supporting Individual and Group Income	100000		
	Sub-Total	100000		
f	<b>Self Help Groups</b>			
	i. Honorarium for 7 volunteer	100000	85460	256000
	ii. Training of SHGs	20000		
	iii. Womens Day	40000		
	iv. Enterprize development	35000		
	v. Exposure visit			
	Sub-Total	195000	85460	256000
g	<b>Adult Learning</b>			
h	<b>Youth Clubs</b>			
	i. Support to local youth for sports tounament		575	
	ii. Prizes and Uniform for sports in school.	30000		
	Sub-Total	30000	575	
i	<b>Capacity building for Service Delivery and PRATIBHA</b>			
i. Monthly reading material	11000			



Sl. No.	Description	Expenditure in Rs.		
		2017-18	2018-19	2019-20
	ii. Honorarium for tutors and counsellor (Normal & Uniform services related coaching )	224000	150000	
	iii. Monthly maintenance 500 per month	5500		
	iv. Volunteers capacity Building	33000	99302	254000
	Sub-Total	273500	249302	254000
j	<b>Consultancy / Professional Cost and Others</b>			
	i. Technical Consultancy			
	ii. Any Survey Studies etc.			
	iii. Others		65527	1000
	Sub-Total		65527	1000
	<b>Grand Total</b>	<b>1586000</b>	<b>1072405</b>	<b>1107000</b>

**FIGURE 5.9: ACTIVITIES WISE DISTRIBUTION OF EXPENDITURE TOWARDS EMPOWERMENT & LIVELIHOOD UNDER CSR PROGRAMME**



The activity wise detail of expenditure incurred for other CSR programme, besides major thrust area, during the last 3 years i.e. from 2017-18 to 2019-20 is presented in Table 5.12. The analysis shows that during 2017-18, funds, spent towards others under CSR activities, are being



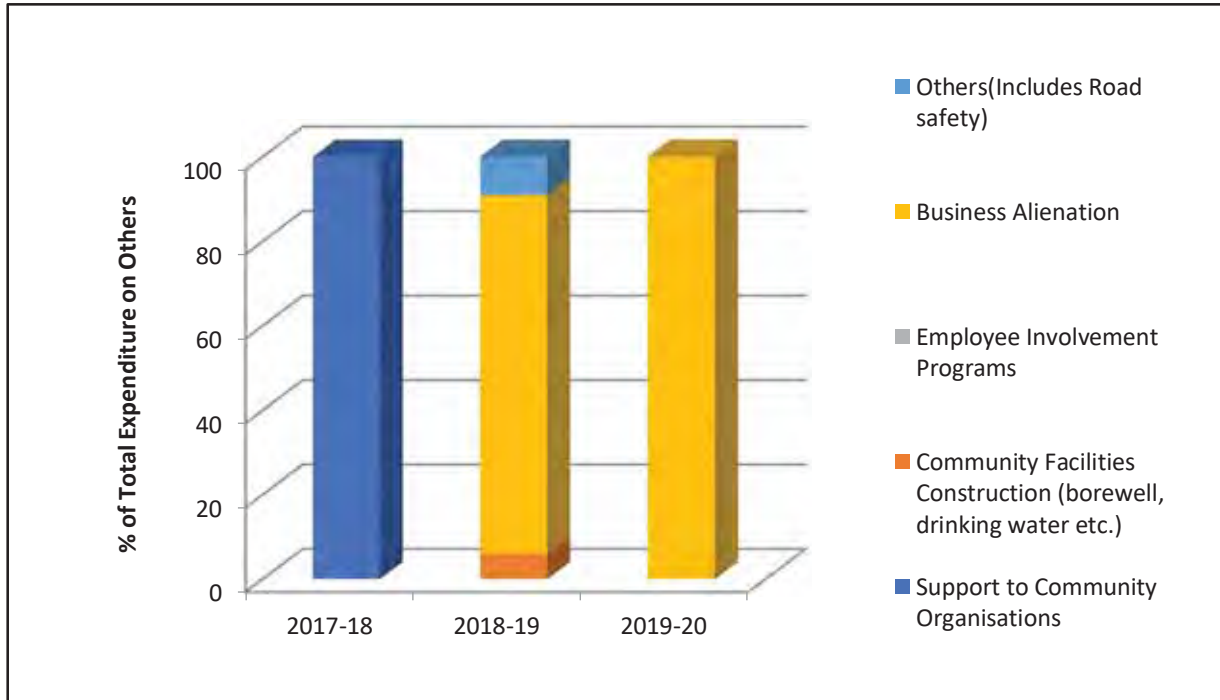
allocated for Support to Community Organisations in the area of Support for Government schools on Important days, Payment of Rent for Raikheda VDC, etc. Whereas during 2018-19, out of the total funds spent towards others under CSR activities, 84.87% are being allocated for Business Alienation in the area of establishment expenses (Domestic Travels, Taxi hire charges, Local conveyance, Mobile Photocopy, Courier & Postage, Printing & Stationary, Office Maintenance, Security Charges, Employee Travel Expense, House Keeping Charges, etc.) (Figure 5.10) and during 2019-20, funds, spent towards others under CSR activities, are being allocated for Business Alienation in the area of administration (office maintenance, housekeeping) and establishment (local conveyance, rural infrastructure by AF-REL).

**TABLE 5.12: ACTIVITY WISE DISTRIBUTION OF EXPENDITURE FOR OTHERS UNDER CSR PROGRAMME**

Sl. No.	Description	Expenditure in Rs.		
		2017-18	2018-19	2019-20
a	<b>Support to Community Organisations</b>			
	i. Payment of Rent for Raikheda VDC.	37000		
	ii. Support for Government schools on Important days.	40000		
	Sub-Total	77000		
b	<b>Community Facilities Construction (borewell, drinking water etc.)</b>		29314	
c	<b>Employee Involvement Programs</b>			
d	<b>Business Alienation</b>		409489	415000
e	<b>Others(Includes Road safety)</b>			
	Awareness programs on Road safety		43687	
	Sub-Total		43687	
	<b>Grand Total</b>	<b>77000</b>	<b>482490</b>	<b>415000</b>



**FIGURE 5.10: ACTIVITIES WISE DISTRIBUTION OF EXPENDITURE TOWARDS OTHERS UNDER CSR PROGRAMME**



## 6.0 SOCIAL AUDIT OF CSR ACTIVITIES

APL has always endeavored to be a leader in community development (CD) and corporate performance, which can be measured in terms of economic, social, and environmental impacts. Further, specifically on CD, APL is governed by the CSR policy formulated in August, 2014 (Annexure 2.1). APL CSR policy is primarily governed by Section 135 of the Companies Act, 2013, which was passed by both Houses of the Parliament, and had received the assent of the President of India on 29 August 2013 on CSR and also conforms to the guidelines of CSR for central public sector enterprises, issued by the Department of Public Enterprises, Ministry of Heavy Industries, and Public Enterprises, Government of India.

### 6.1 IDENTIFICATION OF CSR PROJECTS

As per the APL's CSR policy, August 2014, the first step of planning is identification of broad activities. The broad activities closely linked with the long-term social development goal and objectives and adhere to the practice of sustainable development. An indicative list of prime areas of intervention is placed at Table 6.1. The list is only indicative and not exhaustive. However, the key focus of CSR projects were on facilitating infrastructure provision for qualitative improvement in health, education, access to water/sanitation, and improved roads.

**TABLE 6.1: INDICATIVE LIST OF MAJOR AREAS OF INTERVENTIONS FOR COMMUNITY DEVELOPMENT**

Sl. No.	Area of Intervention for CSR Activities
1	Drinking water facility
2	Education
3	Improving the quality of life of girl child
4	Improving lives of vulnerable persons such as physically challenged, destitute women, widow
5	Improving lives of scheduled caste and scheduled tribe people
6	Electricity
7	Solar lighting system
8	Health and family welfare
9	Irrigation facilities
10	Sanitation and public health
11	Grazing land development
12	Promotion of sports and games





13	Promotion of art and culture
14	Promotion of livelihood for economically weaker sections through forward and backward linkages
15	Relief of victims of natural calamities like earthquake, cyclone, drought, flood situation in any country
16	Supplementing development programs of the government
17	Construction of community centers/ night shelters/ old age homes
18	Imparting vocational training
19	Setting up of skill development centers
20	Adoption of villages
21	Scholarships to meritorious students belonging to SC, ST, OBC and disabled categories
22	Adoption or construction of hostels (especially those for SC/ST and girls)
23	Skill training, entrepreneurship development and placement assistance programs for youth
24	Building roadways, pathways, and bridges
25	Entrepreneurship development programmes
26	Activities related to improvement of livestock
27	Capacity building of the project affected persons to improve their employability

## 6.2 IDENTIFICATION OF CSR PROJECT AREA

The geographical area for implementation of the CSR project extends to entire CSR zone of TPP. Under the REL's CSR zone, there are altogether 65 CSR villages, which have been identified on the basis of their proximity with the TPP along with the magnitude of impact. The detail of CSR zone of TPP has been already presented in earlier chapter.

## 6.3 ACTION PLANS FOR CSR ACTIVITIES

Action plan involves empowering project affected persons (PAPs), community and the target villages in a phased manner and for an identified planned period. This involves the basic and immediate needs of the PAPs, community and target villages, such as roads, school, health, sanitation and drinking water-related plans, and projects.

A three phased CSR action plan (CSR-AP) plan has been prepared:



**Long-term Plan:** Long-term perspective social development plan for 20 years, which is in accordance with the long-term corporate plan of Adani Foundation. The plan includes the overall social development in the vicinity of REL's TPP.

**Medium-term Plan:** Medium-term project plan for five years, which is in coherence with the REL business plan. The plan considers different sector specific projects such as education, health, infrastructure development and sustainable livelihood in the vicinity of REL's TPP.

**Short-term Plan:** Short-term action plan for one year which is in accordance with REL's annual target plan. The plan includes the activities to be undertaken in a particular year under the medium term plans.

The phase wise action plan for undertaking CSR activities in REL's CSR zone is presented in subsequent section:

### 6.3.1 Identification of Area for CSR Activities

The need-based community development work is being undertaken in the CSR villages as an integral part of the REL's TPP under CSR activities. These facilities may also be available to the host population and the neighbouring community and facilitate socio-economic development of the area. The facilities/ amenities may include following:

- Strengthening of educational facilities
- Strengthening of medical facilities
- Strengthening of sanitation facilities
- Strengthening of drinking water facilities
- Strengthening of veterinary facilities
- Setting up of skill development center/ Adoption of ITI
- Strengthening of irrigation facilities
- Women & child empowerment
- Community hall/panchayat ghar
- Strengthening of cultural and sports facilities
- Tree plantation, etc.
- Internal and link/approach road with proper drainage
- Infrastructural strengthening for rural electrification

The land for developing above facilities is being provided by the State Government. The infrastructural facilities shall be set up by REL on the basis of assurance from the State Government that it will take over the infrastructural facilities and maintain it properly.

Special emphasis for community developmental work is being given to the villages/hamlets, which are falling close to the TPP as well as railway corridor and water intake. The need



assessment survey for community development in the CSR villages had indicated for undertaking the following programmes at GP level:

- Strengthening of educational facilities
- Strengthening of Medical & Sanitation facilities
- Strengthening of Inter-village roads within the GP
- Sustainable Livelihood Development
- Water conservation and management for domestic and agricultural needs
- Afforestation on roadside and other government vacant lands under the possession of local Panchayat and Block authority

The above mentioned programme are being undertaken in association with State Government and concerned District authority.

Development programmes for the selected CSR villages include:

- Intra-village concrete roads
- Development of village drinking water facilities
- Development of rain-water harvesting system
- Strengthening of infrastructural facilities in primary schools
- Formation and development of Self-Help Groups / Mahila Samitis
- Skill Development Programmes with special emphasis on vulnerable groups
- Social and farm forestry for fuel, fodder and other domestic needs
- Strengthening of cultural and sports facilities

REL has been continuously working towards the improvement of the quality of life of the people in the communities surrounding their plants. The following measures are being undertaken for minimizing the adverse impacts on socio-economy and parameters of human interest:



- Communication with the local community had been institutionalized and done on regular basis by the AF-REL authorities to provide an opportunity for mutual discussion to undertake CSR activities.
- AF-REL authorities organize regular awareness programmes to bring forth beneficial aspects of the project and social welfare measures, being undertaken for improving their Quality of Life.
- For social welfare activities being undertaken by the AF-REL authorities, collaboration has been sought with local administration, Gram Panchayat, Block Development/Tehsil Offices etc. for better co-ordination, records and also to approach the public.
- Providing skill development training to the women folk as part of welfare activities greatly enhanced and improved their economic strength. Self help groups for women are being encouraged in nearby CSR villages and proper skill upgradation training are being imparted besides encouraging local entrepreneurship around the project activities.
- Job oriented skill training courses have been organized through Adani Skill Development Center (ASDC) as well as Industrial Training Institutions (ITI) for Educated Youth (both for male and female), like Welding, Electrical, Nursing, computer, tailoring, mushroom cultivation, agarbatti making, lac bangle making and other project related specific trades.
- Regular awareness and sensitization programmes are being organized involving women participation in conservation efforts and creating awareness about environmental pollution and health, encouraging respect for local traditions and religious beliefs and promoting local folk dance and music.
- Awareness programmes are being organized to help and educate the local people about the Disaster Management as well as Environmental and Social Management in the project area in association with local administration.
- Some of the community development schemes include tree plantation on avenue roads and other open spaces, providing free health check-up facility and medicines to the poor villagers, providing assistance to construct school building, providing scholarships to deserving and needy students, giving educational aids to poor students, constructing community centers at selected CSR villages, strengthening drinking water facilities like tube-wells & installation of RO Plant in some villages, sponsoring sports tournaments and summer coaching camps, etc.

It has been observed that the constraints of accessing civic amenities are primarily associated with the inappropriate governance and institutional arrangements in managing and monitoring



of the services and lack of community involvement in operation and management of services which is resulting unsustainable financing and poor implementation of various developmental schemes of Central as well as State Government.

There is a need for strengthening an execution process for civic amenities and to establish a strong local governance institution supported by an appropriate monitoring framework and taking into account the following issues:

- Strengthening of intra village road along with drainage facilities.
- Adequate drinking water facilities in most of the CSR villages.
- A clear focus of measurable improvements in health services.
- Individual sanitation with proper solid waste and wastewater disposal system.
- Providing teaching aids viz., bench, desk, computer, etc. and developing the sports facilities in primary/secondary schools.
- Providing additional support to Angandwadi Centres with nutritional food and recreational aspects in mind.
- Providing street lighting facility, preferably solar powered to ensure regularity of light at night.
- Involvement of all the major stakeholders in community development programme i.e. identification, implementation as well as subsequent operation and maintenance of the same.

The most pressing health needs identified by the representatives of the community include:

- Organize preventive healthcare campaign in the CSR villages.
- Organize regular health camps and/or run a mobile clinic.
- Make community access to reproductive health information and services.
- Increase access to better quality drugs, especially anti-malarial drugs and for water borne diseases.
- Promote sanitation practices which includes construction of closed drainage systems.



The key needs for intervention in education include:

- School stakeholders including teachers, parents, panchayat representatives, etc. needed to be consulted thoroughly and identify their role and functions for delivery of quality education.
- Expansion of school services, e-learning tools/kits, learning ambience, infrastructural facilities, sports facilities, improve Mid-Day-Meal (MDM).
- Some schools require additional infrastructure facilities (classrooms, boundary wall, drinking water treatment and supply system, latrines, teacher's room, Computer facilities, development of playground, MDM cooking shed or storage, seating arrangements etc).
- Improve teaching skills and access to teaching-learning materials through e-learning solutions.
- Adequate sanitation facilities, including facilities for girls.
- Provision of learning aids like science model, exposure, basic laboratory teaching materials, library and textbooks.
- Support transport facilities for children especially girls for secondary and higher education.

The major reasons of failure of agriculture and allied sector in the area in providing enough employability includes natural drawbacks viz. poor quality of soil, irregular rainfall and ineffective irrigation facilities; the reasons at the human interface includes drawbacks like use of traditional methods of farming, lack of proper backward and forward linkages, inadequate skills and paucity of funds for investment.

Underdevelopment of market, lack of technical skills and limited opportunities of employment in the industrial activities are the reasons of unemployment in the nonfarm activities. Among the educated youth, lack of technical education, training and disinterest for self-employment and lack of resources for the same are the visible reasons of significant numbers of unemployed youths in the area.



Key needs of intervention in the livelihood and employment sector include:

- Creation of irrigation infrastructure
- Introduction of improved agriculture practices viz; inter cropping, SRI paddy, usage of sprinklers, horticulture crops, etc through demonstrations and trainings.
- Promotion of dairy and poultry as a secondary occupation.
- Technical and business development trainings for youth.
- Computer and English trainings for graduates.
- Seed capital support for setting up enterprises.
- Job counselling and career development programme for better employability.

As an essential pre-requisite for skill development and self-employment of the local people, two kinds of needs could be visualized. These are:

- Orientation and development of skills in traditional occupation
- Skill development in new type of occupation

Skill development training is essential so that the technical and financial aspects of any trade or business can be clearly understood and resources are utilized optimally. Different types of skill development and orientation programme may be required for the men and women or their family member separately. The required new skills may be developed in line with DDU-KVY in collaboration with the Director General of Employment and Training, Ministry of Labour & Employment, Government of India.

The traditional skills may be developed with the help of local vocational training institutes/NGOs, etc. These programs may be organized at the school premises or community hall at village level.



### 6.3.2 CSR Action Plan

Medium-term CSR action plan (CSRAP) for five years envisages improvements of the standard of living of more than 70% of the people in the CSR villages of REL's TPP. For the purpose, REL plans to undertake CSR activities in the phase manner initially covering the CSR villages which are closer to the main plant, ash dyke, railway co-corridor, water intake and subsequently, extending the same to the other CSR villages.

