The Director,
Ministry of Environment Forest & Climate Change
Regional Office, West central Region
Ground Floor, East Wing, New Secretariat Building
Civil Line, Near Old VCA Stadium, Nagpur, Maharashtra — 440 001

Subject:- Six monthly environmental compliance report for Parsa East & Kanta Basan opencast Coal Mine (10 MTPA) & Pit Head Coal Washery (10 MTPA), project, Tehsil – Udaipur, Dist. Surguja, Chhattisgarh.

Reference:-

3. MoEF (revalidated EC) no J-11015/03/2008-IA.II (M) dated 25.06.2015
4. MoEF (EC amendment) no J-11015/03/2008-IA.II (M) dated 29.12.2015

Dear Sir,

This is with reference to Environment Clearance granted for Parsa East & Kanta Basan opencast coal mine (10 MTPA) and pit head coal Washery (10 MTPA). Please find enclosed half yearly compliance report (Hard & Soft copy) for conditions stipulated in environmental clearance letter for the period April 2017 to September 2017.

This is for your kind information.

Thanking You,

Yours truly,

For - Rajasthan Rajya Vidyut Utpadan Nigam Limited

[Signature]

Authorized signatory

RRUVNL

Encl: - As above

Conti ---------
Copy to:

i. Director, Ministry of Environment Forests & Climate Change
   Indira Paryavaran Bhawan,
   New Delhi- 110003

ii. Zonal Officer (CPCB)
    3rd Floor, Sahkar Bhawan, North TT Nagar, Bhopal – 462 003

iii. The Member secretary,
     Chhattisgarh Environment Conservation Board, Paryavas Bhavan, North Block Sec -19,
     Naya Nagar, Raipur (C.G.)

iv. Regional Officer,
    Regional Office, Chhattisgarh Environment Conservation Board, Ambikapur. (CG)