The focus is being provided to increase access to basic services like drinking water, sanitation, education and health for all households. Livelihood opportunities both in agriculture and non-farm are being promoted ensuring increase in real incomes by at least 50% by the end of five years. A multi pronged approach to the same is being followed:

- Improving quality of education
- Strengthening services for Community Health
- Promotion of Sustainable Livelihood Activities
- Rural Infrastructure Development

The strategy is to work with local gram panchayat for planning and development of infrastructure, while user groups may be created operation and maintenance of these structures. REL provides around 60% of the capital cost of the structures, while the respective Panchayat is being supported to raise the other 40% from its own funds, through various government schemes and community contribution. It is also proposed that a user fee based maintenance mechanism is being developed for all infrastructure created.

Focus is being laid on covering at least 30% of SC/ST households in all the programmes implemented. Women and Children are being specifically targeted for health programmes. A special focus may be given on providing training and business development/ job counselling support to all ITIs, Diploma holding youths in the CSR villages. For building the capacities of the communities on local governance; SHGs of women; Youth Clubs and Farmers Societies may be promoted and strengthened.

#### 1. Improving Quality of Education

- a. **Infrastructure Support & Upgrading Local Education Institutes:** There is need for improvement in school infrastructure and upgrade the services of educational institution in the first two years. This includes activities like repairing or adding on the existing infrastructure:





- Additional room construction in primary schools. Development of library in each school which has classes between 5th to 7th standard.
- Construction of multipurpose Activity hall
- Computer Centre
- Bench, desk, blackboard, etc.
- Separate Toilets for Girls & Boys

**b. Increase Access to Provisions of Learning Aids viz.**

- School Bags may be provided to poorer students
- Teaching Learning Material (including e-learning), Books may be provided to schools
- Supports like bicycle, books, school fee etc may be provided to Girls for promotion of girl child education

**c. Youth Development Programmes viz.**

- Extra classes after School Time may be organized for weaker students
- Sports promotion activities may be organized in local schools and colleges
- Cognitive development activities viz. essay writing, quiz, debates etc may be held through intra and inter school competitions
- Health check-up camp may be held every year
- Career/Job Counselling camps may be held every year.

**d. English & Computer Training Centers and Adoption of ITI:**

The employability of the local educated youth viz. undergraduates and graduate to be increased by providing effective skill building in applied knowledge of English language, computer application. The courses and learning facilities need to be upgraded with Private-Public Partnership approach to go with the market demand in technical workforce.



- Computer and English training courses are being organised for graduate/undergraduate youth.
- Skill upgradation training and business development courses for ITI/Diploma passed youth may be conducted. They are being supported to access bank loan/Govt schemes for setting up their own enterprise and/or also provided with job counselling services.

## 2. Strengthening Services for Community Health

- Health Camps, Gynec Camps may be undertaken every six months.
- Strengthening of mobile health clinic service and free check-up camp and medicines may be provided.
- Special Health Camps & Multi Specialty Camps may be organized for general diseases and with a focus of women and child health
- Contribution towards up-gradation & support to Primary Health Centre & CHCs
- Aids are being provided to poor patients for referral to district and state hospitals
- Material support for construction of individual toilets.
- Water and sanitation facilities are being provided viz. drainage, potable water & distribution facilities in surrounding CSR villages

## 3. Promotion of Sustainable Livelihood Activities

### a. Skill Development Activities

- Skill development training for income generation through ASDC and using other local resources is being organized regularly.
- A small credit fund may be developed with an initial capital to provide seed money for each SHG of women.
- Farmers society, Youth Club which can demonstrate credibility (and preferably has taken and repaid bank loan at least once) may be entitled to take loan up to Rs. 25,000/- from this fund at a minimal interest rate of 9% per annum.



### **b. Promote Improved Agriculture and Cattle Care Practices**

- Agriculture and Horticulture demonstration activities may be taken up. This includes provision of improved seeds, compost development, sprinkler sets for farmers, etc.
- Since Paddy is the only crop undertaken in Kharif season, inter cropping/second crop with pulses may be promoted.
- Kitchen garden with drip may be promoted.
- Development of fodder plots
- Construction of Low Cost Cattle Shed
- Cattle Health Camp & Cattle Care Programmes
- Introduce organic farming & vermi-compost & awareness creation for the same
- Small poultry units of 50 chicks of improved variety may be promoted as IGA.
- Deepening of ponds, providing of diesel pump sets to farmers in groups of 5-7 for using on share and pay basis.
- Introduction of group well concept: This includes deepening of an existing well along with irrigation infrastructure (diesel pump and pipeline) to small-holder farmers' group including 5-7 farmers. This could be particularly useful for also providing support irrigation for fodder/vegetable cultivation in Rabi season or summer months which can then be marketed by the group to get additional income.

### **4. Rural Infrastructure Development**

Under infrastructure development programme, emphasis is being laid on repairing or adding on the existing infrastructure in the CSR villages initially. This includes activities like:

- Construction of common community facilities viz. Community Centre, Bus Shelters, Gardens etc
- Construction of toilets in public institutions, angandwadi, school and panchayat.
- Construction & up-gradation of village approach roads and internal roads under PPP model



- Provision of solar streetlights in CSR villages particularly ensuring coverage of SC/ST hamlets.
- A PPP model may be taken to increase access to housing facilities by construction of low cost houses in collaboration with Government schemes viz. IAY.
- Check dams & pond deepening & other water & soil conservation activities
- As a part of irrigation infrastructure development, it is useful to undertake repair and maintenance of canal works in collaboration with irrigation department and the canal society, since more than 70% of the farmer's land is covered under the canal irrigation schemes.

The year wise plan for community development programmes (infrastructure development in CSR villages) and skill development programmes are being finalised in consultation with Village Development Advisory Committee (VDAC) consisting of representatives of PAPs, District Administration, other stakeholders and TTPP.

### 6.3.3 Community Engagement Plan

Youth represent a large segment of the population (i.e. approx 27.5% of the population comprise the youth), it that can be mobilised for community service and development programmes. On one hand, by participating in community service schemes, youth can contribute to grassroots development efforts and help create progress in backward regions. At the same time, these initiatives help the youth build their own skills, such as communication, leadership, inter-personal relationships and develop a sense of moral responsibility and national ownership.

Ministry of Youth Affairs & Sports (MoYAS) currently runs several schemes to enable youth to engage with their community, as well as to participate in grassroots development. Some of these schemes are NYKS, NYPAD and the NSS. These schemes target varying youth segments, and have different models of participation. In addition to MoYAS schemes, there are a range of other government schemes like the Bharat Nirman Volunteers (BNV) programme of Ministry of Rural Development. BNVs are dedicated volunteers working in rural areas for generating awareness among the people about their rights and entitlements. Similarly, the positions of community workers created under NRLM provide opportunity to such workers to get intensely involved in the development programmes, besides being avenues of substantial income to them.



There are also several community-based youth organizations in various parts of the state as well as the country that work towards community development. NGOs, non-profit organisations, corporates through their CSR programmes and social entrepreneurs are engaged across the country on issues ranging from clean fuel usage to prevention of trafficking and rehabilitation. Several of these organisations have youth volunteers and youth employees.

There is a need to institutionalise community engagement and to design and streamline schemes such that they cater to the non-homogenous youth population. Accordingly following community engagement plan may be explored:

**a) Promotion of Community Development Organisations (CDOs):**

While the government continues to implement the schemes that have seen great success, going forward REL may also leverage the large number of organizations that are already working towards community development in project area. This may multiply the scope of youth community engagement and has significant potential to generate positive outcomes at the grassroots level.

- A framework for inventory of accredited and certified NGOs or CDOs is being developed. This may enable funding agencies and youth volunteers to select the most appropriate organisations based on their needs. It can promote the scaling up of organisations that have clearly defined goals and a successful track record for community development.
- A volunteer exchange platform has been set up in project area. Through this platform, the youth that are willing to participate in community development programmes can be identified. Similarly, organisations working in the field that require young volunteers or employees can post their requirements. This may enable the matching of volunteers with organisations in an efficient manner.
- Institutionalise the involvement of youth in disaster response activities. Local youth, because of their dynamism and proximity, are invariably the first responders in any disaster relief and rescue activity. Such team activity in the face of adversity not only builds camaraderie and leadership but also provides a much needed succour to the affected individuals. There is a need to create structures that tap this latent resource and realize its full potential through proper training, equipping and coordinating their efforts with those of the state disaster relief mechanism. Every State and district of the country has Disaster Management Authority as mandated by Disaster Management Act, 2005. The Civil Defence Act, 1968 has also been amended to bring 'disaster management' within its scope. In addition, the panchayats also have a major role under the Disaster Management Act, 2005. The youth can be closely involved in disaster response activities through these mechanisms.



- Similarly, the latent potential and dynamism of youth is also being harnessed in promoting communal harmony and environmental protection.
- The energies of the youth are also being channelized in constructive areas through Panchayati Raj Institutions, which are increasingly playing greater role in local self-governance. This includes campaigning on various social issues and helping in effective implementation of various Government programmes.

#### **b) Promotion of Social Entrepreneurship:**

There are a growing number of social entrepreneurs who recognise that they can create sustainable grassroots development, while making a return for themselves. The social entrepreneurship space is fragmented and largely unregulated and the REL in association with Government may create an enabling environment for social entrepreneurs.

- Promoting social entrepreneurship as an attractive employment proposition for youth creates a positive shift away from volunteerism and philanthropy to sustainable development. This can transform community development and engagement from a short-term prospect for the youth into a sustainable career option.
- Social entrepreneurs require support in the form of seed funding and angel investment. The government can create an enabling policy regime that supports the creation of these funds. It can *enable identification of credible enterprises and financiers* through an endorsement process. It can also *reward the performance of social entrepreneurs through grants-in-aid and award programmes*. These rewards can create further mobilisation of youth towards social enterprise.
- The Government is well positioned to create channels of communication between social entrepreneurs, local communities, investors and policymakers. Social enterprise forums can be convened that enable the exchange of information around *successful models, navigating the complex policy environment, and can generate forward and backward linkages between enterprises*. *Removing barriers to business* on a priority basis for organisations with a social objective can also spawn the development of more social enterprises.

#### **6.4 CONCEPTUALIZATION OF SOCIAL AUDIT**

The REL has identified 3 villages in the core zone, 16 villages in buffer zone-I (i.e. within 5 km radius of TPP) and 46 villages in buffer zone-II (i.e. within 5-10 km radius of TPP) i.e. total 65 villages as the CSR villages. In addition to this, some other villages in the vicinity of water intake have been selected besides Raipur town for undertaking various CSR activities. The social audit of CSR activities have been undertaken for the last three years i.e. 2017-18 to 2019-20.



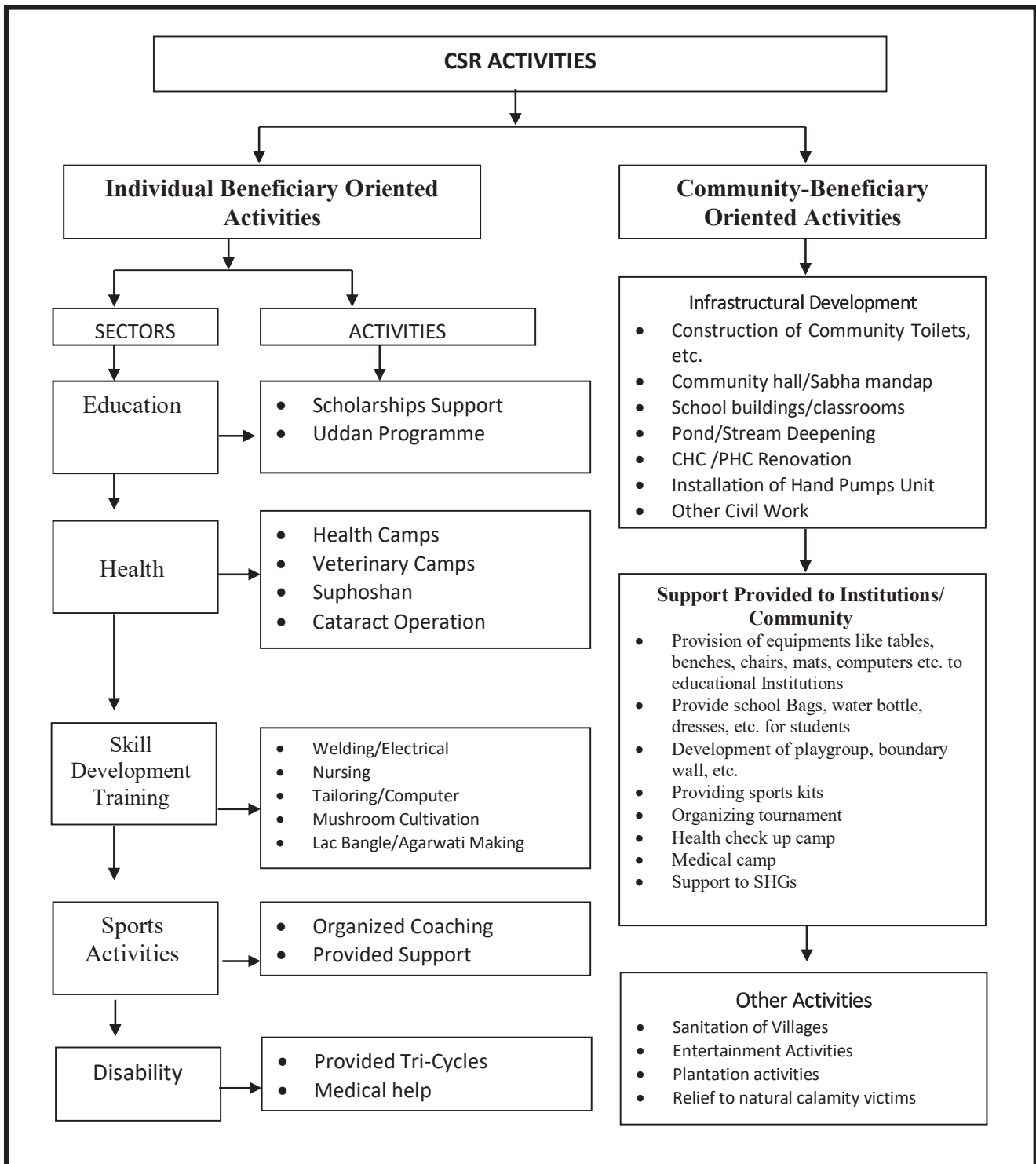
The comprehensive profile of all CSR activities illustrate the following two types of programmes and target groups:

- i) Activities targeted to individual persons like students, physically challenged persons, women, unemployed youth, etc.; and
- ii) Activities targeted on whole community, namely, infrastructure works, support provided to resource-poor institution (school, colleges, Panchayets, etc.), entertainment, health and sanitation etc.

Thus, the activities were bifurcated into two major parts, namely, individual beneficiary oriented activities and community-beneficiary oriented activities. Further, the individual beneficiary oriented activities and community-beneficiary oriented activities were divided into various sectors. The individual beneficiary oriented activities were sub-divided into five sectors, namely, education, health, vocational training, sports & disability. The community-beneficiary oriented activities were similarly sub-divided into three broad areas, namely infrastructure, provision of additional support to institutions and other such activities. A diagrammatic representation of the conceptual framework is shown in Figure 6.1.



**FIGURE 6.1: CATEGORISATION OF CSR ACTIVITIES FOR SOCIAL AUDIT**





## 6.5 SOCIAL AUDIT OF COMMUNITY BENEFICIARY ORIENTED CSR ACTIVITIES

### 6.5.1 Reactions of Local Community

This section presents the reaction of local community on the various activities and programmes conducted in their villages based on the records of focused group discussions (FGDs). The FGDs were held in the selected villages where CSR activities were undertaken and the reactions of the groups were documented. Issues like awareness of the local people on the prospective implementation of various community beneficiary oriented CSR activities, information on the selection process and procedures, decision making body on assessment of the needs of the village, involvement of level of the local people in such decision and implementation process, assurance given to local and extent of meeting of expectations of the local people, and other such issues were taken up for detailed discussion. The groups were further advised to make self-assessment and place their opinion on the various CSR programmes and their efficacy and utility.

### 6.5.2 Awareness of the Communities Regarding CSR Activities

In order to have views of the villagers on the impact of CSR related activities, more than 20 Focus Group Discussions (FGDs) were held in the CSR villages. On the whole, more than 80% of the total groups were aware that their villages had been selected for execution of CSR activities. However less than 20% of the groups primarily from Buffer Zone II villages were not aware of various community beneficiary oriented CSR activities being undertaken by AF-REL.

Of the 16 aware groups, about 85% informed that infrastructural development of their villages are being done under the CSR activities of the AF-REL. Nearly 65% also revealed that they are being provided skill development training for youth for better employment opportunities.

### 6.5.3 Implementation Process of CSR Activities: Responses of the Local Communities

A participatory approach is being taken up to assess the need of the village and its people. This bottom-up approach forms the basis of the success of CSR activities. Majority of the groups (16) were of the view that the activities were undertaken as per decision taken by the AF-REL officials. About 65% and 70% of the groups stated that they were cognizant of the decision making authority for CSR activities and that Gram Pradhan along with AF-REL officials and school teachers took the decision on behalf of the villagers. The CSR activities were mostly



conducted in consultation with the village heads or representatives, the involvement of the local villagers was also moderate to high.

After the decision for conducting any activity under CSR was taken up by the decision making authority, 60% of the groups viewed that the particular activity was put up for discussion with Gram Pradhan, teachers and AF-REL officials. 75% FGD groups also viewed that meeting with local people of the community were held to understand the need for the particular work.