Authorized signatory

RRUVNL

Executive Engineer (C.)
Coal Mining, RVUNL
Ambikapur (Chhattisgarh)
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<tr>
<th>Sr.</th>
<th>Specific Condition</th>
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<tr>
<td>1</td>
<td>The maximum production of Parsa East and Kanta Basan Open cast Mine Project shall not exceed 10 MTPA production of Pit Head and Coal Washery shall not be exceed 10 MTPA ROM.</td>
<td>Production of Pit Head and Coal Washery is as per the approved &amp; consented capacity of 10 MTPA ROM.</td>
</tr>
<tr>
<td>2</td>
<td>The exact location of the FBC based TPP shall be finalized within 2 months in consultation with the villagers and an application for TOR submitted to the MOEF immediately thereafter. The Location of CHP, Washery and the FBC shall be taken up in an integrated manner vis-a-vis transportation of coal (raw, clean, coal and coal rejects) from the mine, CHP, Washery and FBC based TPP by closed conveyors only.</td>
<td>Location of the proposed FBC based TPP has been finalized within the ML area. TOR for FBC based power plant was granted by MoEF &amp; CC. vide letter (J-13012/111/2011-IA-II (T) dated 1st April 2013) and extended for one year vide MoEFCC Letter J-13012/111/2011-IA-II (T) dated 02.03.2016.</td>
</tr>
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<td>3</td>
<td><strong>Amended conditions vide MoEF &amp; CC Letter No: J-1105/03/2008-IA-II (M) Dated 29.12.2015</strong></td>
<td>Shall be complied with.</td>
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<td>4</td>
<td>Coal transportation of clean coal and middling to the linked TPPs located in Rajasthan, shall be entirely by rail or by conveyor-cum-rail mode only except for the initial 2-3 years.</td>
<td>Being complied as per amended condition no. 5.</td>
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<td>5</td>
<td><strong>Amended condition vide MoEFCC Letter No: J-1105/03/2008-IA-II (M) Dated 29.12.2015</strong>&lt;br&gt;A Railway Siding to be established adjoining the mine shall be commissioned within 72 months. Until the railway siding is constructed and commissioned, transportation of clean coal and middling to the nearest railway siding shall be by high capacity trucks (30- T or more) only and thereafter it shall be by rail mode only to the linked TPPs in Rajasthan. After the commissioning of its railway siding and establishment of a rail network to Surajpur railway Station, clean coal and middling form the pit head coal washery shall be loaded by rapid (silo) loading system and transported by rail mode only.</td>
<td>The Railway Siding adjoining the mine and inside the ML area complete with coal conveying arrangements from Pit Head Washery and the rapid loading system for wagon loading is in the last phase end is expected to be complete within the stipulated time period. The coal during this construction period of the rail link from surajpur road railway station to pit head is being transported is high capacity trucks (30- T or more) to the nearest railway siding Kamalpur (of SECR) and Ramanuj-nagar siding private and constructed at 33 KM from Surajpur road railway station on the rail link being constructed from where is transported to liked TPPS in Rajasthan by rail mode only.</td>
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<td>6</td>
<td>Transportation of 30,300 TPD raw coal (of 40% ash content) from the mine pit to the surface and to CHP and thereafter to the coal washery shall be by closed belt conveyors only. Transport of coal rejects to the FBC based TPP shall also be by closed belt conveyors only.</td>
<td>Transportation of raw coal from pit to the surface had been proposed by closed conveyor system for which the construction has begun. The delayed in this due to low progress in mine development due to legal intervention of NGT &amp; cancellation of coal blocks by Hon’ble Supreme Court of India. Meanwhile, ample precautions are being taken to reduce the fugitive emissions by undertaking various measures in mines &amp; road transportation of coal to Railway sidings. CHP to Washery- through closed conveyor belt. The coal movement from CHP to the coal Washery is being done by closed belt conveyors only.</td>
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<td>7</td>
<td>The drainage of River Atem outside the project area shall not be disturbed through construction of embankment or by diversion of nalas / streams without prior study and approval.</td>
<td>Complied. &lt;br&gt;Not required now and shall be complied with if required.</td>
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<td>8</td>
<td>Top soil shall be stacked properly within the dump area with proper slope at earmarked site(s) and shall be used concurrently for reclamation and development of green belt within a year of its generation.</td>
<td>Top soil is being stacked scientifically at the earmarked site and is being used for mine reclamation and green belt development as per mining plan. Top soil generated during mining activities is being stored in separate top soil dump as per top soil management plan and same is being reused in reclamation area. Drainage system has been constructed along top soil dump. Soil</td>
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<td>9</td>
<td>Sequential mining shall be undertaken in the two phases and internal dumping (Backfilling) would be started at the end of 3rd year and no external dumping form 4th year onwards. By the end of Phase - I (15th year) about 74% of the total excavated area would be backfilled and reclaimed. At the end of project an area of 1929.64 ha would be reclaimed out of a total ML area of 2388.53 ha. There shall be no external OB dumping from the end of 3rd year onwards.</td>
<td>Sequential mining is being undertaken. The internal dumping had been started from 2nd year itself as all the areas earmarked for external dumps could not be made available due to issue related to R&amp;R. Reclamation status till 30th September 2017 is mentioned below-</td>
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<td>10</td>
<td>OB shall be stacked at earmarked external OB dumpsite of 165.83 ha within ML area and shall be a maximum height of 60m and one of 90m with a bench height of 30m each. The ultimate slope of the dump shall not exceed 28°. Monitoring and management of existing reclaimed dumpsites shall continue until the vegetation becomes self-sustaining. Compliance status shall be submitted to the Ministry of Environment and Forests and its Regional Office located at Bhopal on yearly basis.</td>
<td>Being Complied with. OB is being stacked at earmarked external OB dumpsite within ML area. Stabilization of OB dumps as per prescribed height of 60 m and 90 m with a bench height of 30 m and ultimate slope at 28° is being maintained. Dump parameter for safe working is being maintained as stipulated by DGMS to maintained good /safe mining condition. A fully equipped horticulture department is established for monitoring and management of vegetation over reclaimed area. Additionally regular monitoring of slope of existing dumps is being done and further measures have been taken up for slope stabilization and appropriate grading and benching thus making the dumps stable which includes Geo-textile mats and proper development of catch drains and toe walls.</td>
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<td>11</td>
<td>Catch drains and siltation ponds of appropriate size shall be constructed to arrest silt and sediment flows from soil, OB and mineral dumps. The water so collected shall be utilized for watering the mine</td>
<td>Catch drains and siltation ponds have been constructed for rain water collection and arresting silt and sediment flow of soil during rainy season. Details of existing catch drains and siltation ponds are mentioned below-</td>
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|     | area, roads, green belt development, etc. The drains shall be regularly desilted and maintained properly. | A) Catch drains:  
i. **Catch drain at External Dump-I** - Length-2100 m, Avg. Width- 2 m & Avg. depth 2m  
ii. **Catch drain at External Dump-II** - Length-1200 m, Avg. Width- 2 m & Avg. depth 2m.  
B) Siltation Ponds- Total 9 siltation ponds have been constructed with net capacity of about 1,56,888 cum.  
i. **Three Siltation ponds in North of Salhi Dump** -  
   **Siltation Pond-1** - Total capacity about 14855.82cum (Avg. Length 98 m, Avg. width 31 m and Avg. depth 4.89 m),  
   **Siltation Pond-2** - Total capacity about 17902.17cum (Avg. Length 107 m, Avg. width 33 m and Avg. depth 5.07 m),  
   **Siltation Pond-3** - Total capacity about 19454.4cum (Avg. Length 120 m, Avg. width 42 m and Avg. depth 3.86 m).  
ii. **Two Siltation ponds near Baigapara** -  
   **Siltation Pond-1** - Total capacity about 2818.8 cum (Avg. length 29 m, Avg. width 27 m and Avg. depth 3.6 m),  
   **Siltation Pond-2** - Total capacity about 2646cum (Avg. length 28 m, Avg. width 27 m and Avg. depth 3.5 m).  
iii. **One Siltation pond near Kete** - Total capacity about 39600cum (Avg. length 150 m, Avg. width 60 m and Avg. depth 4.4 m).  
iv. **One Siltation pond near CHP** - Total capacity about 11880cum (Avg. length 60 m, Avg. width 44 m and Avg. depth 4.5 m)  
v. **One Siltation pond near substation** - Total capacity about 8131.3cum (Avg. length 61 m, Avg. width 43 m and Avg. depth 3.1 m)  
vi. **One Siltation pond near Washery** - Total capacity about 39600cum (Avg. length 90 m, Avg. width 80 m and Avg. depth 5.5 m)  
vii. **One Siltation pond near weighbridge** - Total capacity about 16000 cum (Avg. length 150 m, Avg. width 40 m and Avg. depth 5.5 m). |
| 12 | Garland drains (size, gradient and length) and sump capacity shall be designed keeping 50% safety margin over and above the peak sudden rainfall and maximum discharge in the area adjoining the mine site, Sump capacity shall also be provided for adequate retention period to allow proper settling of silt material. | Garland drains have been already constructed and connected to settling tanks. Settling tanks have been connected in manner to provide adequate retention period  
**Details of the sump capacity are** -  
Total sump capacity approximately 10 Lakh cubic meters has been made in the quarry area for storage of mine seepage / rain water, with capacity of 10 hours retention period, further 2 |
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<td>13</td>
<td>Dimension of the retaining wall at the toe of the dumps and OB benches within the mine to check run-off and siltation shall be based on the rainfall data.</td>
<td>Complied.</td>
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<td>[Image 0x0 to 595x842]</td>
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<td>Retention wall / toe walls along with geo-textile, Check dams, has already constructed to arrest sliding down of the excavated material along the contour. Additional construction of toe wall is being been undertaken with progress of dumping activities.</td>
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<td>14</td>
<td>There shall be no drilling and blasting for coal extraction and use of shovel and dumper combination with drilling and blasting shall be for OB removal only. Controlled blasting shall be practiced only during daytime with use of delay electric detonators. Drills shall be wet operated. The mitigative measures for control of ground vibrations and to arrest the fly rocks and boulders shall be implemented.</td>
<td>Complied with.</td>
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<td>[Image 0x0 to 595x842]</td>
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<td></td>
<td>Coal Extraction is being carried by Surface Miner only.</td>
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<td>15</td>
<td>The raw coal, washed coal and coal wastes (Rejects) shall be stacked properly within the washery premises at earmarked site (s) within stockyards of one-day storage capacity fitted with wind breakers/shields. Adequate measures shall be taken to ensure that the stored raw coal, washed coal and coal wastes do not catch fire.</td>
<td>Agreed &amp; Complied.</td>
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<td>[Image 0x0 to 595x842]</td>
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<td></td>
<td>The washed coal and coal wastes (Rejects) are being stacked properly within the Washery premises at earmarked site. Wind breakers/shields have been constructed along the stockyard. Arrangements have been made to control coal fire through movable sprinklers and two numbers of automated fire tenders at site.</td>
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<td>16</td>
<td>Crushers at the CHP shall be operated with high efficiency bag filters, water sprinkling system shall be provided to check fugitive emissions from crushing operations, conveyor system, haulage roads, transfer points, etc. Hoppers of the coal crushing unit and washery unit shall be fitted with high efficiency bag filters and mist spray water sprinkling system shall be installed and operated effectively at all times of operations to check fugitive emissions from crushing operations, transfer points, stockyards and at the Railway Siding.</td>
<td>* Main Haul Road has been made pucca and is being maintained.</td>
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<td>* Crusher / Sizer and screening area in CHP is provided with High Efficiency Bag filters, Dry and wet fog dust suppression system has been installed.</td>
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<td></td>
<td>* All transfer points have been provided with dust suppression system.</td>
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<td>* All Belt conveyors are of covered type.</td>
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<td>* Rail link (Railway Siding) is under development for ultimate transportation of washed coal to the linked TPPs in Rajasthan.</td>
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<td>* Water sprinkling is being done along all haul roads and surface roads through movable sprinkling units.</td>
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<td></td>
<td>* Permanent water sprinkling arrangement [Image 0x0 to 595x842]</td>
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<td>17</td>
<td>All approach roads shall be black topped and internal roads and major haul roads shall be black topped or concreted and swept regularly with mechanical sweeper. A 3-tier avenue plantation using local species shall be developed along with main roads, and approach roads to mine and to the washery and to Railway Siding. In addition, green belt shall be developed using local species all along the periphery of the site, along the areas such as the washery unit, crushing unit, and stockyards. Railway Siding and Silo Loading Area shall be properly maintained and green belt developed all around it. Water sprinkling arrangements shall be established and functional during transfer and loading of coal.</td>
<td>All approach roads has been made black topped /pucca and is being maintained. The WBM road has already been completed to black top. 3-tier avenue plantation using local species is being developed along with main roads, and approach roads to mine and to the Washery plant using all local species. Permanent water sprinkling arrangement has been made in Coal Stock yards and road side.</td>
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<td>18</td>
<td>A 30 m green belt consisting of a 3-tier plantation using native species shall be developed between quarry and villages, and external OB dump and villages and R&amp;R site. The green belt/plantation using a mix of native species shall be developed within two-three years of grant of environmental clearance.</td>
<td>Agreed and is being complied. A thick greenbelt of local plant species like Shorea robusta (Sal), Albizia Lebbeck, Ficus Benghalensis, Madhuca Indica, Mangifera Indica, Azadirachta Indica, Dalbergia Sissoo is being developed in earmarked areas and continuous tree transplantation is also being planted through mechanized Transplanter in consultation with the Local Forest Department. <strong>Details of species wise plantation attached as Annexure- II.</strong></td>
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<td>19</td>
<td>Proper records of quantum of raw coal, clean and coal rejects generated and been utilized shall be maintained. Proper records of ash content (of raw coal, clean coal and coal rejects) shall be maintained in this regard. The company shall enter into a contract for the use of coal rejects until the FBC TPP is commissioned within 24-36 months. The details of quantum and ash content of raw coal, clean coal and coal rejects generated and utilized shall be uploaded regularly on the company website.</td>
<td>Proper records of quantum of raw coal, clean coal and coal rejects generated from washery are being maintained. The company has signed an agreement for sale of coal rejects.</td>
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<td>20</td>
<td>The washery unit shall be a zero discharge facility and no wastewater shall be discharged from the washery into the drains/natural water courses. Recycled water shall be used for development and maintenance of green belt and in the Plant Operations. A Filter Press shall be installed in the washery plant for recovery of water.</td>
<td>Is being complied with. Washery is designed and installed with 100% water recirculation unit comprised of sump tanks, fines recovery circuit (hydro cyclone banks), thickener and belt press filter. Even in worst case of breakdown of the circuit or spillage there is a provision of two slime ponds to cater discharge water. Thereby ensuring Zero discharge outside washery premises/plant.</td>
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| 21  | The entire total estimated requirement of make-up water of 3750m³/day for the coal washery shall be met from mine water. No ground water shall be used form the mine and Washery Plant Operations except for drinking purpose and during the initial first year of mine operation. Any additional water requirements envisaged from mine/washery operations shall be obtained from mine pit water, by recycle/reuse to the maximum extent and from rainwater harvesting measures. | Complied with.  
For mine and Washery Plant operations water requirement is being met from mine pit/sump water by adequate treatment and reuse as well as rainwater harvesting measures is also being adopted for water requirement to the extent possible.  
Only Drinking water requirement is being met from tube wells as per CGWA NOC. |
| 22  | Heavy metal content in raw coal, washed coal and coal rejects shall be analyzed twice in a year and records maintained thereof and also uploaded on the company website. | Complied (Analysis Report enclosed as Annexure-III). |
| 23  | No fly ash from the Linked TPPs shall be used in backfilling of the void without undertaking an environmental feasibility study and without prior approval of the Ministry under EIA notification, 2006. | Shall be complied. |
| 24  | Area brought under afforestation shall not be less than 2600.633ha which includes reclaimed external OB dump (165.83ha), topsoil dump, backfilled area (2365.949ha) along ML boundary, infrastructure and washery area (26.976ha) along roads, green belt (41.878ha), in undisturbed areas/safety zone and in colony by planting native species in consultation with the local DFO/Agriculture Department. The density of the trees shall be around 2500 plants per ha. | A thick greenbelt of local plant species like Shorea robusta (Sal), Dalbergia Sissoo, Albizia Lebbeck, Ficus Benghalensis, Madhuca Indica, Mangifera Indica, Azadirachta Indica is being developed in earmarked areas and continuous tree transplantation is also being planted through mechanized Transplanter in consultation with the Local Forest Department.  
The afforestation drive is progressing well commensurate with the excavation plan of mine. Details till sept 2017 are as under- |
|     | Outside Mine Area (Ha) | 1.5     | 2.3     | 5.1     | 4.6     | 31      | 19.02   | 57.52 |
|     | Within Mine Area (Ha)  | 0       | 0       | 0.8     | 3.1     | 8.2     | 6.20    | 18.83 |
|     | Total Reclamation in (Ha) | 1.5   | 2.3    | 5.9    | 7.7    | 39.2    | 19.22   | 75.85 |
|     | Plantation by Saplings (Nos) | 3732 | 5852 | 14790 | 19206 | 67903 | 48543 | 189625 |