The CSR activities show its impact in terms of fulfilment of the expectations of the local people. About 85% of the groups opined that assessment of the local needs before execution of CSR activities was highly effective. Of the total groups, 15 groups opined that their consent was taken before initiation of CSR activities. However, remaining groups expressed their resentment that no prior opinion was taken from the local people.

Involvement of the local people in execution of the CSR activities was limited. About 30% of the groups informed that no participation of the local people was ensured. Yet another 20% informed that the level of participation of the people was very low.

More than 70% of the groups informed that the responsibility for monitoring of the work done and executed by AF-REL is taken up by the AF-REL officials. Nearly 65% groups also opined that the Panchayat members have taken up interest in up-keeping and protection of the community property created by AF-REL under CSR activities.

#### **6.5.4 Assessment of Need of the Villagers Prior to Execution of CSR Activities**

Programmes like deepening of ponds and construction of check dam, CC roads & bridges/culvert, installation of bore wells were perceived as very high priority areas by the villagers. Similarly, the programmes for improvement of health and sanitation facilities, assistance for construction of toilets, skill development for unemployed youth were considered next priority area for intervention under CSR activities. There were some programmes that were considered unnecessary from the point of view of the groups. Construction of bus stop and benches, village gate and sabha mandap, etc were considered as least priority area by few groups.

#### **6.5.5 Quality of Works: Opinion of the Communities**

To ascertain public opinion on the quality of the work done under CSR, the groups were asked to grade their perception/opinion on the various activities undertaken. While activities like



construction of check dam and deepening of ponds and streams, installation of hand pumps & RO units, construction of community hall and school building were rated as 'very good', however activities like construction of Anganwadi centre, sabhamandap, crematorium, etc. were opined by few groups as 'average'. All these activities were perceived to be highly beneficial for the upliftment of the quality of life of local people around REL's TPP including water intake and pipeline as well as railway corridor.

All the groups opined that there are significant changes in the village socio-economic and cultural environment with initiation and implementation of CSR activities, though in varying degrees. More than 90% groups were of the view that the availability of drinking water has improved and will further enhance in future due to deepening of pond and construction of check dam as a part of CSR activity in the vicinity of REL's TPP. Building of school boundary wall has helped in keeping out stray animals, maintaining clean environment of school, and children safety inside the compound.

#### **6.5.6 Impact of CSR Benefits on Target Families: Opinion of the Local Communities**

Almost all the groups opined that CSR activities have had considerable impact ('good or very good') on the living conditions of the target beneficiaries. Furnishing the infrastructure of the classrooms was opined to have very good impact on the targeted beneficiaries and high impact on their living.

Of the total number of 20 groups surveyed, more than 15 admired the quality of works conducted by AF-REL under CSR. About 80% of the groups opined that with the efforts of AF-REL the availability of safe drinking water has improved. Similarly, 65% and 70% voted for very high quality as per their required standards of materials provided to them for training and boring depth of the hand pumps respectively. Quality of check dam and CC/Pitch road construction, installation of high mast light, construction of community hall were also appreciated. However, few groups opined that the quality of work was 'moderate'.

#### **6.5.7 Need for Alternatives Activities in Lieu of Activities Performed**

About 20% of the groups from buffer zone villages opined that other alternate activities should have been conducted in their villages as per their priority needs. Contrary to this, more than 70 to 80% groups opined that the CSR activities conducted in their villages are as per their priority need and no need of alternative activities to be conducted in place of already executed activities.



Around 15-20% groups which opined that alternate activities could better address or suit the needs of their villages are required to be conducted. Such groups placed a very high need for development of irrigation facilities and better drinking water facilities. This demand was placed by most of the groups. Nearly 6-8 groups also placed their need for strengthening drinking water facilities and construction of toilet facilities to their respective villages. Construction of rainwater harvesting structure, provision of skill development training which has got high employment potential and provision of tap water supply were also other important needs as placed by the groups.

### 6.5.8 Changes as Perceived by Villagers in Different Time Intervals

There were few groups which viewed that alternate activities that better suited the needs of their village were required to be conducted and placed the reasons for which the required activities were not conducted in their villages. Apathy of the officials towards the comprehensive need-assessment of the villages was cited as the major reason for non-execution of required activities (20%). Another major reason was that the performed activities were done not in consultation with the villagers (10-15%). This was especially true for the work conducted in the buffer zone villages.

The groups felt that there have been major positive as well as negative changes in the village in varying magnitude. As a positive change or transformation, more than 80% groups opined that there has been good to very good changes in the well-beings of people in the village. About 85% of the groups believed that the quality of education and its prospects has improved considerably. Heralding an era of change and as an indication of women's improved status in the society and empowerment of women, more than 90% of the groups opined that women now participate in the public sphere and could work outside. Similarly, more than 80% opined that the decision making autonomy of women has also improved. Against 80% groups that were of the view that the social relations well-being of the villagers and employment opportunities as well as cultivation have improved significantly in the last three years, About 20% groups also viewed that the social relation in the village had worsened due to economic disparity. As a paradox to these positive changes, there have been some sectors viz cost of land, availability of cheap labour, etc that had slight negative impact in the last three years.



## 6.6 EVALUATION OF IMPACT OF CSR ACTIVITIES

To evaluate the social impact of the CSR activities undertaken by AF-REL, ranking of impact in the basic amenities and infrastructural facilities besides the livelihood pattern were undertaken in consultation with local people and village representatives during the FGDs conducted in the CSR villages. The overall impact evaluation of CSR activities undertaken were rated in selected areas, viz., road, drinking water, education, health, drainage and sanitation, skill development training, irrigation, veterinary service and sports in the scale 1 to 5, i.e. 1: Poor, 2: Average, 3: Good, 4: Very good and 5: Excellent.

The prime social impact of the CSR activities undertaken by AF-REL in the rural infrastructure, education facilities, health facilities including level of awareness regarding health, hygiene and various social issues, agricultural pattern, skill development training opportunities, socio-cultural improvement, etc are presented in subsequent sections.

Impact of CSR activities on strengthening of road network shows that in more than 60% villages, impact of CSR activities is average, whereas some villages have excellent impact (about 20%). Furthermore, remaining (about 20%) villages have good to very good impact. The analysis shows that in more than 50% villages, impact of CSR activities on strengthening status of community building is average and in more than 30% villages the impact ranges between good to very good. Impact of CSR activities on providing safe drinking water in terms of availability is good in 70% villages and 30% villages show very good to excellent impact of the same. Impact of CSR activities on strengthening sanitation facilities reveals that about 70% villages have average impact, though in remaining 30% villages impact ranges between good to very good.

Impact of CSR activities on providing classroom in school shows that in more than 40% villages it is good and in 50% of the villages, there is very good to excellent impact. Impact of CSR activities on providing safe drinking water in school shows that in 30% villages it is good and in more than 55% villages it ranges between very good to excellent. Same picture is revealed in case of sanitation facilities in school. Impact of CSR activities on strengthening sanitation facilities in school shows that more than 90% of villages have average to good impact, though only few (less than 10%) villages have excellent impact. Impact of CSR activities on providing table, desk, etc. in school shows that more than 55% villages have very good to excellent impact, though 20% villages have average impact of the same. Impact of CSR activities on providing/developing playground in school shows that 60% of villages have good impact, though more than 30% villages have average impact. Impact of CSR activities on strengthening educational facilities and ambience during last three years reveals that more than 55% villages have average to good impact and about 45% villages have very good impact in this regard.

Similarly, remarkable impact of CSR activities on strengthening health facilities and ambience in Government Hospitals/Health Centres is envisaged during last three years. Analysis states that



more than 55% villages have good impact and about 45% villages have very good impact. There is significant impact of CSR activities on enhancing level of awareness towards hygiene and sanitation. In more than 60% villages there is good impact.

Impact of CSR activities on enhancing level of awareness towards social issues reveals that in more than 70% villages the impact is average, whereas in remaining villages, it is good. Impact of CSR activities on reducing mortality rate of livestock shows that more than 70% villages have good impact. Similarly, impact of CSR activities on improving health status of livestock shows that 90% villages have good impact.

Impact of CSR activities on improving agricultural pattern during last three years reveals that 70% villages have good to very good impact and in remaining villages it is average. Impact of CSR activities on providing skill development training opportunities during last three years shows that more than 90% villages there is good to very good impact.

Impact of CSR activities on improving level of participation of people including children in sports shows that more than 80% of villages have average to good impact and about 15% villages have very good impact. Impact of CSR activities on improving level of participation of people including children in cultural activities shows that more than 85% of villages have average to good impact and about 15% villages have very good impact. Impact of CSR activities on improving socio-cultural pattern of communities due to project interventions in different fields shows that about 85% of the villages have average to good impact and more than 15% villages have very good impact.

## 6.7 ASSESSMENT OF MAGNITUDE OF IMPACT OF CSR ACTIVITIES

The assessment of magnitude of impact of any programme based on any single variable or factor is highly limited. Accordingly, to assess the actual impact of CSR activities on individual beneficiary oriented programmes and community beneficiary oriented CSR activities, executed by the AF-REL since 2017-18 to 2019-20, a number of variables have been evaluated. To assess the individual beneficiary oriented programmes in a significant manner, eight variables were studied (Table 6.2), while the assessment of the impact of the community beneficiary oriented CSR activities were based on seven variables (Table 6.3). The responses/perception of selected beneficiaries on all these variables, collected during the interview of the beneficiaries were taken for the assessment of magnitude of impact of CSR activities. The subsequent section highlights the actual impact of the CSR activities. The beneficiaries were classified into different economic sections on their score on the seven variables as mentioned below:

- Occupations of the beneficiaries
- Annual income of the beneficiaries



- Availability of basic facilities
- Type of houses
- Land ownership of the beneficiaries
- Indebtedness among beneficiary households
- Assets holding

The economic index helps to understand the actual impact especially individual beneficiary-oriented programmes on different economic sections of the village community.

**TABLE 6.2: VARIABLES FOR INDIVIDUAL BENEFICIARIES ORIENTED PROGRAMMES**

<i>Variables</i>	<i>Methodology</i>
Willingness to obtain benefits	Given high score to higher extent of willingness to obtain benefits (Very High-4, High-3, Low-2, Very Low-1, Nothing-0)
Extent to which benefits were received	Given high score to higher extent of benefits received (Very High-4, High-3, Low-2, Very Low-1, Nothing-0)
Change in living condition of beneficiaries	Given high score for high level of positive change (Given 1 score to each change)
Direct or indirect benefits received from the programme	Given high score for high level of positive change (Given 1 score to each change)
Expectation level of people regarding future benefit by the programme	Given high score to high expectation level for future benefit (Very High-4, High-3, Low-2, Very Low-1, Nothing-0)
Social change with execution of CSR activities	Given high score to higher level of social changes (Very High-5, High-4, Moderate-3, Low-2, Very Low-1, No change-0)
Economic changes with execution of CSR activities	Given high score to higher level of economic changes (Very High-5, High-4, Moderate-3, Low-2, Very Low-1, No change-0)
Cultural changes with execution of CSR activities	Given high score to higher level of cultural changes (Very High-5, High-4, Moderate-3, Low-2, Very Low-1, No change-0)



**TABLE 6.3: VARIABLES FOR COMMUNITY BENEFICIARY ORIENTED DEVELOPMENT PROGRAMMES**

Name of Variables	Methods
Availability of roads	Given high score to high changes (Some improvement-1, High improvement-2, Very High improvement-3)
Constructions of community building	Given high score to high changes (Some improvement-1, High improvement-2, Very High improvement-3)
Safe drinking water	Given high score to high changes (Some improvement-1, High improvement-2, Very High improvement-3)
Ground water level	Given high score to high changes (Some improvement-1, High improvement-2, Very High improvement-3)
Sanitation facilities	Given high score to high changes (Some improvement-1, High improvement-2, Very High improvement-3)
Infrastructural resources for education	Given high score to higher level of changes (Some improvement-1, High improvement-2, Very High improvement-3)
Infrastructural resources for health	Given high score to higher level of changes (Some improvement-1, High improvement-2, Very High improvement-3)

### 6.7.1 Status of Beneficiaries of Different Economic Categories

Barring few beneficiary households belonging to 'very low' economic category, approx. 55% of the beneficiaries belonged to the 'low' economic category. The second economic category was that of the 'moderate status' with approx. 35% households in this category. Whereas, approx. 10% belonged to 'high' or 'very high' economic category. The distribution of economic categories across various caste groups reveals that the low economic group was a majority in all the caste categories in varying degrees. Against 70 and 65% low economic category households in the SC and Minority groups respectively, the proportion for the OBC and general caste were 45 and 35% respectively. Among the OBC and General caste beneficiary households, 30 and 25% were in the moderate economic group respectively. The 'very high' economic category comprised of less than 5% of beneficiary households from the general caste.

Distribution of beneficiaries across different economic groups shows that the low and moderate income groups took maximum benefits of the CSR programmes. The further distribution of the beneficiaries across various programmes shows majority of skill development training, scholarship, medical aid were provided to 'low' economic category. This





distribution of beneficiaries across different economic categories justifies the selection criteria of the beneficiaries. Similarly, majority of the beneficiaries of computer training programme, tailoring and beneficiaries of aid to physically challenged were from the moderate economic class. However, very few beneficiaries belong to very high economic category taking benefit of medical aid and improved agricultural practice/water conservation/dairy farming.

### 6.7.2 Impact of Individual Beneficiary Orientated Programmes

In terms of impact on the villagers, in the villages Raikheda, Chicholi and Gaitru with significant beneficiaries selected, most of them opined that the CSR activities have had 'very high' to 'high' impact on their living conditions. The buffer zone-I villages Gourkheda, Sontara, Murra, Khamharia and Tarashiva with number of beneficiaries also opined that programmes have had 'very high' to 'high' impact. The buffer zone-II villages i.e. Tulsi, Konari, Bartori, Chatod and Samoda were ranked lowest as few beneficiaries of these villages opined that the CSR activities have had 'moderate' to 'low' impact in the village.

### 6.7.3 Qualitative Observation Regarding Impact of CSR Activities

The AF-REL undertook CSR activities under two heads, one being the individual beneficiary oriented programmes and other being community beneficiary oriented programmes. Under the individual beneficiary oriented schemes like providing scholarships, free education, skill development training, computer training, provision of tri-cycle, special shoes and hearing aids for handicapped were given. With the provision of scholarship, free education and aids for handicapped, there has been a rise in the sense of solidarity and self-dependence among the beneficiaries. Skill development training for women and girls has helped in capacitating them with skills and opened avenues for earning opportunities. Many of these women and girls have now opened up their business at home which is providing additional income to support their family besides economically empowering them. ASDC and other training has helped several beneficiaries to make self-reliant. The high pressure welding training as well as electrical and nursing training at ASDC has made remarkable impact in terms of providing greater job opportunities especially to vulnerable group of people. The significant number of women in adjacent villages are motivated to scale up their business of mushroom cultivation.

Some of the benefits provided by the AF-REL for any particular village were also availed directly or indirectly by other villagers. Deepening of pond and streams and bus shelters for passengers have proved to be useful not only for the residents of the particular village, but also for all the other villagers who access these facilities. The problems of villagers with regard to water logging and swampy filthy areas have been solved with construction of drains at various



villages. With construction of school buildings/classroom and better sanitation facilities including development of play ground, the expected results have been achieved to enhance the learning ambience in the educational institutions. With building up of school boundaries, safety of children in the school has enhanced. With the commencement and subsequent strengthening of MHCU services in almost all the CSR villages, the health status of local people has improved significantly. With maintenance and renovation of schools and cleaning of drains, there has been a positive impact on the atmosphere of the villages.

The AF-REL has done commendable work in ensuring the provision of clean potable drinking water to villagers. In several adjoining villages, hand pumps have been installed and being maintained by local people effectively. This has helped in solving the problem of shortage of water availability to great extent.

Besides the regular mobile health care unit services to various CSR villages, every year the AF-REL also conducts various health camps in different villages where people from the nearby villages also come to get free medical check-up. In these camps medical check-ups and advice or consultation by specialized doctors is provided. Seasonal ailments are treated and free medicines are distributed. Patients suffering from serious ailments are referred to other hospitals. Such camps have had positive impact on the lives of the people who are now not only relieved of seasonal diseases but are also diagnosed for complicated ailments.

From time to time health camps for livestock are also organized wherein villagers from the concerned villages as well as nearby villages come for free medical treatment and advice. Apart from free medical checkups and medicines, other facilities like vaccines are also provided. With these camps being organized from time to time, the livestock mortality rates have gone down.

Sports competitions are also conducted/sponsored by AF-REL regularly at various villages/town. Volleyball, Kabaddi, Cricket, race, high jump, short puts throw and several other games are organized. The AF-REL bears the expenses of providing players food, etc. The winners are given medals and trophies. These tournaments have very positive impact on the local youths interested in games and sports. This not only enhances their interest in games and sports but also gives them recognition. Apart from this, AF-REL has provided computer, chairs, tables, sittings mats and games and sports appliances for schools. All the activities conducted in the selected villages under CSR were need-based and have had positive impact on the lives of the people.



## 6.8 ALLOCATION OF FUNDS

In accordance with its mission of being socially responsible corporate entity with thrust on community development, REL aims to focus on implementing community development and engagement programs in the affected/ neighboring villages around its TPP. To accomplish this mission, a survey has been conducted to identify the social, economic and cultural needs of the villages falling within the 10 km radius of TPP, societies that can facilitate in formulating a comprehensive long-term development programme, to be undertaken under Corporate Social Responsibilities (CSR) activities. The whole exercise aims to set long-term priorities for CSR activities, which could be achieved within the specified time frame. Generally, the needs that are rated most important are the ones that get addressed on priority. In this connection, a comprehensive plan has been chalked out delineating a budget allocation as per CSR policy of APL.

## 6.9 INSTITUTIONAL ARRANGEMENT

A Corporate Social Responsibility Committee (CSRC) is being re-constituted at the REL for identification and implementation of activities which involve the followings:-

- To interact with the concerned State Government Officials to confirm the areas for undertaking activities under CSR and ensure to avoid duplicity of the job.
- To decide the priority of the activities to be undertaken under CSR.
- To interact with the NGOs for determining the activities to be undertaken.
- Based on the total activities to be undertaken the Committee recommends the quantum of budget for the year.
- Utilisation Certificate with statement of expenditure duly certified by an Authorised Auditor need to be submitted by the Organisation/ Institution to whom CSR fund is allocated.
- To monitor and review the progress of activities undertaken/completed.

The committee has been constituted with the representation from all parts of the local community, headed by Vice President (P&IR) and in every 6 (six) months Managing Director of APL reviews the CSR activities.

Assistance of NGOs is being sought, as and when necessary, for preparation of baseline data, action plans and involvement of the local communities. For this purpose, only NGOs of national repute or with a good track record are being involved.



## **6.10 UPKEEP AND MAINTENANCE OF ASSETS CREATED**

Maintenance of Assets created under CSR is the Responsibility of the concerned State Government and local representative of the Society. Before any Capital investment is made, an undertaking is being taken from the representatives of local community that they are responsible for maintenance of the Assets.

## **6.11 REFLECTION OF CSR ACTIVITIES**

Annual audit of all activities undertaken by the company is being done by local Authorized auditor. The CSR activities are reflected in the Annual Report and Accounts of APL under Social Overhead (CSR).



## 7.0 SOCIAL AUDIT IMPACT MATRIX

### 7.1 SOCIAL AUDIT FRAMEWORK

Social Audit team applied tools to gather first hand response from the stakeholders including the implementing staff from the REL-AF. The findings are classified in the 3 thrust areas – Education (Quality Improvement, Infrastructure supplementation, HR Support); Health, Hygiene and Sanitation (Preventive and Curative measures); Empowerment and Livelihoods (Youth, Farmers, Women and Groups). In each of the segments selected sample units were considered to study the programme design, implementation approach, reception and impact among the beneficiaries. These sample units are quantitatively and qualitatively assessed as per the scheme of social audit as elaborated in earlier chapters.

Social audit system applies certain base indicators which are chosen after the preliminary study of intent and content of any programme. Accordingly following indicators framework applied for the present study:

<b>Fundamental Factors and Programme Design</b>	Overall Common Factors -I (POLICY)
	Overall Common Factors-II (PROCESS)
	Programme Common Factors (PROGRAMMES)
<b>Programme Component-Education</b>	Programme Specific Factors (EDUCATION)
	Sample Activity Education-Navoday Coaching Centres
	Sample Activity Education-Vidya Volunteers
	Sample Activity Education : Minimum Learning Standard (MLS)
	Sample Activity Education : Anaganwadi Strengthening
	Sample Activity Education : Kidsmart
	Sample Activity Education : Community Library
	Sample Observation Education. : Transport Facilities for Students
<b>Programme Component-Health</b>	Programme Specific Factors (HEALTH HYGIENE AND SANITATION)
	Sample Activity Health. : Nutrition Centre
	Sample Activity Health : Mobile Medical Unit (MMU)
	Sample Activity Health : Women Hygiene and Sanitation
	Sample Activity Health : Individual Toilet Tiles Fitting
<b>Programme Component-Empowerment and Livelihoods</b>	Programme Specific Factors (EMPOWERMENT and LIVELIHOODS)
	Sample Observation Emp. & Livelihoods : Pratibha Centres



	Sample Observation Emp. & Livelihoods : Vocational Training Centre
	Sample Activity Emp. & Livelihoods : Community Level Training
	Sample Activity Emp. & Livelihoods : Computer Literacy
	Sample Observation Emp. & Livelihoods : Self Help Group
	Sample Observation Emp. & Livelihoods : Tailoring Production Centre



## 7.2 SOCIAL AUDIT IMPACT MATRIX

The present social audit conducted for CSR activities undertaken during 2017-18 to 2019-20 on the basis of above mentioned framework. The impact assessment matrix along with analysis and finding for selected 23 indicators are presented in subsequent sections.

### 7.2.1 Fundamental CSR Factors & Programme Design

The impact assessment matrix for fundamental CSR factors and CSR schemes design are presented in subsequent tables:

#### Social Audit Constituent - 1 : Applied Weight = 10X

##### Overall Common Factors -I (Foundation's Mandate on CSR Policy)

30

					-3	-2	-1	0	1	2	3	
1.1	Expertise of CSR implementing body	No	Partly	Yes							X	3
1.2	CSR Policy in place	No	Partly	Yes							X	3
1.3	Functional freedom to the CSR implementing body	0	Low	High							X	3
1.4	CSR staff expertise in the sector	None	Partly	All							X	3
1.5	CSR wing leadership	Poor	Average	Good							X	3
1.6	CSR HR Policy in place and known to staff	No	Partly	Yes							X	3
1.7	Inclusion of Health	No	Partly	Yes						X		2
1.8	Inclusion of Education	No	Partly	Yes							X	3
1.9	Inclusion of Livelihood	No	Partly	Yes							X	3
1.10	Visible and evident Gender Sensitive Planning	No	Partly	Yes						X		2

Change against the Social Audit of 2016-17

1.5 % Increased

SA Lead Auditor	REL-AF Representative	SUM	AVERAGE/3	SA WEIGHT/1000
		28	2.8	933



**Social Audit Constituent - 2 : Applied weight = 5X**

**Overall Common Factors -II (Foundation's Mandate on CSR Process)**

30

					-3	-2	-1	0	1	2	3	
2.1	Training to staff / volunteer	No	Partly	Yes						X		2
2.2	SOP available for activities	None	Some	All						X		2
2.3	Stakeholder Integration before rollout	NO	Low	High						X		2
2.4	Socio Economic Study of PAVs preactivity	None	Few	All							X	3
2.5	Measurable Indicator Assessed	No	Some	Yes							X	3
2.6	Integration with District level statebodies	None	Few	All							X	3
2.7	Integration with PRI representatives	No	Partly	Yes							X	3
2.8	Visible attention to Marginalized Communities	No	Partly	Yes							X	3
2.9	Gender Sensetive Process Design	No	Partly	Yes							X	3
2.10	Defined Stakeholder Grievance Redressal System	No	Partly	Yes						X		2

Change against the Social Audit of 2016-17

8.3% Increased

		SUM	AVERAGE/3	SA WEIGHT/500
SA Lead Auditor	REL-AF Representative	26	2.6	433





**Social Audit Constituent - 3 : Applied weight = 5X**

**Programme Common Factors (CSR Programme/Schemes)**

36

					-3	-2	-1	0	1	2	3	
3.1	Structured Community Need Assessment	No	Partly	Yes						X		2
3.2	CAN participated by stakeholder	No	Partly	Yes						X		2
3.3	Gap Addressing Procedure followed	NO	Partly	Yes						X		2
3.4	Qualitative Indicators in place	None	Some	All							X	3
3.5	Qualitative input Indicators in place	No	Partly	Yes							X	3
3.6	Quantitative outcome indicators in place	No	Partly	Yes						X		2
3.7	Community Need Relevance against Wants	No	Partly	Yes						X		2
3.8	Sustainability Checks exercised	No	Partly	Yes						X		2
3.9	Internal Resource Optimization in CSR	No	Partly	Yes							X	3
3.10	Community Monitoring System in place	No	Partly	Yes						X		2
3.11	Result Based Programme Management	No	Partly	Yes						X		2
3.12	Staff Motivation Level	No	Average	Yes							X	3

Change against the Social Audit of 2016-17

22 % Increased

		SUM	AVERAGE/3	SA WEIGHT/500
SA Lead Auditor	REL-AF Representative	28	2.33	389



**Social Audit Constituent - 4 : Applied weight = 5X****Programme Specific Factors (Education)****24**

					-3	-2	-1	0	1	2	3	
4.1	Change in Perception & Significance of Education	Decr	Neutr	Incr							X	3
4.2	Change in Learning Inclination	Decr	Neutr	Incr							X	3
4.3	Change in Female drop out in higher classes	Incr	Neutr	Decr							X	3
4.4	Change in Educator's HR Quality in select schools	No	Partly	Yes						X		2
4.5	Follow up mechanism in place	No	Partly	Yes						X		2
4.6	Infra support meets the needs	Below	Matches	Above							X	3
4.7	Efforts made to train the teachers	No	Partly	Yes						X		2
4.8	Integration with Anganwadi	Nil	Partly	High							X	3

Change against the Social Audit of 2016-17

16.6% Increased

SA Lead Auditor	REL-AF Representative	SUM	AVERAGE/3	SA WEIGHT/500
		21	2.6	437.5



**Social Audit Constituent - 5 : Applied weight = 5X****Programme Specific Factors (Health)****30**

					-3	-2	-1	0	1	2	3	
5.1	Staff/External expertise trained in relevant skill sets	No	Partly	Yes							X	3
5.2	Covers mother and child health issues	No	Partly	Yes							X	3
5.3	Availability of essential medicines	None	Some	All							X	3
5.4	Equipments available and functioning	No	Partly	Yes						X		2
5.5	Impact of Door Step Services	<40%	<60%	>60%							X	3
5.6	Integration with NRHM/ANM /Mitanin	No	Partly	High						X		2
5.7	Follow up mechanism in place at dispensaries	No	Partly	Yes					X			1
5.8	Access to Health Services by MMU	No	Partly	Yes							X	3
5.9	Preparedness to handle epidemic conditions	No	Partly	Yes						X		2
5.10	Focus Programme on Women Health Issues	No	Partly	Yes						X		2

Change against the Social Audit of 2016-17

21 % Increased

SA Lead Auditor	REL-AF Representative	SUM	AVERAGE/3	SA WEIGHT/500
		24	2.4	400



**Social Audit Constituent - 6 : Applied weight = 5X****Programme Specific Factors (Empowerment & Livelihoods)****27**

					-3	-2	-1	0	1	2	3	
6.1	SHG Federation against expected performance	Below	Matches	Above						X		2
6.2	VTC's Dynamic Response to Employability Training	Poor	Avg	Good							X	3
6.3	Banking Linkages	Decr	Neutr	Incr							X	3
6.4	Inclusion of Marginalized Communities	No	Partly	Yes							X	3
6.5	SHGs Operational Performance Abilities	Decr	Neutr	Incr							X	3
6.6	Change in level of income	0	30%+	50%+							X	3
6.7	Integration with NRLM and other agencies	No	Partly	Yes						X		2
6.8	Productivity / Employability Preparedness	No	Approx	Yes						X		2
6.9	Feedback is used in planning	No	Partly	Yes						X		2

Change against the Social Audit of 2016-17

15 % Increased

SA Lead Auditor	REL-AF Representative	SUM	AVERAGE/3	SA WEIGHT/500
		23	2.5	426

**Findings**

Overall, the CSR Policy & Process are in line with the mandate. The components are getting aligned in a better and effective manner. The programme design is sound enough to render a sustainable growth. However, it was realized that the interpretation of programme design at the implementation level need to be strengthen.

**Cherish**

1. Understanding of local needs and dynamics infused into the present CSR programme designs.
2. Proactive compliance and strategic implementation of Sec. 135 , Schedule 7 provisions.



- 3. Functional parameters set informally within the team and volunteers.
- 4. Gender Sensitive Process Designs.
- 5. Sustainability Anchors in Programme Design.

**Focus**

- 1. Foundation's Value System and its functional presence in group dynamics.
- 2. Community Connect in the Programme Communication Strategy

**7.2.2 Education Programmes**

The impact assessment matrix for Education Programmes are presented in subsequent tables:

**SA Constituent: 07**

**EDUCATION : Navoday Coaching**

SA Parameters	Point Source	-3	-2	-1	0	1	2	3
Design Rationale	3							X
Delivery Process	2.5						X	
Beneficiary Ownership	3							X
Outcome Reflection	3							X
Value Proposition	2.5						X	
Gender Inclusion	3							X

Total out of 18      17

Average      2.8

Score      **283.3**

Out of 300

Weight: 3X



**EDUCATION : Vidya Volunteers**

**SA Constituent: 08**

SA Parameters	Point Source	-3	-2	-1	0	1	2	3
Design Rationale	2.5						X	
Delivery Process	2						X	
Beneficiary Ownership	3							X
Outcome Reflection	2.5						X	
Value Proposition	2.5						X	
Gender Inclusion	1.5					X		

Total out of 18      14

Average      2.3

Score      **233.3**

Out of 300

Weight: 3X

**EDUCATION : Minimum Learning Standard**

**SA Constituent: 09**

SA Parameters	Point Source	-3	-2	-1	0	1	2	3
Design Rationale	2.5						X	
Delivery Process	1					X		
Beneficiary Ownership	1.5					X		
Outcome Reflection	1					X		
Value Proposition	2						X	

Total out of 15      8

Average      1.6

Score      **160**

Out of 300

Weight: 3X



**SA Constituent: 10**

**EDUCATION : Anganwadi Strengthening**

SA Parameters	Point Source	-3	-2	-1	0	1	2	3
Design Rationale	2						X	
Delivery Process	2.5						X	
Beneficiary Ownership	1.5					X		
Outcome Reflection	1					X		
Value Proposition	2						X	
<b>Total out of 15</b>	<b>9</b>							
<b>Average</b>	<b>1.8</b>							
<b>Score</b>	<b>180</b>	<b>Out of 300</b>	<b>Weight: 3X</b>					

**SA Constituent: 11**

**EDUCATION : Kidsmart**

SA Parameters	Point Source	-3	-2	-1	0	1	2	3
Design Rationale	3							X
Delivery Process	3							X
Beneficiary Ownership	2						X	
Outcome Reflection	2.5						X	
Value Proposition	2						X	
Gender Inclusion	2.5						X	
<b>Total out of 18</b>	<b>15</b>							
<b>Average</b>	<b>2.5</b>							
<b>Score</b>	<b>166.7</b>	<b>Out of 200</b>	<b>Weight: 2X</b>					



**SA Constituent: 12**

**EDUCATION : Community Library**

SA Parameters	Point Source	-3	-2	-1	0	1	2	3
Design Rationale	3							X
Delivery Process	3							X
Beneficiary Ownership	3							X
Outcome Reflection	2.5						X	
Value Proposition	3							X
Gender Inclusion	2.5						X	
<b>Total out of 18</b>	<b>17</b>							
<b>Average</b>	<b>2.8</b>							
<b>Score</b>	<b>188.9</b>	<b>Out of 200</b>		<b>Weight: 2X</b>				

**SA Constituent: 13**

**EDUCATION : Transportation Facility**

SA Parameters	Point Source	-3	-2	-1	0	1	2	3
Design Rationale	3							X
Delivery Process	2.5						X	
Beneficiary Ownership	3							X
Outcome Reflection	3							X
Value Proposition	2.5						X	
Gender Inclusion	3							X
<b>Total out of 18</b>	<b>17</b>							
<b>Average</b>	<b>2.8</b>							
<b>Score</b>	<b>377.8</b>	<b>Out of 400</b>		<b>Weight: 4X</b>				





**Findings:**

Education as a CSR component has been one of the very strong hold areas of inputs and an anchor of community perception ever since the days of inception with entry level CSR. Initiatives like Kids Smart, Navoday Coaching, Transport facility for girls have earned good repute and a high social return on investment. In the current reporting period too, it was quite evident that nothing connects with the community better and deeper than the education component under CSR. Drinking Water at Chicholi through Solar Pump, Teaching support through Vidya Volunteers and salary contribution at 1 school, Saksham Scholarship, Navoday Coaching, Bus facility for college going girls - all have made a lot of positive impact. These are the areas where outputs reach to impact. Amidst all these satisfactory reports there are few areas where we register either gradual loss of benefits or deviation from the target path. It is worth mentioning here that Kids Smart centre appears to be not using the past credential and evidence-based learning as CSR input. The volunteer engaged is a good selection, but she ends up underutilized due to lack of proper training inputs. The highly potential Minimum Learning Standard component has still its nose up long after the take off. After a deep thought and discussion with all stakeholders it was found that in the education sector those programmes do well where the creative and persuasive skills of the Programme Staff is less required such as Saksham, Transport, Navoday ; but where it is required the relevant sub components tumble such as Kids Smart, MLS, Quality Teaching etc.

**Cherish:**

1. The experiential learning generated by the salary contributed teachers' segment. Their ideas that they shared during the social audit makes us believe in their integrity and commitment. This lot of teachers is in deep contrast with rest of the teachers in the PAVs. Their skills can be applied for inducting similar results in other schools as well.
2. Saksham Scholarships, Vidya Volunteers and indirect support to schools.
3. Infrastructure support to schools. Plantation activities as done at Samoda need to be mainstreamed. The school campuses in most of the schools at PAVs are very plane and barren. Plantation will not only improve the micro local environment but will also instill good values for environment conservation among students. This can also be clubbed with state component of School Eco Clubs.
4. The early streaming approach adopted with Navoday at Class 3itself

**Focus:**

1. The most important and yet very under addressed area is Capacity and Behaviour Modeling of Teaching Staff - Pedagogy, Use of Learning Aid, Ability to sort and address



learning level differences , Psychometric Abilities, Reinforcement of Knowledge, Stress Management, Ability to Assess and record , Reporting , Updating self-awareness level.