[Signature]

Executive Engineer (CM)
Coal Mining, RVUNL
Amirchaur (Chhattisgarh)
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<td>25</td>
<td>A plan for OB dumping and management so that there is no void left at the post mining stage shall be submitted to the Ministry immediately. A progressive Mine Closure Plan shall be implemented by reclamation of the total quarry area of 2365.949 ha backfilling reclamation by afforestation, to create a 3-storeyed forest in lieu of original forest, by planting native species in consultation with the local DFO/Agriculture Department/relevant institution. The density of the trees shall be around 2500 plants per ha. At the post mining stage, the entire quarry area shall be backfilled and reclaimed with vegetation and there shall be no void left as a water body.</td>
<td>Is being complied with. Mine Closure Plan approved by MoC will be implemented which includes OB management &amp; backfilled area reclamation already started after two year from mine operation. The restoration plan is progressing well commensurate with the excavation plan of mine. Details of the reclamation are as under-</td>
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<td>Outside Mine Area (Ha)</td>
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<td></td>
<td>Within Mine Area (Ha)</td>
<td>0</td>
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<tr>
<td></td>
<td>Total Reclamation in (Ha)</td>
<td>1.5</td>
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<td></td>
<td>Plantation by Saplings (Nos)</td>
<td>3732</td>
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26 A Conservation Plan (in-situ and ex-situ) for endangered faunal species reported in the study area and for the medicinal plants found in and around the project area shall be prepared in consultation with Wildlife Institute of India, Dehradun within 4 months from date of environmental clearance and the Plan shall be implemented in consultation with the State Forest and Wildlife Departments. An in-situ conservatory of species found in the pre-mining original ecosystem and rare and endangered plant species including medicinal plants species found in the study area during pre-mining phase shall be established and reintroduced during mine reclamation and habitat restoration. The Conservation Plan shall include conservation of area within the project boundary to be left undisturbed as free passageways for the wildlife to reach the forests in the study area. The Conservation Plan shall also include activities of mine reclamation and wildlife habitat restoration of mined out areas within the core zone and project area using native species representative of the forest ecosystem during the pre-mining phase separate funds of Rs.20 crores as capital costs and Rs. 2 crores as revenue costs shall be earmarked for implementation of the various activities under the Conservation Plan. The status of the Conservation Plan including financial status shall be reported once a year as part of the monitoring report to this Ministry and to the MOEF Regional Office, Bhopal. The proponent shall also participate. In the Regional Wildlife Conservation Plan (RWLCP) for the Wildlife plan was approved by PCCF (Wildlife) Chhattisgarh on 07th September, 2009 & total cost approved for plan implementation was Rupees 22 Crore.

Rs. 22.00 Crores deposited in CAMPA account for wildlife protection & management as a compliance of FC Stage-I along with other levies.

After incorporating the suggestions & recommendations of WII, revised wildlife management plan of PEK5 mine was approved by PCCF (Wildlife) on 06th March, 2013. As per conditions of Forest Clearance, implementation of wildlife management plan will be done by State government along with other independent institutes with the funds provided by User Agency.