2. Kids Smart Centre is on the down curve, it can be very well re-structured with proper approach plan and specialized training support for the volunteering staff. The training modules which trained the first few staff for Kids Smart were amazing.
3. HR Strengthening at the Programme Staff level for education. It has multiple hands to handle it. This needs to be addressed in light of the opportunities MLS can crack with right approach.
4. The behavior that the school management share with Vidya Volunteers is very discriminatory, undue and discouraging. Foundation needs to secure the very purpose of this arrangement. Vidya Volunteers are not to substitute the regular teachers, they are to support them with the workload and some different teaching inputs

### 7.2.3 Health, Hygiene & Sanitation Programmes

The impact assessment matrix for Health, Hygiene and Sanitation Programmes are presented in subsequent tables:

#### SA Constituent: 14

#### HEALTH : Nutrition Strengthening

SA Parameters	Point Source	-3	-2	-1	0	1	2	3
Design Rationale	3							X
Delivery Process	2.5						X	
Beneficiary Ownership	2.5						X	
Outcome Reflection	2.5						X	
Value Proposition	2.5						X	
Gender Inclusion	2						X	

Total out of 18      15

Average      2.5

Score      **416.7**

Out of 500

Weight: 5X



**SA Constituent: 15**

**HEALTH : Mobile Medical Unit (MMU)**

SA Parameters	Point Source	-3	-2	-1	0	1	2	3
Design Rationale	2						X	
Delivery Process	2.5						X	
Beneficiary Ownership	2.5						X	
Outcome Reflection	2.5						X	
Value Preposition	2.5						X	
Gender Inclusion	2						X	

Total out of 18 14

Average 2.3

Score **388.889**

Out of 500

Weight: 5X

**SA Constituent: 16**

**HEALTH : Women Hygiene and Sanitation**

SA Parameters	Point Source	-3	-2	-1	0	1	2	3
Design Rationale	2						X	
Delivery Process	1					X		
Beneficiary Ownership	1.5					X		
Outcome Reflection	1					X		
Value Preposition	1.5					X		
Gender Inclusion	2						X	

Total out of 18 9

Average 1.5

Score **250**

Out of 500

Weight: 5X



**SA Constituent: 17**

**SANITATION : Individual Toilet Tiles Fitting**

SA Parameters	Point Source	-3	-2	-1	0	1	2	3
Design Rationale	2.5						X	
Delivery Process	2.5						X	
Beneficiary Ownership	2						X	
Outcome Reflection	2						X	
Value Preposition	2						X	
Gender Inclusion	3							X

Total out of 18      14

Average      2.3

Score      **388.9**

Out of 500

Weight: 5X

**Findings:**

Health Care interventions have been very significantly placed in the CSR activities during the reporting period. In compliance with state government's order to prevent practices of unauthorized medical prescription and drug administration the services of health volunteers at village dispensaries have been redesigned. Now the medicines are only prescribed by authorized doctors and medical team from Mobile Medical Unit and Tilda Mission Hospital. Dispensaries and MMU are providing a stable presence whereas Nutrition Care, Eye Camp, School Health Awareness Drive, ANC and Annaprashan, Women Hygiene Awareness kind of activities are creating a positive environment for the general health care among the people. X Ray unit and Blood Bank are serving the purpose as designed. Individual toilets tiles fitting is a good value addition in the sanitation drive.

**Cherish:**

1. Partnership with Tilda Mission Hospital and Tilda Jan Jagran Sansthan
2. Weekly Health Awareness drives especially among women and children
3. Mobile Medical Unit's coverage
4. ANC care and Support to lactating women



5. Blood Bank and X Ray Unit's contribution at macro parameters.

**Focus:**

1. Mobile Medical Units have emerged as the face of Health component under the CSR. There is a perception difference between what MMU can offer and what people expect out of it. It is requested that a Perception Communication Strategy be devised for this issue.
2. Nutrition component is really vital and also connects with the state body's Nava Jatan programme for combating malnutrition. If SHGs could be linked with production of Nutrition Supplement packed items such as NutriBar, a good convergence can be created.
3. Dispensaries need a turn around restructuring. It was also observed that just at the entrance of Raikheda VDC there are 2 small *paangutkha* shops selling tobacco and allied products. This needs to be checked and balanced.
4. Foundation needs to find out better ways to engage its resources in sanitation drive. Tiles fitting was a good exercise. Since many villages have been certified as ODF villages due to the efforts made by foundation, foundation can play a role in extending ODF provisions beyond toilet usages. This will not only create better sanitation standards but will also supplement the sector where state bodies have their functional limitations.
5. It seems now possible with increased attention on ANC activities that now indicators of IMR/MMR can formally be included in the mainframe of CSR activities.
6. School Health Awareness sessions are doing good, and they have a lot of untapped potential. One such input could be to use the students strength as sound board for preventive community health and nutrition components. Further during the school visits it was observed that children suffered from skin disease and vitamin deficiency . These could find place through a project mode component at the same platform.
7. Institutional Partnership with Tilda Mission Hospital can be further explored for better results.
8. Women Health and Hygiene awareness drive was a good initiative. It is suggested that based on the inputs earned during the activity a fresh component dedicated on Women Health and Hygiene (Sanitary Napkin usages, Reproductive Tract Infection, Urinary Tract Infection, Sexual Hygiene, Safe Use of Contraceptives etc.). A medical professional



working in the region shared , that the cases of pelvic inflammatory disorder have increased among women.

- PRI members, teachers and other village representatives, during the discussion, found technically less aware and inclined for the holistic approach of Swachh Bharat Abhiyan, that is holistic sanitation and hygiene. This area can be addressed through the foundation by initiating a linear approach for holistic sanitation at household and at community levels.

### 7.2.4 Empowerment & Livelihood Development Programmes

The impact assessment matrix for Empowerment & Livelihood Programmes are presented in subsequent tables:

#### SA Constituent: 18

#### EMPOWERMENT & LIVELIHOODS : Pratibha Centre

SA Parameters	Point Source	-3	-2	-1	0	1	2	3
Design Rationale	3							X
Delivery Process	3							X
Beneficiary Ownership	2.5						X	
Outcome Reflection	2.5						X	
Value Proposition	2						X	
Gender Inclusion	2						X	

Total out of 18      15

Average      2.5

Score      **250**

Out of 300

Weight: 3X



**SA Constituent: 19**

**EMPOWERMENT & LIVELIHOODS : Skill Development Centres**

SA Parameters	Point Source	-3	-2	-1	0	1	2	3
Design Rationale	3							X
Delivery Process	3							X
Beneficiary Ownership	3							X
Outcome Reflection	2.5						X	
Value Preposition	2.5						X	
<b>Total out of 15</b>	<b>14</b>							
<b>Average</b>	<b>2.8</b>							
<b>Score</b>	<b>280</b>	<b>Out of 300</b>	<b>Weight: 3X</b>					

**SA Constituent: 20**

**EMPOWERMENT & LIVELIHOODS : Community Level Training**

SA Parameters	Point Source	-3	-2	-1	0	1	2	3
Design Rationale	2						X	
Delivery Process	2.5						X	
Beneficiary Ownership	2.5						X	
Outcome Reflection	3							X
Value Preposition	2.5						X	
Gender Inclusion	2.5						X	
<b>Total out of 18</b>	<b>15</b>							
<b>Average</b>	<b>2.5</b>							
<b>Score</b>	<b>250</b>	<b>Out of 300</b>	<b>Weight: 3X</b>					



**SA Constituent: 21**

**EMPOWERMENT & LIVELIHOODS : Computer Literacy**

SA Parameters	Point Source	-3	-2	-1	0	1	2	3
Design Rationale	2.5						X	
Delivery Process	1.5					X		
Beneficiary Ownership	2.5						X	
Outcome Reflection	2						X	
Value Proposition	2.5						X	
Gender Inclusion	2						X	
<b>Total out of 18</b>	<b>13</b>							
<b>Average</b>	<b>2.2</b>							
<b>Score</b>	<b>216.7</b>	<b>Out of 300</b>		<b>Weight: 3X</b>				

**SA Constituent: 22**

**EMPOWERMENT & LIVELIHOODS : Self Help Groups**

SA Parameters	Point Source	-3	-2	-1	0	1	2	3
Design Rationale	3							X
Delivery Process	3							X
Beneficiary Ownership	3							X
Outcome Reflection	2.5						X	
Value Proposition	2						X	
Gender Inclusion	2.5						X	
<b>Total out of 18</b>	<b>16</b>							
<b>Average</b>	<b>2.7</b>							
<b>Score</b>	<b>444.4</b>	<b>Out of 500</b>		<b>Weight: 5X</b>				





**SA Constituent: 23**

**EMPOWERMENT & LIVELIHOODS : Integrated Tailoring Centre / Production House**

SA Parameters	Point Source	-3	-2	-1	0	1	2	3
Design Rationale	2.5						X	
Delivery Process	2.5						X	
Beneficiary Ownership	3							X
Outcome Reflection	2						X	
Value Proposition	2						X	
Gender Inclusion	2						X	
<b>Total out of 18</b>	<b>14</b>							
<b>Average</b>	<b>2.3</b>							
<b>Score</b>	<b>233.3</b>	<b>Out of 300</b>		<b>Weight: 3X</b>				

**Findings:**

This is the star performer segment in the reporting period. It is just not that the Empowerment and Livelihoods segment did not fail or suffer, on the contrary this segment faces challenges, conflicts more than any other segment. But the beauty of journey has been the way the programme level staff and the volunteers have evolved through each such experience. Vocational Training Centre has become more out stretched and functional. The small partnerships with local repair shops, mechanics fuel in a high value to the segment. The settlement ratio is also high and satisfactory. There are suggestions for improvement but for all good reasons and because of the strength this team exhibits. SHGs are doing good in their own limited definitions, in spite of lot of efforts from the leadership level the segment doesn't pick the call. One key factor remains the staff at the programme level that is not very approachable and gelled well with the stakeholders. Other components such as Pratibha and Community Library find a strong place among the target population.

**Cherish:**

1. Vocational Training Centres and their functional approach of evolving with every challenge.



2. SHGs linkage with NRLM /Bihan.
3. Advanced Tailoring Training cum Production Centre at Raikheda

**Focus:**

1. The trainers at VDC now need some upgradation in terms of managerial skills, pedagogy, documentation, entrepreneurship development, backward / forward linkages and follow up. VTC in its present approach is doing good but it now needs to converge into a training and entrepreneurship centre, where there are possibilities of 3 vital linkages for the trained youth – certification, finance and market.
2. SHGs do not seem to be addressing the social capital building. Even their financial strength is connected with NRLM. This is in a way an opportunity where the SHGs can make use of the financial strength into exploring earning options.
3. ChiRaG still has a problem of blurred vision and blind execution.
4. The concept of local economy strengthening through CSR inputs can be taken up to effectively engage the component of IIGA and Family Income Support components.
5. Saheli centres though doing well seem a bit deviated from the very core inception values and purpose.
6. Pratibha Centres have got a broader vision and a smart and dynamic input at the component management level can bring in higher returns.
7. Advanced Tailoring Training cum Production Centre is a big promising component. It can be the face changing activity not only for GMRVF but for the entire CSR segment of the region. Foundation has established the best equipment and machines, but the programme level staff needs to prepare a market centric approach for the centre. The centre must not be left to swing between being a training centre or a production unit. The balance needs to be found and maintained. The past experiences with production units – be it soft toys or papad, has taught that the entire approach lacked business development essentials.
8. The trainers now need some upgradation. VTC in its present approach is doing good but it now needs to converge into a training and entrepreneurship centre, where there are possibilities of 3 vital linkages for the trained youth – certification, finance and market. Each trainee must be analyzed in terms of individual skills, strengths, family background,



financial link up potential etc. Further a techno legal documentation post training is required to streamline the placement or settlement process.

9. IIGA and IGA beneficiaries and the managing staff collectively do not treat the inputs and outputs in business framework. The understanding of profit and sustainability is very short term and cost assessment, or pricing is also very weak.
10. Organic Cultivation, Food Processing and convergent linkages with CSIDC and MoFPI schemes is possible if thought upon in a long-term perspective.

The brief summary impact assessment matrix of CSR Policy, Programmes and Activities during the present audit period is presented in subsequent tables:

#### Summary of Impact Matrix for CSR Policy, Process & Programme

Sl. No.	Description	Total Score	Score Obtained	% of Score
1	Overall Common Factors –I (POLICY)	1000	933	93.30
2	Overall Common Factors-II (PROCESS)	500	433	86.60
3	Programme Common Factors (PROGRAMMES)	500	389	77.8
4	Programme Specific Factors (EDUCATION)	500	473.5	94.7
5	Programme Specific Factors (HEALTH HYGIENE AND SANITATION)	500	400	80.0
6	Programme Specific Factors (EMPOWERMENT and LIVELIHOODS)	500	426	85.2
	<b>Grand Total</b>	<b>4000</b>	<b>3054.5</b>	<b>76.4</b>



**Summary of Impact Matrix for CSR Activities Under Education Programme**

Description	Total Score	Score Obtained	% of Score
Sample Activity Education-Navoday Coaching Centres	300	283.333	94.444
Sample Activity Education-Vidya Volunteers	300	233.333	77.778
Sample Activity Education : Minimum Learning Standard(MLS)	300	160	53.333
Sample Activity Education : Anaganwadi Strengthening	300	180	60.000
Sample Activity Education : Kidsmart	200	166.666	83.333
Sample Activity Education : Community Library	200	188.898	94.445
Sample Observation Education. : Transport Facilities for Students	400	377.778	94.445
<b>Total</b>	<b>2000</b>	<b>1595.008</b>	<b>79.750</b>

**Summary of Impact Matrix for CSR Activities Under Health, Hygiene and Sanitation Programme**

Description	Total Score	Score Obtained	% of Score
Sample Activity Health : Nutrition Centre	500	416.667	83.333
Sample Activity Health : Mobile Medical Unit (MMU)	500	388.889	77.778
Sample Activity Health : Women Hygiene and Sanitation	500	250	50.000
Sample Activity Health : Individual Toilet Tiles Fitting	500	388.889	77.778
<b>Total</b>	<b>2000</b>	<b>1444.445</b>	<b>72.222</b>



### Summary of Impact Matrix for CSR Activities Under Empowerment and Livelihood Programme

Description	Total Score	Score Obtained	% of Score
Sample Observation Emp. & Livelihoods : Pratibha Centres	300	250	83.333
Sample Observation Emp. & Livelihoods : Vocational Training Centre	300	280	93.333
Sample Activity Emp. & Livelihoods : Community Level Training	300	250	83.333
Sample Activity Emp. & Livelihoods : Computer Literacy	300	216.667	72.222
Sample Observation Emp. & Livelihoods : Self Help Groups (SHG)	500	444.444	88.889
Sample Observation Emp. & Livelihoods : Tailoring Production Centre	300	233.333	77.778
<b>Total</b>	<b>2000</b>	<b>1674.444</b>	<b>83.722</b>

CSR Activities are being implemented with a result based approach. Good indicators are being maintained. Community is satisfied. Quantitative Indicators exhibit a healthy level at 7768 of 10000 scale. Qualitative indicators meet satisfaction of the beneficiaries in the grade of 75% and above.

Since the SA point weight 7768 is in band 7500-10000 it is termed as – Sustainably Excellent. This indicates that the current position has the potential to improve, however it has gained basic strength to deliver. More value addition strategies need to be implied with the core approach in time to come. There is an increase of about 10 % against social audit impact score of 2016-17.



**Overall Summary of Impact Score Matrix for CSR Activities**

Sl. No.	Description	Total Score	Score Obtained	% of Score
1	CSR Policy, Process & Programme	4000	3054.5	76.4
2	CSR Activities Under Education Programme	2000	1595.0	79.6
3	CSR Activities Under Health, Hygiene and Sanitation Programme	2000	1444.4	72.2
4	CSR Activities Under Empowerment and Livelihood Programme	2000	1674.4	83.7
	<b>Grand Total</b>	<b>10000</b>	<b>7768.3</b>	<b>77.68</b>



**ANNEXURE 2.1**  
**CSR POLICY OF APL**  
**AUGUST, 2014**



## **ADANI POWER LIMITED**

### **CORPORATE SOCIAL RESPONSIBILITY (CSR) POLICY**

(Approved by the Board of Directors on 6<sup>th</sup> August, 2014)



## **A. Corporate Social Responsibility (CSR) – Philosophy:**

Adani Power Limited (APL) has always been committed to the cause of social service and has repeatedly channelized a part of its resources and activities, such that it positively affects the society socially, ethically and also environmentally. The Company has taken up various Corporate Social Responsibility (CSR) initiatives and enhanced value in the society.

Social and environmental responsibility has always been at the forefront of APL operating philosophy and as a result the Company consistently contributes to socially responsible activities. CSR at APL portrays the deep symbiotic relationship that the group enjoys with the communities it is engaged with. As a responsible corporate citizen, we try to contribute for social and environmental causes on a regular basis. We believe that to succeed, an organization must maintain highest standards of corporate behavior towards its employees, consumers and societies in which it operates. We are of the opinion that CSR underlines the objective of bringing about a difference and adding value in our stakeholders' lives.

With the advent of the Companies Act, 2013 constitution of a Corporate Social Responsibility Committee of the Board and formulation of a Corporate Social Responsibility Policy became a mandatory requirement. Therefore, the Company has formulated a robust CSR Policy which encompasses its philosophy and guides its sustained efforts for undertaking and supporting socially useful programs for the welfare & sustainable development of the society.

## **B. CSR Vision:**

Improve Quality of Life for All our Communities through Integrated and Sustainable Development.

## **C. CSR and Group Values:**

- |                   |   |   |
|-------------------|---|---|
| <b>Courage</b>    | : | To embrace new and Innovative ideas for betterment of people                    |
| <b>Trust</b>      | : | Believe in all stakeholders   |
| <b>Commitment</b> | : | Stand by our promises and adhere to high standard of work in all CSR activities |

#### **D. CSR and Group Culture: (PRIDE)**

<b>Passion</b>	:	Performing with enthusiasm and Energy and true passion
<b>Result</b>	:	Consistently achieve goals, Resourcefulness which brings desired results
<b>Integration</b>	:	Working across functions and businesses to create Synergy with integrity
<b>Dedication</b>	:	Working with commitment in the pursuit of our aim
<b>Entrepreneurship</b>	:	Seizing opportunity with initiative and ownership. Evolving replicable models

#### **E. Constitution of CSR Committee:**

Keeping in line with section 135 of the Companies Act, 2013 and the rules thereunder (hereinafter referred to as 'the Act'), the Board of Directors of the Company shall form a Corporate Social Responsibility Committee (hereinafter referred to as the 'CSR Committee') headed by an independent director, to *inter alia*, carry out the following functions:

- a) To formulate and recommend to the Board, a Corporate Social Responsibility Policy which shall indicate the activities to be undertaken by the Company as specified in Schedule VII of the Companies Act, 2013 and rules made thereunder;
- b) To recommend the amount of expenditure to be incurred on the CSR activities.
- c) To monitor the implementation of framework of CSR Policy.
- d) To carry out any other function as mandated by the Board from time to time and / or enforced by any statutory notification, amendment or modification as may be applicable or as may be necessary or appropriate for performance of its duties.

#### **F. Definitions:**

In this Policy, unless the context otherwise requires:

1. "Act" shall mean the Companies Act 2013 and the rules made thereunder, including any modifications, amendments or re-enactment thereof.

2. "Adani Foundation" means a society formed and registered under the Societies Registration Act, 1860 and includes a society jointly formed and registered by the Company with all or any of its Group Companies.
3. "Agency" (or Agencies) means any Section 8 Company or a registered trust/ society/NGO/ institution, performing social services for the benefit of the society and excluding a registered trust/society/ NGO/institution/ Section 8 Company which is formed by the Company or its holding or subsidiary company/companies.
4. "Approved Budget" shall mean the total budget as approved by the Board of the Company upon the recommendation of the CSR Committee, which is to be utilized for CSR Projects.
5. "Board" shall mean the Board of Directors of the Company.
6. "Company" shall mean Adani Power Limited and wherever the context requires, shall signify the Company acting through its Board.
7. "CSR Annual Plan" shall mean the annual plan detailing the CSR expenditure for the year.
8. "CSR Committee" shall mean the Corporate Social Responsibility Committee constituted by the Board of the Company in accordance with the Act, consisting of three or more directors, out of which at least one director shall be an independent director.
9. "CSR Expenditure" means all CSR Expenditure of the Company as approved by the Board upon recommendation of the CSR Committee, including the following:
  - i. contribution to CSR Projects which shall be implemented and/or executed by the Company;
  - ii. contribution to CSR Projects (including for corpus as required) which shall be implemented and/or executed by Adani Foundation and associated organizations such as Adani Research and Education Foundation, Adani Skill Development Centre, etc.
  - iii. Any other contributions covered under Schedule VII to the Act.

Contribution of any amount directly or indirectly to any political party under section 182 of the Act, shall not be considered as CSR Expenditure.

10. "CSR Officer" shall mean the whole time person engaged by the Company for activities envisaged in the CSR Policy; having due comprehension, understanding, drive and passion for such activities and designated as such.
11. "CSR Policy" shall mean the present Corporate Social Responsibility Policy of the Company, which covers the activities to be undertaken by the Company as specified in Schedule VII to the Act and the CSR Expenditure thereon.
12. "CSR Projects" or "Projects" means Corporate Social Responsibility projects/activities/ programs/ initiatives instituted in India, either new or ongoing, and include but not limited to those undertaken by the Board in pursuance of recommendations of the CSR Committee as per the declared CSR Policy of the Company.

Projects/activities/ programs/ initiatives undertaken in pursuance of normal course of business of the Company and projects which benefit only the employees of the Company and their families shall not be considered as CSR Projects.

13. "Financial Year" shall mean the period beginning from 1st April of every year to 31st March of the succeeding year.
14. "Group Companies" means holding, subsidiaries and associates of the Company.
15. "Net profit" shall mean the net profit as per the Act and Rules based on which the specific percentage for CSR Expenditure has to be calculated.
16. "Rules" shall mean the Companies (Corporate Social Responsibility) Rules 2014, including any re-enactment, modifications or amendments thereof.
17. "Thrust Areas" shall have the meaning as ascribed to them as per provision G of the Policy.
18. "Trust" means a Trust created and registered under the India Trust Act, 1882 by the Company and includes a Trust jointly created and registered by the Company with all or any of its Group Companies.

Words and expressions used and not defined in the Policy shall have the same meanings respectively assigned to them in the Act and/or Rules.

## G. Thrust Areas:

While the Company is eligible to undertake any suitable/rightful activity as specified in Schedule VII to the Act, however, at present, it proposes to undertake the relevant activities on priority basis in the following four Thrust Areas:

- Primary Education
- Community Health
- Sustainable Livelihood Development
- Rural Infrastructure Development

## H. CSR Objectives and Projects:

Adani Group will carry out/ get implemented its CSR activities projects through Adani Foundation and associated organizations such as Adani Research and Education Foundation, Adani Skill Development Centre, etc.

CSR Projects will be taken up in following core sectors covering influenced villages near business sites and some projects having state wide and nationwide coverage:

### (i) Primary Education:

#### **"Ignited Minds for a brighter future"**

- Establish and run our own schools
- Support to the Government anganwadis and schools
- Joining hands with the Government through Public Private Partnership (PPP)

All efforts geared towards improving Quality of Education.

### (ii) Primary Health Care:

#### **"Ignited Minds for Healthy Life"**

- Rural Clinics
- Mobile Health Care Units
- Joining hands with the Government through Public Private Partnership (PPP)
- Innovative and need based projects such as Anaemia Prevention Program, Health Card to Senior Citizens, etc.
- Medical Education

All efforts will be geared towards Preventive and Primary Health Care.

**(iii) Sustainable Livelihood Developments:**

**“Ignited Minds for an Empowered Life”**

- Support to Fisher Folk community for livelihood enhancement
- Empowering Women for better Livelihood
- Improving Agriculture and Animal Husbandry
- Optimising Natural Resource Utilization in Rural areas and conservation of natural resources
- Encouraging Vocational Skill Development and Entrepreneurial Initiative especially among women, children, elderly and differently abled

All efforts will be geared towards enhancing Socio-Economic Stature.

**(iv) Rural Infrastructure Development:**

**“Ignited Minds for better Living”**

Infrastructure related to

- Water conservation and Recharge
- Drinking Water availability
- Upgrading Infrastructure for Education
- Upgrading Infrastructure for primary Health and Hygiene Promotion
- Community Utility Infrastructure

All projects will be geared towards enhancing Rural Civic Amenities.

**(v) Rural Sports and Sports Training:**

**“Ignited Minds for Disciplined Life”**

- Training in promotion of Rural Sports
- Creating or upgrading rural sports grounds
- Encouraging sports activities amongst rural youth

All projects will be geared towards promoting Rural Sports.

**I. Identification of CSR Projects:**

1. CSR Projects need to be identified and planned for approval of the CSR Committee, in particular in Thrust Areas, with estimated expenditure and phase wise implementation schedules.
2. The Company shall ensure that in identifying its CSR Projects, preference shall be given to the local area and areas around which the Company (including its Units) operates. However, this shall not bar the Company from pursuing its CSR objects in other areas.

3. As a cardinal principle, the CSR Projects in Thrust Areas shall be identified on the basis of a detailed assessment survey.
4. The CSR Officer may engage external professionals/firms/agencies if required for the purpose of identification of CSR Projects.

## **J. Implementation of CSR Projects:**

The Company shall implement the identified CSR Projects by the following means:

### **I. Direct Method**

1. The Company may itself implement the identified CSR Projects presently within the scope and ambit of the Thrust Areas as defined in the Policy;
2. The Company may also implement the identified Projects presently through its Foundation or Society which is involved in CSR activities, within the scope and ambit of the Thrust Areas as defined in the Policy.
3. The CSR Officer may engage external professionals/firms/agencies if required, for the purpose of implementation of its CSR Projects.
4. The Company may collaborate with other companies, including its Group Companies if required, for fulfilling its CSR objects through the Direct Method, provided that the CSR Committees of respective companies are in a position to monitor separately such CSR Projects.

### **II. Indirect Method**

1. The Company may implement the identified CSR Projects through Agencies, subject to the condition that:
  - The activities pursued by the Agency are covered within the scope and ambit of Schedule VII to the Act provided
    - The Agency has an established track record of at least three years in undertaking similar programs or projects, and
    - The Company has specified the Project to be undertaken through the Agency which shall preferably be in Thrust Areas, the modalities of utilization of funds on such Projects and the monitoring and reporting mechanism which shall be at least once in three months.

2. The Company may collaborate with other companies, including its holding and subsidiary Companies and Group Companies if required, for fulfilling its CSR objects through the Indirect Method provided that the CSR Committees of respective companies are in a position to monitor separately such Projects.

#### **K. Monitoring Mechanism:**

There will be a review and monitoring committee comprised of Business Site Head, Head Operations, Volunteer Employee and Adani Foundation representative which will meet every quarter. This committee will report to the board through CSR Committee of the business.

Internal Audit and review as well as regular capacity building at all levels of execution/implementing partners and monitoring/review committees will be done on regular basis.

#### **L. Fund allocation and Others:**

##### **A. Fund allocation**

1. The Company, in every Financial Year, shall endeavor to spend such feasible amount as CSR Expenditure, which shall not be restricted by the statutory limit of a specified percentage of its average net profits of the immediately preceding three Financial Years. However, the aforementioned CSR Expenditure in any Financial Year shall be at least 2% of Company's average Net profits for the three immediately preceding Financial Years.
2. The CSR Committee shall prepare a CSR Annual Plan for the above which shall include:
  - a. Identified CSR Projects
  - b. CSR expenditure
  - c. Implementation Schedules
3. Total expenditure in the CSR Annual Plan shall be approved by the Board upon recommendation by the CSR Committee
4. In case the Company fails to spend the statutory minimum limit of 2% of Company's average net profits of the immediately preceding three years, in any given financial year, the Board shall specify the reasons for the same in its report in terms of clause (o) of sub-section (3) of section 134 of the Act.



## **B. Others**

1. The CSR Committee shall ensure that major portion of the CSR expenditure in the Annual Plan shall be for the Projects as per CSR objectives. However, there shall not be any preference given to any particular projects for budgetary allocation and it shall be made purely as per the identified CSR Projects on need basis.
2. The Chairman and the Managing Director of the Company are authorized severally to decide on Projects to be implemented within the allocation as per the Annual Plan.
3. Any surplus arising out of the CSR Projects shall not form a part of the business profit of the Company.
4. The Company may build CSR capacities of their own personnel or personnel of Adani Foundation or its Trust or Society, as well as those of the Agencies through institutions with established track records of at least three Financial Years but such expenditure on capacity building shall not exceed 5% of the Approved Budget of the Company in one Financial Year.

## **M. Duties and responsibilities:**

### **I. Board of Directors**

The Board shall include in its Report the annual report on CSR Projects as per the format provided in the Annexure to the Rules.

### **II. CSR Committee**

- i. The CSR Committee shall monitor the implementation of the CSR Policy and CSR Plan. For this purpose, the CSR Committee shall meet atleast twice a year.
- ii. In discharge of CSR functions of the Company, the CSR Committee shall be directly responsible to the Board for any act that may be required to be done by the CSR Committee in furtherance of its statutory obligations, or as required by the Board.
- iii. The CSR Committee shall place before the Board the draft annual report as per the format in annexure to the Rules in Board meeting in April/May of the following year for Board review and finalization.

- iv. The CSR Committee shall place before the Board in April/May every year a responsibility statement of the CSR Committee that the implementation and monitoring of CSR Policy, is in compliance with CSR objectives and Policy of the company for inclusion in the Board's Report.
- v. The CSR Committee shall ensure that the CSR Policy and finalized Annual Plan is displayed on the Company's website.

**N. Review Periodicity and Amendment:**

- i. CSR Plan may be revised/modified/amended by the CSR Committee at such intervals as it may deem fit.
- ii. The CSR Committee shall review the Policy every two years unless such revision is necessitated earlier.

\*\*\*\*\*

## ANNEXURE 3.1

### SAMPLE QUESTIONNAIRE & FORMATS FOR SOCIAL AUDIT & SOCIAL IMPACT EVALUATION

# SOCIAL IMPACT EVALUATION STUDY

## Questionnaire for Evaluation of CSR Activities

Schedule No. .... Date: .....

Name of Village: ..... Name of GP: .....

Name of Block: ..... District: .....

Location of Village (wrt Project): Direction: ..... Distance (km): .....  
Longitude: N ..... Latitude: E .....

Distance from Gram Panchayat Office (in km): \_\_\_\_ at .....

Distance from Block HQ (in km): \_\_\_\_ at .....

Distance from District HQ (in km): \_\_\_\_ at .....

Distance from All Weather (Metalled) Road (in km): \_\_\_\_ at .....

Distance from Fair Weather (Laterite/Brick/Stone) Road (in km): \_\_\_\_ at .....

Distance from Railway Station (in km): \_\_\_\_ at .....

### 1.0 GENERAL DESCRIPTION

Total No. of Households: \_\_\_\_ Total Population: \_\_\_\_ (as per 2011 census)

Number of BPL families: \_\_\_\_ Number of MNREGA card holders: \_\_\_\_

Person with VI Card: \_\_\_\_ Total no. of Houses: \_\_\_\_

Type of Houses (%):

Thatched \_\_\_\_\_ Kutcha \_\_\_\_\_ Kutcha-Pucca Mixed \_\_\_\_\_ Pucca \_\_\_\_\_

Caste (%): General \_\_\_\_\_, SC \_\_\_\_\_ ST \_\_\_\_\_ OBC \_\_\_\_\_

Religion (%): Hindu \_\_\_\_\_, Muslim \_\_\_\_\_ Christian \_\_\_\_\_ Others \_\_\_\_\_ (specify)

Occupation (%):

Cultivator \_\_\_\_\_, Agricultural/Non-agricultural Labour \_\_\_\_\_, Govt. Service \_\_\_\_\_,

Private Service \_\_\_\_\_, Business \_\_\_\_\_, Others \_\_\_\_\_

## 2.0 BASIC AMENITIES & INFRASTRUCTURAL FACILITIES

Status of Improvement in Availability of Basic Amenities & Infrastructural Facilities in the Villages:

Type of Amenities	Yes/ No	If no, nearest distance (km) and Place	Type of Improvement (in last three years)	Authority Responsible for Change with Year
Village Connected by Metalled Road				
Railway Station				
Bus Service				
Primary School (I to IV)				
Secondary School (V-X)				
Higher Secondary School (XI-XII)				
Degree College				
Anganwadi Centre (ICDS)				
Tap Water Supply for Drinking				
Electricity				
Street Lights				
Primary Health Centre/Sub-Centre				
Private doctor				
Medicine Shop				
Pathological Centre				
Veterinary Centre				
Private Veterinary Doctor				
Ration Shop (PDS)				
Vocational Training Centre				
Post Office				
Commercial Bank				
Agricultural Co-operative Society				
Seeds & Fertilizer Distribution Centre/Kishan Help Centre				
Community Hall				
Public Library				
Yoga/Bayam Centre				

## 2.1 EDUCATIONAL FACILITIES

Sl. No.	Particulars	Number	No. of students	No. of teachers	If No, distance in Km	Place
1	Primary School (I – IV)					
2	Secondary School (V-X)					
3	Higher Secondary (XI-XII)					
4	Degree College					
5	ICDS Centre					
6	Others (specify)					

**Name of Primary School:** \_\_\_\_\_

Village: ..... Type of School: Govt/Private

Name of Head Master: ..... Contact No.: .....

Land Area of School: ..... Ownership: Own/Rented

Type of Building: Kutcha / Pucca / Kutcha-Pucca Mixed, Boundary Wall: Yes / No

No. of Class Room \_\_\_\_\_ Size: \_\_\_\_\_

No. of Office Room \_\_\_\_\_ Size: \_\_\_\_\_

Kitchen for Midday Meal: Yes / No Size: \_\_\_\_\_

Toilet: Yes/No If Yes, No. of Toilets: Boys \_\_\_\_\_, Girls \_\_\_\_\_, Total \_\_\_\_\_

Water Supply in Toilet: Yes/No

Play Ground: Yes / No Size: \_\_\_\_\_ Electricity: Yes / No

Source of Drinking Water Within School: Yes/No, Type of Source: Well/HP

Water Supply System: Yes/No, If Yes, Detail: Pump/Reservoir/Filter

Quality of Drinking Water: Poor/Average/Good

If Poor, Type of Problem: Odour/Turbid/Hard/Saline/High Iron/Other .....

Treatment of DW: Yes/No, If Yes, Type of Treatment: .....

Detail of Teachers:

Type	2016-17			2017-18			2018-19		
	M	F	T	M	F	T	M	F	T
Permanent									
Contractual									
<b>Grand Total</b>									

Year Wise Enrolment of Students:

Class	Category	2016-17			2017-18			2018-19		
		M	F	T	M	F	T	M	F	T
I										
II										
III										
IV										

REL Assistance Provided: Yes/No, If Yes, Impact of Activities:

Sl. No.	Detail of Activities	Year	No. of Beneficiaries	Social Impact

Assessment of Future Needs:

Priority	Activities	Expected Beneficiaries
1		
2		
3		
4		
5		

Name of Secondary/HS School: \_\_\_\_\_

Village: ..... Type of School: Govt/Private

Name of Head Master: ..... Contact No.: .....