However, Project Proponent is ready to assist in the plan implementation as and when required by State Wildlife Dept. Matter is also being continuously pursued with the State Forest Dept.
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<td>27</td>
<td>Regular monitoring of groundwater level and quality shall be carried out by establishing a network of existing wells and construction of new Pelzometers. The monitoring for quantity shall be done four times a year in pre-monsoon (May), monsoon (August), post-monsoon (November) and winter (January) seasons and for quality in May and in monsoon. Data thus collected shall be submitted to the ministry of Environment and Forests and to the Central Pollution Control Board quarterly within one month of monitoring.</td>
<td>M/s Vardan Enviro laboratories Pvt. Ltd., (Accredited NABL &amp; MoEF) has been awarded environmental monitoring assignment. Regularly monitoring is being done. Ground water quality monitoring was carried out through MoEF approved third party for all season. Monitoring Reports enclosed as Annexure – IV.</td>
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<td>28</td>
<td>The Company shall put up artificial ground water recharge measures including rainwater harvesting structure for augmentation of ground water resource in case monitoring indicated decline in water table. The project authorities shall meet water requirement of nearby village(s) in case the village wells go dry due to dewatering of mine.</td>
<td>Rain water harvesting structure including ponds. Check dams etc. has been constructed at Mine area and rainwater harvesting from rooftop is being done at residential housing colony outside ML area. The impact of rainwater harvesting is being monitored through dug well located outside of ML Area.</td>
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<td>29</td>
<td>ETP shall also be provided for workshop and CHP; Effluents shall be treated to conform to prescribed standards, particularly for PH and TSS in case of discharge into any water course within or outside the lease.</td>
<td>Complied with. • The Coal Washery is designed with closed loop water circuit to ensure zero effluent discharge. No discharge is being done outside the washery plant.</td>
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<td>30</td>
<td>An STP shall be provided for the township/colony to treat the domestic effluents to prescribed standards and for the reuse in project activities.</td>
<td>Complied • STP has been established for the Township located outside of the ML area. • In the isolated locations/buildings, septic tank and soak pit systems have been provided.</td>
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<td>31</td>
<td>Industrial wastewater (workshop and wastewater from the washery) shall be properly collected, treated so as to conform to the standards prescribed under GSR 422(E) dated 19th May 1993 and 31st December1993 or as amended from time to time before discharge. Oil and grease trap shall be installed for treatment of workshop effluents.</td>
<td>Being complied with. • Workshop effluent passed through an oil and grease trap followed by fine filters, sedimentation pond. The treated water is being reused in the workshop. • There is no effluent discharge from the Coal Washery. • The physico-chemical characteristic of treated effluent is as per prescribed standards.</td>
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<td>32</td>
<td>R&amp;R Plan prepared for an estimated Rs. 20.693 crores shall be not less than the norms laid down/approval by the Stage Government and shall not be inferior that that in the National R&amp;R Policy and shall be completed within a specified time-frame. R&amp;R shall include specific income generation schemes and setting up a SHGs and cooperatives, and activities and assistance under the Tribal development plan for the tribals being displace and provision of annuities for the underprivileged sections. The provision also includes a Corpus Fund for the maintenance of the Resettlement site. The status of the implementation of the R&amp;R plan along with financial plan along with financial status of the activities under taken shall be uploaded on the company website and updated at least once in a year.</td>
<td>Noted. Being Complied. Resettlement and Rehabilitation Plan has been prepared as per Adarsh Punarwas Yojna of the State Government and same has been implemented as per approved plan. Following benefits have accrued to the project affected people: i. Rs. 79.55 Cr. has been paid against land compensation in four villages for acquisition of 368.190 ha private land. ii. Rs. 29.70 cr. has been paid as compensation for settling the forest rights of dwellers under the Forest Rights Act 2006 to 338 Forest right holders. iii. 397 persons have been given employment and Rs. 8.91 cr. has been paid as one time compensation (@ Rs. 3 lacs per person) to 297 persons in lieu of employment. iv. A monthly pension of Rs. 500 is being given to all persons who have attained the age of 60 years in the affected villages. This benefit is also going to the people who have not given their lands for the project. 240 people got benefited under this scheme during 2016-17. v. 165 no of plots having areas as per the approved R&amp;R Plan of Chhattisgarh state has been offered to Kete villagers (Project affected) in the R&amp;R colony at Basen village. In addition to these plots, 68 numbers of houses have also been constructed in the R&amp;R colony where other facilities such as roads, drains, lighting, water supply, school, Community center and health center etc. have been provided. A lump sum amount of Rs. 3 lacs is also being given to families who are opting to construct their own houses either on the plots given or elsewhere vi. A State of the Art Vocational Training Center has been established in one of the project affected villages (Salhi) to impart training to youths of the affected villages as well as the nearby areas for developing skills under different trades such as, Industrial sewing machine operator, mechanical fitter, electrician, welder and hospitality. This VTC is equipped with residential facilities for all the male and female trainees who will require stay in the campus.</td>
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<td>33</td>
<td>The proponent shall provide not less than Rs. 10 crores towards capital costs and Rs. 5/T of coal has revenue expenditure (which shall be up scaled after adjusting for depreciation of the rupee towards activities undertaken under CSR for 12 villages - Salhi, Haripur, Pasa, Paragia, Basan, Shinigar, Suskam, Sonitarai, Janardanpur, Tara Mandra and Fatehpur for the life of the project. The activities shall include establishing /strengthening of schools roads, drainage and sanitation, community halls, drinking water into the villages and skill development of the local communities. The CSR Plan shall also include Tribal Welfare activities for the tribals and their skill development for alternate livelihood and addressing issues such as availability of minor forest produce for the tribal/local communities. The details of the activities and expenditure made thereon in each of the villages taken up under CSR Shall be displayed on the company’s website and updated at least once in six months. The socio-economic development of the villages shall be monitored over the life of the project using indices such as the UNDP Human Development Index.</td>
<td>The CSR initiatives initiated includes establishing /strengthening of schools roads, drainage and sanitation, community halls, drinking water into the villages and skill development of the local communities around of project site villages. CSR Details – (i) A model school of 10+ 2 under CBSE has been established in village Salhi for imparting education to boys and girls of the entire project affected villages. It is equipped with all modern facilities and infrastructure such as standard class rooms, library, computer room, science and math labs, art and music, audio visuals aids, CC TV cameras, WiFi, assembly point, play grounds etc. Education including tuition fees, uniforms, study materials, meals and transportation is absolutely free. (ii) A number of initiatives in form of project have been started under health, education, self-employment generation, agriculture, sports and culture and women empowerment etc. for uplifting the socio-economic status of the project affected people in 14 project area villages. Detailed CSR expense is attached as Annexure -V. A Human Development Index (HDI) study as per UNDP guidelines carried out in February 2017 in 6 core villages of Parsa East and Kanta Basan mines in Udaipur Tehsil of Surguja by CII- ITC Centre of Excellence for Sustainable Development (CII-CESD), New Delhi (Copy of the same enclosed as Annexure-VI).</td>
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<td>For monitoring land use pattern and for post mining land use, a time series of land use maps, based on satellite imagery (one scale of 1:5000) of the core zone and buffer zone, from the start of the project until end of mine life shall be prepared once in 3 years (for any one particular season which is consistent in the time series) and the report submitted to MOEF and its Regional office at Bhopal.</td>
<td>Complied. First Satellite imagery study was completed &amp; Reports were submitted in June 2013. Second Satellite imagery study has been completed in June-August 2016 &amp; has been submitted in December 2016. Land use studies shall be continued and shall be done once in three years during entire life of mine, in accordance with in stipulation of EC Condition.</td>
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<td>35</td>
<td>A Final Mine Closure Plan along with details of Corpus Fund shall be submitted to the Ministry of Environment &amp; Forests for approval 5 years in advance of final mine closure for approval. The plan shall include habitat restoration of the project area consisting of a 3-storeyed forest</td>
<td>It shall be fully complied with.</td>
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<td>36</td>
<td>A dedicated team drawn from disciplines of ecology, wildlife, sociology, hydrology, etc shall be engaged over the life of the project for implementation of Wildlife conservation Plan, R&amp;R and CSR Plan and for progressive and final mine closure plan and issues of habitat restoration.</td>
<td>Complied with. A dedicated team drawn from disciplines of ecology, wildlife, sociology, Land &amp; CSR, hydrology etc has already been deployed at site for implementation of mine closure plan &amp; other plans.</td>
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<td>No change in technology and scope of working shall be made without prior approval of the Ministry of Environment and Forests.</td>
<td>Noted.</td>
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<td>No change in the calendar plan including quantum of mineral coal and waste being produced shall be made.</td>
<td>Noted.</td>
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<td>Four ambient air quality monitoring stations shall be established in the core zone as well as in the buffer zone for monitoring PM10, PM2.5, SO2 and NOx. Location of the stations shall be decided based on the meteorological data, topographical feature and environmentally and ecologically sensitive targets in consultation with the State Pollution Control Board, Monitoring of heavy metals such as Hg, As, Ni, Cd, Cr, in the particulate matter etc. shall be carried out at least once in six months.</td>
<td>Four ambient air quality monitoring stations are established. Ambient air quality monitoring is being carried out at four locations each in the core zone &amp; four in buffer zone) for PM10, PM2.5, SO2, NOx &amp; CO along with heavy metal monitoring. Location of the stations is based on the meteorological data, topographical features and environmentally and ecologically sensitive targets in consultation / Direction with State Pollution Control Board.</td>
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<td>Data on ambient air quality (PM10, PM2.5, SO2 and NOx) and heavy metals such as Hg, As, Ni, Cd, Cr, etc. and other monitoring data shall be regularly submitted to the Ministry including its Regional Office at Bhopal and to the State Pollution Control Board and the Central Pollution Control Board once in six months. Random verification of samples through analysis from independent laboratories recognized under the EP Rules, 1986 shall be furnished as part of the compliance report.</td>
<td>Is being complied with. M/s Vardan Enviro Lab., (Accredited NABL &amp; MoEF) has been awarded environmental monitoring assignment. Monitoring Report is regularly submitted to MOEF Regional Office, SPCB, &amp; CPCB.</td>
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<td>5</td>
<td>Adequate measures shall be taken for control of noise levels below 85 DBA in the work environment. Workers engaged in blasting and drilling operations, operation of HEMM, etc shall be provided with ear plugs/muffs.</td>
<td>Complied with. Ear plugs/muffs and all other necessary PPEs are being provided to Workers engaged in blasting and drilling operations, operation of HEMM, etc.</td>
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Executive Engineer (CM)  
Coal Mining, RVUNL  
Ambikapur (Chhattisgarh)
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<td>Industrial wastewater (workshop and wastewater from the mine) shall be properly collected, treated so as to conform to the standards including for heavy metals before discharge prescribed under GSR 422(E) dated 19th May 1993 and 31st December 1993 or as amended from time to time before discharge. Oil and grease trap shall be installed before discharge of workshop effluents.</td>
<td>There is no waste water discharge from the Washery plant boundary. Workshop effluent after treatment is being recycled. Similarly mine discharge &amp; surface run-off (monsoon season) is channelized to settling ponds along with water treatment facility and then used for water sprinkling on haul roads, green belt development etc. The quality of water has been maintaining within prescribed limits.</td>
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<td>7</td>
<td>Vehicular emissions shall be kept under control and regularly monitored.</td>
<td>All the HEMM and other vehicles are maintained properly. PUC for all the vehicles is being checked regularly during mine operation.</td>
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<td>8</td>
<td>Monitoring of Environmental quality parameters shall be carried out through establishment of adequate number and type of pollution monitoring and analysis equipment in consultation with the State pollution Control Board and data got analysis through a laboratory recognized under EP Rules, 1986.</td>
<td>M/s Varan Enviro Lab, Gurgaon (Accredited NABL &amp; MoEF) has been awarded environmental monitoring assignment. Environmental monitoring laboratory has been set up. The Laboratory is well equipped with monitoring/ sampling and analytical instruments for monitoring Weather, Air, Water, Noise, Soil &amp; other environmental parameters.</td>
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<td>Personnel working in dusty areas shall wear protective respiratory devices and they shall also be provided with adequate training and information on safety and health aspects Occupational health surveillance programme of the workers shall be undertaken periodically to observe any contractions due to exposure to dust and to take corrective measure, if needed.</td>
<td>Compiled. Personnel working in the project area have been provided with nose masks, ear muffs/plugs, helmets, goggles, safety shoes, hand gloves etc. Intermediate medical examination (IME) is undertaken as per Mine rules. In addition to this all precautionary measures are being taken care in compliance to health &amp; safety norms. Regular Training Programs related to occupational health is being done at premises.</td>
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<td>10</td>
<td>A separate environmental management cell with suitable qualified personnel shall be set up under the control of a Senior Executive who will report directly to the Head of the company.</td>
<td>The Environment Management Cell has been established under the supervision of an Environmental officer. He is directly reporting to Head of the project. A full-fledged environmental laboratory has been established. Regular environmental monitoring is being carried out by M/s Varan Enviro Lab (Accredited NABL &amp; MoEF).</td>
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<td>The funds earmarked for environmental protection measures shall be kept in separate account and shall not be diverted for the other purpose. Year-wise expenditure shall be reported to this Ministry and its Regional Office at Bhopal.</td>
<td>Noted. Fund kept in separate account for environmental protection measures. <strong>Details attached. Annexure- VII.</strong></td>
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<td>The project authorities shall advertise at least in tow local newspaper widely circulated around the project, one of which shall be in the vernacular language of the locality concerned within seven days of the clearance letter informing that the project has been accorded environmental clearance and a copy of the clearance letter is available with the State Pollution</td>
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<td>A copy of the environmental clearance letter shall be marked to concerned</td>
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<td>Panchayat/Zila parishad, Municipal corporation or Urban Local Body and Local</td>
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<td>NGO, if any, from whom any suggestion/representation has been received</td>
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<td>while processing the proposal. A copy of the clearance letter shall be</td>
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<td>displayed on the company's website.</td>
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<td>A copy of the clearance letter shall be displayed on the website of the</td>
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<td>concerned State Pollution Control Board. The EC letter shall also be</td>
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<td>displayed at the Regional Office, District Industry Center and Collector's</td>
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<td>Office/Tehsildar's office for 30 days.</td>
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<td>The clearance letter shall be uploaded on the company's website. The</td>
<td>Noted.</td>
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<td>compliance status of the stipulated EC conditions shall also be uploaded by</td>
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<td>the project authorities on their website and updated at least once every</td>
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<td>six months so as to bring the same in the public domain. The monitoring</td>
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<td>data of environmental quality parameters (Air, water, noise and soil) and</td>
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<td>critical pollutant such as PM10, PM2.5, SO2 and NOx (ambient and stack, if</td>
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<td>any) and critical sectoral parameters shall also be displayed at the</td>
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<td>entrances of the project premises and mines office and in corporate office</td>
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<td>and on the company's website.</td>
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<td>16</td>
<td>The project proponent shall submit six monthly reports on the status of</td>
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<td>compliance of the stipulated environmental clearance conditions (both in</td>
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<td>hard copy and in e-mail) to the respective Regional Office of the MOEF, the</td>
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<td>respective Zonal Offices of CCPCB and SPCB.</td>
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<td>17</td>
<td>The Regional office of this Ministry located at Bhopal shall monitor</td>
<td>Full cooperation will be extended.</td>
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<td>compliance of the stipulated conditions. The project authorities shall</td>
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<td>extend full cooperation to the office(s) of the Regional office by</td>
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<td>furnishing the requisite data/information/monitoring reports.</td>
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<td>18</td>
<td>The environmental statement for each financial year ending 31st March in Form-V 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 uploaded on the company's website along with the status of compliance of EC conditions and shall be sent to the respective Regional Offices of the MOEF by e-mail.</td>
<td>Being complied with.</td>
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Yours sincerely,