Land Area of School: ..... Ownership: Own/Rented

Type of Building: Kutcha / Pucca / Kutcha-Pucca Mixed, Boundary Wall: Yes / No

No. of Class Room \_\_\_\_\_ Size: \_\_\_\_\_

No. of Office Room \_\_\_\_\_ Size: \_\_\_\_\_

Kitchen for Midday Meal: Yes / No Size: \_\_\_\_\_

Toilet: Yes/No If Yes, No. of Toilets: Boys \_\_\_\_\_, Girls \_\_\_\_\_, Total \_\_\_\_\_

Water Supply in Toilet: Yes/No

Play Ground: Yes / No Size: \_\_\_\_\_ Electricity: Yes / No

Source of Drinking Water Within School: Yes/No, Type of Source: Well/HP

Water Supply System: Yes/No, If Yes, Detail: Pump/Reservoir/Filter

Quality of Drinking Water: Poor/Average/Good

If Poor, Type of Problem: Odour/Turbid/Hard/Saline/High Iron/Other.....

Treatment of DW: Yes/No, If Yes, Type of Treatment: .....

Detail of Teachers:

Type	2016-17			2017-18			2018-19		
	M	F	T	M	F	T	M	F	T
Permanent									
Contractual									
<b>Grand Total</b>									

Year Wise Enrolment of Students:

Class	Category	2016-17			2017-18			2018-19		
		M	F	T	M	F	T	M	F	T
V										
VI										
VII										
VIII										
IX										
X										
XI										
XII										



Computer Facility: Yes/No If Yes, Detail: -----

Laboratory Facility: Yes/No If Yes, Detail: -----

Short Term/Vocational Courses: Yes/No If Yes, Detail: -----

-----

REL Assistance Provided: Yes/No, If Yes, Impact of Activities:

Sl. No.	Detail of Activities	Year	No. of Beneficiaries	Social Impact

Assessment of Future Needs:

Priority	Activities	Expected Beneficiaries
1		
2		
3		
4		
5		

## 2.2 DRINKING WATER FACILITIES

Main Source of Drinking Water: Surface water/Ground water

If surface water, river/lake    If ground water, well/HP

Tap Water supply: Yes/No    If Yes, Source of Tap Water Supply: River/Tubewell

No. of Standpost: \_\_\_\_\_    No. of HH having Tap Connection: \_\_\_\_\_

Quality of Drinking Water: Poor/Average/Good

If Poor, Type of Problem: Odour/Turbid/Hard/Saline/High Iron/Other.....

Treatment of DW: Yes/No, If Yes, Type of Treatment: .....

No of Tube Well: \_\_\_\_ (Functioning \_\_\_\_)    No of Well: \_\_\_\_ (Functioning \_\_\_\_)

No of Ponds \_\_\_\_ (seasonal \_\_\_\_\_ perennial \_\_\_\_\_)

If no sources of drinking water present in the village,

Nearest Source of Drinking Water: \_\_\_\_\_ Distance from Village (km): \_\_\_\_\_

REL Assistance Provided: Yes/No, If Yes, Impact of Activities:

Sl. No.	Detail of Activities	Year	No. of Beneficiaries	Social Impact

Assessment of Future Needs:

Priority	Activities	Expected Beneficiaries
1		
2		
3		
4		
5		

### 2.3 ROAD NETWORK

Village Connected by Metalled Road: Yes/No,

If No, Distance (km) of Metalled Road from Village: \_\_\_\_\_

Type of Village Access Road: Kutcha/Morrum/Brick

Length (m) of Road: Kutcha \_\_\_\_\_, Morum \_\_\_\_\_, Brick \_\_\_\_\_

Existing Road within the Village:

Kutcha \_\_\_\_\_ m, Morum \_\_\_\_\_ m, Brick \_\_\_\_\_ m, Concrete \_\_\_\_\_ m, Metalled \_\_\_\_\_ m

REL Assistance Provided: Yes/No, If Yes, Impact of Activities:

Sl. No.	Detail of Activities	Year	No. of Beneficiaries	Social Impact

Assessment of Future Needs:

Priority	Activities	Expected Beneficiaries
1		
2		
3		
4		
5		

## 2.4 DRAINAGE SYSTEM

Village having Drainage System: Yes/No, if Yes, Length of Drain \_\_\_\_\_ m

Toilet Available in Houses: Yes/No            If Yes, No. of Houses having Toilet \_\_\_\_\_

REL Assistance Provided: Yes/No, If Yes, Impact of Activities:

Sl. No.	Detail of Activities	Year	No. of Beneficiaries	Social Impact

Assessment of Future Needs:

Priority	Activities	Expected Beneficiaries
1		
2		
3		
4		
5		

## 2.5 HEALTH FACILITY

Sl. No.	Particulars	Number	If No, Distance in km	Place
1	Health Sub-Centre			
2	Primary Health Centre			
3	Gramin/Community Hospital			
4	Dispensary: a) Allopathic b) Homeopathic/Ayurvedic			
5	Private Medical Practitioners: a) Allopathic b) Ayurvedic/Homeopathic			
6	Veterinary Centre/Dispensary			
7	Pharmacy/Medicine Shop			
8	Diagnostic/Pathological Center			

Detail of Health Facilities:

Name of Health Centre: .....

Name of In-Charge: ..... Contact No.: .....

Facilities	Yes/No	Detail
Doctors		
Nurses		
Compounders		
Other Supporting Staffs		
Beds		
OT		
Delivery Room		
Ambulance		
Drinking water		
Pathological Testing Facilities		
X-Ray Facilities		
Vaccination Facilities		

Birth, Mortality & Morbidity Rate:

Type of Mortality Rate	2016-17	2017-18	2018-19
Maternal Mortality			
Infant (Child upto 1 year age) Mortality			
Under 5 years Mortality			
No. of Persons Died			
No. of Persons Born			

Status of Major Diseases:

Type of Major Diseases	2016-17	2017-18	2018-19
TB			
Malaria			
Measles			
Cancer			
Others			

Status of Disabled Persons:

Type of Disability	No.	Detail
Deaf & Dumb		
Blind		
Polio		
Mentally Retarded		
Others		

REL Assistance Provided: Yes/No, If Yes, Impact of Activities:

Sl. No.	Detail of Activities	Year	No. of Beneficiaries	Social Impact

Assessment of Future Needs:

Priority	Activities	Expected Beneficiaries
1		
2		
3		
4		
5		

## 2.6 AGRICULTURAL PATTERN

No. of Cultivators: Big farmers (>2.47 acre): \_\_\_\_ Small farmers (<2.47 acre): \_\_\_\_

Marginal farmers (<1.24 acre): \_\_\_\_ Total: \_\_\_\_

No. of agricultural labourers: \_\_\_\_ No. of non-agricultural labourers: \_\_\_\_

### Important Crops Grown in the Village (i.e. Area under Crops)

Sl No	Particulars	Irrigated Area (in Acres)	Non-irrigated Area (in Acres)	Total Area (in Acres)	Crop Yield (Quintal/acre)
1	Paddy				
2	Wheat				
3	Barley/Maize				
4	Jawar/Bajara				
5	Arhar				
6	Masoor/Moong				
7	Gram/Peas				
8	Oil seeds – Mustard/ Linseed/ Soyabean				
9	Sugarcane				
10	Potato/Onion				
11	Cotton				
12	Others (specify)				

### Modern Agricultural Implements:

Sl No	Particulars	Number	Sl No	Particulars	Number
1	Tractor		5	Harvester	
2	Power Tiller		6	Thresher	
3	Pumps Set		7	Rota vater	
4	Sprayer/Puddlers		8	Plough	

Prime Sources of Irrigation Facilities \_\_\_\_\_

REL Assistance Provided: Yes/No, If Yes, Impact of Activities:

Sl. No.	Detail of Activities	Year	No. of Beneficiaries	Social Impact

Assessment of Future Needs:

Priority	Activities	Expected Beneficiaries
1		
2		
3		
4		
5		

## 2.7 LIVESTOCK

Sl No	Category	Number	Sl No	Category	Number
1	Drought animals		5	Pigs	
2	Milch animals		6	Poultry birds	
3	Young stocks		7	Others (specify):	
4	Sheep/Goats				

Veterinary Center Within the Village: Yes/No

If No, Distance (km) of Nearest Centre: \_\_\_\_\_ Name of Place: \_\_\_\_\_

REL Assistance Provided: Yes/No, If Yes, Impact of Activities:

Sl. No.	Detail of Activities	Year	No. of Beneficiaries	Social Impact

Assessment of Future Needs:

Priority	Activities	Expected Beneficiaries
1		
2		
3		
4		
5		



## 2.8 ELECTRICAL FACILITY

Electricity available in the Village: Yes/No

If the village is not electrified, reason: \_\_\_\_\_

If Yes,

Sl No	Particulars	No of households using electricity	Rate per unit
1	Domestic Light and Fan		
2	Street Lighting (no. of poles and points)		
3	Irrigation Purposes		
4	Commercial Purposes		
5	Industrial Purposes		

Is solar/wind/biomass, energy is being used in the village? Yes/No

If Yes, Mention the detail: \_\_\_\_\_

REL Assistance Provided: Yes/No, If Yes, Impact of Activities:

Sl. No.	Detail of Activities	Year	No. of Beneficiaries	Social Impact

Assessment of Future Needs:

Priority	Activities	Expected Beneficiaries
1		
2		
3		
4		
5		

### 3.0 VOCATIONAL TRAINING & COMMUNITY ENGAGEMENT

Vocational Training Institute: Yes/No

If Yes, Name of Institute .....

Type of Trade: ..... Duration: .....

Trade wise Eligibility: ..... Seats: .....

No. of Person taken Vocational Training in the village \_\_\_\_\_

Training given by \_\_\_\_\_

Type of Vocational Training \_\_\_\_\_

Post Vocational Training Involvement: Yes / No

If Yes, No. of Persons involved in Post-Vocational Training \_\_\_\_\_

REL Assistance Provided: Yes/No, If Yes, Impact of Activities:

Sl. No.	Detail of Activities	Year	No. of Beneficiaries	Social Impact

Assessment of Future Needs:

Priority	Activities	Expected Beneficiaries
1		
2		
3		
4		
5		



#### 4.0 PARTICULARS OF INDUSTRIES

Does the village have any industry? Yes/No If Yes, Mention detail.

Sl. No.	Particulars	Number	Name & Production Capacity
1	Lime & Brick Kilns		
2	Food Processing Industry		
3	Chemical based industry		
4	Engineering based industry		
5	Textile based industry		
6	Others (specify)		

REL Assistance Provided: Yes/No, If Yes, Impact of Activities:

Sl. No.	Detail of Activities	Year	No. of Beneficiaries	Social Impact

Assessment of Future Needs:

Priority	Activities	Expected Beneficiaries
1		
2		
3		
4		
5		

## 5.0 SOCIO-CULTURAL PROGRAMME

Detail of Tournament Being Organized: \_\_\_\_\_

Detail of Cultural Programme Being Organized: \_\_\_\_\_

Awareness Programme (AIDS/Alcoholism/Drugs, etc.): \_\_\_\_\_

REL Assistance Provided: Yes/No, If Yes, Impact of Activities:

Sl. No.	Detail of Activities	Year	No. of Beneficiaries	Social Impact

Assessment of Future Needs:

Priority	Activities	Expected Beneficiaries
1		
2		
3		
4		
5		

## 6.0 RELIGIOUS STRUCTURE

No. of Religious Structure: \_\_\_\_\_ Detail \_\_\_\_\_

REL Assistance Provided: Yes/No, If Yes, Impact of Activities:

Sl. No.	Detail of Activities	Year	No. of Beneficiaries	Social Impact

Assessment of Future Needs:

Priority	Activities	Expected Beneficiaries
1		
2		
3		
4		
5		

**7.0 SUMMARY OF OVERALL SOCIAL IMPACT EVALUATION**

Evaluation of Changes in 1-5 Scale during last three years:

Deteriorated - 1, Same - 2, Slightly Improved - 3, Moderately Improved - 4, Highly Improved - 5

Rating for overall impact evaluation for CSR Activities Undertaken in the village

Poor - 1, Average - 2, Good - 3, Very Good - 4, Excellent - 5.

Indicators	Evaluation of Changes in Last three years	Overall Impact Evaluation of CSR Activities Undertaken
Status of Village Access Road		
Status of Internal Village Road		
Availability and Quality of Drinking Water		
Availability of Educational Facilities		
Status of Availability of Health Facilities		
Status of Availability of Drainage Facilities		
Status of Availability of Toilets		
Availability of Vocational Training Facilities		
Status of Availability of Irrigation Facilities and Modern Equipments (Tractor, Harvester etc.) for Agricultural Activities		
Status of Availability of Veterinary Services/ Facilities		
Status of Availability of Sports Facilities		

**8.0 FIVE PRIORITY NEEDS FOR THE VILLAGE**

- 1. \_\_\_\_\_
- 2. \_\_\_\_\_
- 3. \_\_\_\_\_
- 4. \_\_\_\_\_
- 5. \_\_\_\_\_

**9.0 OVERALL SOCIAL IMPACT IN THE VILLAGE DUE TO SETTING UP OF TPP & ITS CSR ACTIVITIES BEING UNDERTAKEN**

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Signature of Investigator with Date











## 2.0 Impact Evaluation Indicators

### 2.1 Quantitative Indicator for Evaluation of Impact

Broad Area & Activities	Indicators	Data from Primary Sources (School Authorities PHC/Hospitals Etc.)		Data from Secondary Sources (From Beneficiaries)	
		2018-19	2019-20	2018-19	2019-20
Education	<p>1. Net enrolment ratio in schools</p> <ul style="list-style-type: none"> <li>- Girls</li> <li>- Boys</li> <li>- Total</li> </ul> <p>2. No. of pupils starting grade 1 who reach grade 5</p> <ul style="list-style-type: none"> <li>- Girls</li> <li>- Boys</li> <li>- Total</li> </ul> <p>3. No. of pupils enrolled in</p> <ul style="list-style-type: none"> <li>- Class I</li> <li>- Class II</li> <li>- Class III</li> <li>- Class IV</li> <li>- Class V</li> </ul> <p>3. Overall literacy rate (15-24 yrs age group)</p> <ul style="list-style-type: none"> <li>- Male</li> <li>- Female</li> <li>- Total</li> </ul>				
Health	<p>1. Infant Mortality Rate (IMR)</p> <p>2. Maternal Mortality Rate (MMR)</p> <p>3. Under 5 Mortality Rate (U5MR)</p> <p>4. No. of cases of :-</p> <ul style="list-style-type: none"> <li>- Measles</li> <li>- TB</li> <li>- Polio</li> <li>- Malaria</li> </ul> <p>5. Birth rate</p> <p>6. Death rate</p>				

Disabilities	<ol style="list-style-type: none"> <li>1. No. of people benefited from distribution of aids and appliances.</li> <li>2. No. of disable people enrolled in schools (inclusive education)</li> <li>3. No. of disabled people engaged in self employment/ income generation activities after attending vocational training courses.</li> <li>4. No. of disabled people undergone surgeries etc.</li> </ol>				
Vocational Training.	<ol style="list-style-type: none"> <li>1. No. of people attending vocational training program.</li> <li>2. No. of people employed after attending vocational training program.</li> <li>3. No. of people taking up income generation activities after attending vocational training programs.</li> </ol>				

**Social Auditor's Overall Observations**

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## 2.2 Qualitative Indicators of Evaluation of Impact (1 to 5 scale)

Evaluation of Changes in 1-5 Scale during last three years: Deteriorated – 1, Same – 2, Slightly Improved – 3, Moderately Improved – 4, Highly Improved – 5  
 Overall impact evaluation for CSR Activities Undertaken in the village under broad areas as Poor – 1, Average – 2, Good – 3, Very Good - 4, Excellent – 5.

Broad Area	Indicators	Evaluation of Changes in Last three years	Overall Impact Evaluation of CSR Activities Undertaken
Infrastructure	Availability of -Roads -Community buildings -Safe drinking water facilities -Sanitation facilities		
Education	Availability of -Adequate classroom -Safe drinking water -Sanitation facilities -Table, desk, etc. -Playground Changes in educational facilities and ambience during the last three years		
Health	Changes in health facilities and ambience during the last three years		
Awareness	Level of awareness generated towards -Hygiene & sanitation -Social issues etc.		
Livestock	Mortality rate Health status		
Agricultural Pattern	Changes in agricultural pattern during the last three years		
Vocational Training	Changes in vocational training facilities during the last three years		
Socio-Cultural Improvement	Level of participation of people including children -in sports -in cultural activities.  The changes in socio-cultural pattern of communities due to project interventions in different fields		

**3.0 Beneficiaries' Feedback**

Beneficiaries for each category of activities would be interviewed (For example: In education category respondents who have got benefited from different activities like English speaking, literacy classes, carrier counseling, scholarships etc would be interviewed):

Broad Area	Benef	Name	Age	Sex	Address	Occupation	Awareness about Program	Perception
Education	1.							
	2.							
	3.							
	4.							
Health	1.							
	2.							
	3.							
	4.							
Disabilities	1.							
	2.							
	3.							
	4.							
Vocational Training	1.							
	2.							
	3.							
	4.							
Infrastructure	1.							
	2.							
	3.							
	4.							
Sports	1.							
	2.							
	3.							
	4.							
Agriculture	1.							
	2.							
	3.							
	4.							
Livestock	1.							
	2.							
	3.							
	4.							

Signature of Social Auditor's with Date: .....

Ref. No. IISWBM(CU)/SIE /R&D

Date: ...../...../2020

To  
The Sarpanch/Up-Sarpanch/Member  
Gram Panchayat: ...../Village: .....  
Tehsil:.....  
District:.....

Sub: Social Audit & Social Impact Evaluation of CSR Activities of REL

Dear Sir,

The Indian Institute of Social Welfare and Business Management (IISWBM) is the first Management Institute in the country and has been continuing as a premier Institute for Management Education. IISWBM is conducting PG courses in Management of the **University of Calcutta**. These courses form an integral part of the Indian Government's efforts to promote professional management in industries for exclusive growth of country.