For - Rajasthan Rajya Vidyut Utpadan Nigam Limited

[Signature]

Authorized Signatory
RRVUNL
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TEST REPORT

TEST REPORT NO.: IGI/98SR/TR/2017 SUB 1047
NAME & ADDRESS OF CUSTOMER: INSPECTORATE GRIFFITH INDIA PVT. LTD., 312, GROUND FLOOR, INORA RESIDENTIAL & COMMERCIAL COMPLEX, P. NAGAR, KORBA - 495077
CUSTOMER'S REFERENCE: KOR/C&C- 09287/2017/000025
DATE: 23.09.2017
SAMPLE PARTICULARS: COAL
DATE: 26.09.2017
SAMPLE RECEIPT DATE: 23.09.2017
NO. OF SAMPLE(S): 02 X 200 gms
SAMPLE DESCRIPTION: SAMPLE RECEIVED FROM IGI KORBA, CUSTOMER: MIS PARSIA EAST & KANTA BASAN COAL BLOCK.
CONDITION OF SAMPLE: POWDER SAMPLE
PARAMETERS TESTED: Pb, Hg, As, Cd, Cr, Ni on (ARB)
TEST METHOD: (Pb, As, Cd, Cr, Ni)- ASTM: D 6357.04, Hg- ASTM: D 6722:01

TEST RESULTS

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REMARKS:

*Indicates information supplied by the customer for which the laboratory has no control

Samples are tested on as received basis.