We would like to have meeting with you and other village representatives on ....., 2020 at ..... hrs at your office/village to discuss the improvement in the basic amenities and infrastructural facilities viz., road and communication, education, drinking water, electricity, health and sanitation, training, etc. along with demographic profile of village(s) under your Gram Panchayat/village to assess the changes in quality of life of local people due to setting up and operation Thermal Power Plant and REL's CSR activities being undertaken in your vicinity. The findings of these studies would be helpful in formulation of future social development plan (SDP) for the region.

Therefore, we look forward for your kind cooperation in arranging the meeting on said time and venue. We expect maximum dissemination and participation of your village people.

Thanking you,

Yours faithfully,

Professor (Dr.) K. M. Agrawal  
Dean & Project Coordinator

Signature of Sarpanch/Up-Sarpanch/  
Member with seal









# SOCIAL IMPACT EVALUATION

## Individual Beneficiary Evaluation Questionnaire

Schedule No.: .....

Village/Hamlet: .....

Date: .....

### Category of the Beneficiary:

1. PAPs			2. Agricultural Labour	3. Non-agricultural Labour	4. Other
A. Land oustee	B. Homestead oustee	C. Loss of other Immovable Property			

Does Beneficiary belong to vulnerable category?

(1) Yes

(2) No

If yes, Vulnerability status of beneficiary:

1. SC	2. ST	3. BPL	4. Physically challenged	5. Widow/Widower	6. Aged person (above 60 years)	7. Others .....
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### Section 1: Household Profile

1.1 Profile of the Head of Household: Name:		
Age :	Sex : M/F	EQ: Illiterate/Primary/Middle/Secondary/HS/Dipl/Graduate/PG/Others
Occupation :		Annual Income:

1.2 Religion:

1. Hindu	2. Muslim	3. Christian	4. Sikh	5. Buddhist	6. Others
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1.3 Caste:

1. General	2. SC	3. ST	4. OBC
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1.4 Mother tongue:

1. Hindi	2. Urdu	3. Others
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1.5 Type of family:

1. Nuclear	2. Joint	3. Extended
------------	----------	-------------

1.6 Size of the family:

Male		Female		Total	
------	--	--------	--	-------	--

1.7 Status of ownership of house:

1. Own	2. Rented	3. Others
--------	-----------	-----------

1.8 Size ..... and type of house:

1. Thatched Roof	2. Kuchha	3. Kuchha-Pacca Mixed	4. Pucca
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1.9 Availability of toilet:

1. Yes	2. No
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### Section 2: Possession of Assets

Sl. No	Item	Number	Sl. No	Item	Number
1	Agricultural Land area	..... acre	9	Mobile Phone	
2	T.V.		10	Refrigerator	
3	Cycle		11	Computer	
4	2/4 Wheeler		12	Washing Machine	
5	Stove		13	Sewing machine	
6	Cooking Gas		14	Tractor/Pump/Others	
7	Micro Oven/OTG		15	Milch/Drought Animal	
8	Bio Gas		16	Others (specify).....	

**Section 3: Profile of Beneficiary**

3.1 Name of the Beneficiary:		
Relationship with the Head of the HH:		
Type/Mode of Benefit:		
Benefit received in the Year :		
Age :	Sex : M/F	EQ: Illiterate/Primary/Middle/Secondary/HS/Dipl/Graduate/PG/Others
Occupation before receiving the Benefit:		Present occupation:
Income before receiving the Benefit:		Present income:
Amount of loan: Rs.		Source of loan: Bank/Money Lender/Others

- 3.2 Reason for accepting the benefit? .....
- 3.3 What type of benefit received from the programme: .....
- 3.4 Type of changes in your living condition after receiving benefit: .....
- 3.5 Intensity of economic change occurred after receiving benefit: .....
- 3.6 Type of changes occurred in social activities after receiving benefit: .....
- 3.7 What way this benefit has helped you individually? .....
- 3.8 What way this benefit has helped your whole family? .....
- 3.9 Any suggestion for improving the activity: .....

**Section 4: Evaluation of Individual Beneficiary Activities:**

Sl. No.	Variables	Level of Individual Beneficiary				
		No	Low	Moderate	High	Very High
1.	Willingness to obtain the benefit					
2.	Changes in living condition after receiving the benefits					
3.	Level of direct benefit received from the programme					
4.	Level of indirect benefit received from the programme					
5.	Impact of benefits on individual					
6.	Impact of benefits on whole family					
7.	Level of profits received from the benefits					
8.	Economic changes after receiving the benefits					
9.	Social changes after receiving the benefits					

Remarks-----  
 -----  
 -----  
 -----

Signature of Investigator with date: .....

# SOCIAL IMPACT EVALUATION

## Community Beneficiary Evaluation Questionnaire

Schedule No.: .....

Village/Hamlet: .....

Date: .....

**Section 1: Detail of CSR Activities:**

1.1 Category of CSR Activities:
1.2 Type & Size of CSR Activities:
1.3 Year of CSR Activities:
1.4 Location of CSR Activity:
1.4 Number of Beneficiary :

**Section 2: Detail of Benefits of CSR Activities:**

- 2.1 Is REL consulted with community before planning and implementation of CSR activity? Yes/No  
If yes mechanism of consultation.....
- 2.2 Reason for accepting the CSR Activity? .....
- 2.3 What type of benefit received from the programme: .....
- 2.4 Type of changes in living condition after receiving benefit: .....
- 2.5 Intensity of economic change occurred after receiving benefit: .....
- 2.6 Type of changes occurred in social activities after receiving benefit: .....
- 2.7 What way this benefit has helped community? .....
- 2.8 Any suggestion for improving the activity: .....

**Section 3: Evaluation of Specific Community Beneficiary Activities:**

Sl. No.	Variables	Level of Community Benefits				
		No	Low	Moderate	High	Very High
1.	Willingness to obtain the benefit					
2.	Changes in living condition after receiving the benefits					
3.	Level of direct benefit received from the programme					
4.	Level of indirect benefit received from the programme					
5.	Impact of benefits on community					
6.	Economic changes after receiving the benefits					
7.	Social changes after receiving the benefits					

**Section 4: Evaluation of Overall Community Beneficiary Activities:**

Sl. No.	Variables	Level of Improvement due to Community Development Programmes				
		No	Low	Moderate	High	Very High
1.	Availability of Roads					
2.	Availability of Safe Drinking Water					
3.	Rise in Groundwater Level					
4.	Strengthening of Sanitation Facility					
5.	Strengthening of Educational Infrastructure					
6.	Strengthening of Health Infrastructure					
7.	Strengthening of Community Building					

Signature of Investigator with date: .....



INDIAN INSTITUTE OF SOCIAL WELFARE & BUSINESS MANAGEMENT

(Constituents Institute of University of Calcutta)

College Square West, Kolkata – 700 073 (West Bengal)

# ANNEXURE -VII





क्र.सं./SL NO.:  
विक्रमो/वी.वाशी वाशी कॉम्प्लेक्स  
BRIT/BARC Vashi Complex  
सेक्टर-20, वाशी / Sec-20, Vashi,  
नवी मुंबई / Navi Mumbai-400 703  
www.britatom.gov.in

भारत सरकार / GOVERNMENT OF INDIA

परमाणु ऊर्जा विभाग / DEPARTMENT OF ATOMIC ENERGY

विकिरण एवं आइसोटोप प्रौद्योगिकी बोर्ड / BOARD OF RADIATION & ISOTOPE TECHNOLOGY

रेडियोसक्रियता परीक्षण प्रमाण-पत्र / RADIOACTIVITY TEST CERTIFICATE

RADIOANALYTICAL LABORATORY

Ref: BRIT/RAL/D-103-110/MISC/93-100/20-21

JULY 21, 2020

TO  
M/S. RAIPUR ENERGEN LTD.,  
ADANI CORPORATE HOUSE,  
SHANTIGRAM, S.G. HIGHWAY,  
AHMEDABAD 382 421, GUJARAT (INDIA).

This is regarding the "COAL AND ASH" sample submitted vide your letter ref. no. REL/ENV/19-20/137 dated 20.03.2020 for radioactivity analysis.

SL.NO.	SAMPLE MATERIAL	SAMPLE IDENTITY	DATE OF SAMPLING	TOTAL BULK QTY. FROM WHICH SAMPLE DRAWN
1.	COAL	2 X 685 MW COAL BASED TPP, RAIPUR ENERGEN LIMITED ( A SUBSIDIARY OF ADANI POWER), RAIKHEDA, RAIPUR	21.03.2020	20000 MT
2.	ASH	2 X 685 MW COAL BASED TPP, RAIPUR ENERGEN LIMITED ( A SUBSIDIARY OF ADANI POWER), RAIKHEDA, RAIPUR	21.03.2020	5000 MT

The samples were analysed for U-238, Th-232, Ra-226 and K-40 radioactivity content and the values obtained are as follows:

SAMPLE NO.	TYPE OF SAMPLE	U-238 Bq/Kg	Th-232 Bq/Kg	Ra-226 Bq/Kg	K-40 Bq/Kg
1.	COAL	30.8 ± 5.6	45.7 ± 8.0	30 ± 5.5	257.4 ± 15.4
2.	ASH	91.4 ± 9.6	119.3 ± 11.5	89 ± 9.6	349.6 ± 17.0

Date of receipt of sample: 11.06.2020

Date of completion of test: 02.07.2020

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

Note: (i) The report pertains to the given sample only. (ii) The sample will be retained in this laboratory for a period of one month from certificate date and thereafter it will be disposed off. (iii) This report shall not be reproduced except in full, without written approval of the laboratory (iv) The sampling is not done by this laboratory.

Checked by:

Authorized Signatory:  
  
21/07/2020

\*\*\*\*End of Report\*\*\*\*

एन. जयचंदन / N. Jayachandran  
प्रभारी अधिकारी / Officer-in-Charge  
रेडियोसक्रियता प्रयोगशाला / Radioanalytical Laboratory  
विकिरण एवं आइसोटोप प्रौद्योगिकी बोर्ड  
Board of Radiation & Isotope Technology,  
सेक्टर-20, वाशी मुंबई / Vashi Complex  
नवी मुंबई / Navi Mumbai - 400 703

# ANNEXURE -VIII



21<sup>st</sup> September 2020

Ref. No: REL/ENV/Sept./ 72

To,

**The Member Secretary,**  
Chhattisgarh Environment Conservation Board,  
Paryavas Bhavan, Sector - 19  
**Naya Raipur (C.G.)**

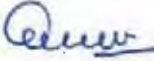
**Sub.:** Submission of Environmental Statement Report (Form-V) for our 1370 MW (2×685 MW) Coal Based Thermal Power Plant at Village – Raikheda, Block- Tilda, Distt.- Raipur, Chhattisgarh by M/s. Raipur Energen Limited.

Dear Sir,

This has reference to the above subject and General Conditions of the Environment Clearance Letter above cited issued by MoEF & CC, New Delhi. We are hereby submitting Environment Statement Report (Form-V) for the period of April'2019 to March'2020.

Thanking you,

Your's faithfully,  
**for Raipur Energen Ltd.**

  
[Rambhav Gattu] 21-09-2020  
Station Head

Encl.: As above

CC: The Regional Officer,  
Chhattisgarh Environment Conservation Board, Kabir Nagar, Raipur

**FORM - V**

**ENVIRONMENTAL STATEMENT FOR THE FINANCIAL YEAR ENDING  
31<sup>st</sup> MARCH 2020**

**PART – A**

- (i) Name and address of owner/occupier of the industry operation or process : Mr. Rambhav Gattu.  
Raipur Energen Limited  
(Formerly Known as GMR Chhattisgarh Energy Limited)  
Village: Raikheda, Block: Tilda  
Dist.: Raipur, Chhattisgarh  
PIN: 493225
- (ii) Industry categories : Large scale industry
- (iii) Production capacity : 2 X 685 MW
- (iv) Year of establishment : 2014
- (v) Date of last environmental statement submitted : 28.10.2019

**PART – B**

**WATER AND RAW MATERIAL CONSUMPTION**

**I. Water Consumption (M<sup>3</sup> / Day)**

Process	:	1242.9
Cooling	:	45901.2
Domestic	:	62.7

SN	Name of product	Process water consumption per unit of product output.
1	Electricity	During the current financial Year 2019-20
		0.058 m3/MWh

## II. Raw Material Consumption

SN.	Name of raw material	Name of product	Consumption of raw material per unit of output	
			During the Previous financial Year 2018-19	During the current financial Year 2019-20
1	Coal	Electricity	0.59 MT/MWh	0.67 MT/MWh

### PART – C

#### **POLLUTION DISCHARGED TO ENVIRONMENT/ UNIT OF OUTPUT** (Parameter as specified in the consent issued)

SN	Pollutants	Quantity of pollutants discharged (Ton/day)	Concentrations of pollutants in discharges (mg/Nm <sup>3</sup> )	Percentage of variation from prescribed standards with reason
a	Water	0.00	0.00	Plant is designed for zero discharge
b	Air : PM	1.75	29.1	Within the standards
	SO <sub>2</sub>	51.46	857.80	Communicated with MoEF & CC regarding time of alignment with CEA phasing plan for achievement of new emission standards.
	NO <sub>x</sub>	29.41	490.4	Communicated with MoEF & CC regarding time of alignment with CEA phasing plan for achievement of new emission standards.

During FY 2019-20, plant was not running continuously. Monitoring report of ambient air quality, Ground water quality, Surface water quality, Sound level are being submitted regularly to MoEF & CC, CPCB and CECB.

**PART – D**

**HAZARDOUS WASTES**

**AS SPECIFIED UNDER HAZARDOUS WASTES (MANAGEMENT, HANDLING AND TRANS  
BOUNDARY MOVEMENT) RULES, 2008**

Hazardous wastes	Total quantity (KL)	
	During the previous financial year (2018-19)	During the current financial year 2019-20
a) From process	9.0 kl used oil	15.048 kl used oil
b) From pollution control facility	0.00	0.00

**PART – E**

**SOLID WASTES**

SN		Total Quantity in MT	
		During the previous financial year 2018-19	During the current financial year 2019-20
(a)	From Process (Ash)	517757	1308258
(b)	From pollution control facility	0.00	0.00
(c)	(1) Quantity recycled or re-utilized within the unit	0.00	0.00
	(2) Sold	0.00	0.00
	(3) Disposed	517757	1310415

Note –In the year 2019-20 plant was not running continuously.

## PART- F

PLEASE SPECIFY THE CHARACTERIZATIONS (IN TERMS OF COMPOSITION OF QUANTUM) OF HAZARDOUS AS WELL AS SOLID WASTE AND INDICATE DISPOSAL PRACTICE ADOPTED FOR BOTH THESE CATEGORIES OF WASTES.

**Hazardous waste:** Used oil generated as part of process was collected in MS drum from source; disposed to the authorized recyclers.

**Solid waste:** Fly ash is generated as solid waste in our plant & we are putting every effort as illustrated below for utilization of fly ash:

- We have made agreements with various cement manufacturers in Dist: Raipur, Balodabazar, Bhilai-Chhattisgarh for utilization of fly ash. Presently, we are providing fly ash to M/S Ultratech Cement Hirmi, Ultra Tech Rawan, J.K.Lakshmi Cement, UTCL-Baikunth and Aditya Cement plant.
- We have made agreements with various Bricks & Blocks manufacturers units in Dist: Raipur, Chhattisgarh for utilization of fly ash. Presently, we are providing fly ash to M/s.Ecorex Buildtech Private Limited, R.K.Bricks, Sun Bricks and Positive Associates
- We have made agreement & signed MOUs with M/s. Shree cement Limited for We are providing Pond Ash approx. 3.0 Lac MT /month and also we are in discussion with various cement manufactures to maximize ash utilization in cement manufacturing.
- In addition to above, we are providing fly ash to Road Projects to M/s. Bilaspur Pathrapali Road Project and also in construction activities.
- Also, we are planning to supply bottom ash in fly ash bricks manufactures for replacement of sand.
- We are in discussion with Local red bricks manufactures for "Use of Bottom Ash in Production of Red Bricks" .
- We made an agreement with M/s. Sharma construction for lifting Bottom ash and filling for mine stowing.
- Planning and discussion going on with local Mine people for disposal of Pond ash for mines filling.

## **PART – G**

### **IMPACT OF THE POLLUTION ABATEMENT MEASURES TAKEN ON CONSERVATION OF NATURAL RESOURCES AND ON THE COST OF PRODUCTION**

- i) Fly ash brick manufacturing unit has been set up to utilize the fly ash being generated.
- ii) We have been using fly ash brick for all the construction activities in our plant.
- iii) Extensive tree plantation have been already done, as a part of greenbelt development, which will control the impact of Air Pollution and optimize the ambient temperature of surrounding area.
- iv) We have constructed the rain water harvesting ponds in our plant premises to recharge ground water.
- v) Rain water harvesting in the form of conservation of monsoon run off, reuse and recycle of water is in place.

## **PART - H**

### **ADDITIONAL MEASURES / INVESTMENT PROPOSALS FOR ENVIRONMENTAL PROTECTION INCLUDING ABATEMENT OF POLLUTION, PREVENTION OF POLLUTION**

- (1) Adoption of Good House-Keeping practices, in which proper & systematic stacking & movement of construction materials, packing material etc. has been implemented.
- (2) All the internal roads have been made pucca in order to reduce fugitive dust emission.
- (3) 03 Nos. Online ambient air quality monitoring systems as well as meteorological monitoring system is installed which helps us to take corrective action instantaneously in case of any deviation.
- (4) ETP has been installed to treat industrial wastewater.