PREPARED BY

[K. Das]
(SR. OFF. ASST.)

S.K. Mallik
(DY. TECHNICAL MANAGER)

AUTHORIZED SIGNATORY

SAMPLING NOT DONE BY THE LABORATORY. RESULTS RELATE TO THE SAMPLE TESTED ONLY

THE CONTENTS OF THE REPORT SHALL NOT BE REPRODUCED EITHER IN FULL OR IN PART WITHOUT PRIOR WRITTEN CONSENT OF THE ISSUING AUTHORITY

Regd. Office: Vasundhara, 3rd Floor, 2/F Swar Boat Road, Kolkata - 700 020
Page 1 of 1
Date: 01.07.2014
Environmental Monitoring Report

(April 2017 to September 2017)
## Ambient Air Quality (April 17 to September 17)

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#### 1. Sampling Location: Village – Parsa (Near Coal Washery) (AAQ-1)

#### 2. Sampling Location: Village – Sabhi Village (AAQ-2)

#### 3. Sampling Location: Near Mine Admin Office (AAQ-3)
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2. Sampling Location: Village – Sathi Village [AAQ-2]

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3. Sampling Location: Near Mine Admin Office [AAQ-3]

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4. Sampling Location: Village-Manihari

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**Sampling Location**: Near Coal Stock Yard (AAQ-6)

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# Noise Levels (April 2017 to September 2017)

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<th>Night Time (10:00 pm to 06:00 am)</th>
<th>Unit</th>
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<tbody>
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<td>1.</td>
<td>Village- PARSA</td>
<td>01-04-2017</td>
<td>44.20 – 56.80</td>
<td>39.20 – 43.70</td>
<td>dB(A)</td>
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<tr>
<td>2.</td>
<td></td>
<td>02-04-2017</td>
<td>42.80 – 58.70</td>
<td>37.40 – 43.20</td>
<td>dB(A)</td>
</tr>
<tr>
<td>3.</td>
<td></td>
<td>15-04-2017</td>
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<td>38.00 – 48.00</td>
<td>dB(A)</td>
</tr>
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<td>5.</td>
<td>Village- BAIGAPARA</td>
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<td>42.50 – 56.40</td>
<td>35.70 – 49.40</td>
<td>dB(A)</td>
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<tr>
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### May 2017

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<td>Night Time (10:00 pm to 06:00 am)</td>
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## Effluent Water Quality (April 2017 to September 2017)

### April 2017

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<td>BDL (DL 0.01 mg/l)</td>
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<tr>
<td><strong>Sampling Location:</strong> STP Water Treated</td>
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<td>14/06/2017</td>
<td>7.08</td>
<td>63.22</td>
<td>17.1</td>
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<td>&lt;0.50</td>
<td>0.27</td>
<td>BDL (DL 0.02 mg/l)</td>
<td>0.24</td>
<td>0.18</td>
<td>BDL (DL 0.01 mg/l)</td>
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### July 2017

<table>
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<th>Parameter →</th>
<th>pH</th>
<th>COD</th>
<th>BOD</th>
<th>TSS</th>
<th>Oil &amp; Grease</th>
<th>Copper as Cu</th>
<th>Nickel as Ni</th>
<th>Lead as Pb</th>
<th>Mercury as Hg</th>
<th>Hexavalent Chromium as Cr+6</th>
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<tbody>
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<td><strong>Sampling Location:</strong> Work Shop ETP Water</td>
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<td>12/07/2017</td>
<td>7.42</td>
<td>85.30</td>
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<td>81.09</td>
<td>24.09</td>
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<td>0.32</td>
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<td>0.18</td>
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### August 2017

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<th>pH</th>
<th>COD</th>
<th>BOD</th>
<th>TSS</th>
<th>Oil &amp; Grease</th>
<th>Copper as Cu</th>
<th>Nickel as Ni</th>
<th>Lead as Pb</th>
<th>Mercury as Hg</th>
<th>Hexavalent Chromium as Cr+6</th>
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<tbody>
<tr>
<td><strong>Sampling Location:</strong> Coal Washery Mine Drain water</td>
<td>12/07/2017</td>
<td>7.00</td>
<td>85.0</td>
<td>21.3</td>
<td>26.8</td>
<td>0.50</td>
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<td>0.25</td>
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<td>21/07/2017</td>
<td>7.49</td>
<td>76.0</td>
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### September 2017

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<tr>
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<th>COD</th>
<th>BOD</th>
<th>TSS</th>
<th>Oil &amp; Grease</th>
<th>Copper as Cu</th>
<th>Nickel as Ni</th>
<th>Lead as Pb</th>
<th>Mercury as Hg</th>
<th>Hexavalent Chromium as Cr+6</th>
</tr>
</thead>
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<tr>
<td><strong>Sampling Location:</strong> Work Shop ETP Water</td>
<td>09/09/2017</td>
<td>7.77</td>
<td>87.9</td>
<td>21.4</td>
<td>28.0</td>
<td>0.50</td>
<td>0.33</td>
<td>BDL(DL 0.02 mg/l)</td>
<td>0.28</td>
<td>0.18</td>
</tr>
<tr>
<td></td>
<td>23/09/2017</td>
<td>7.90</td>
<td>74.3</td>
<td>23.7</td>
<td>28.0</td>
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<td>BDL(DL 0.02 mg/l)</td>
<td>0.29</td>
<td>0.17</td>
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</tbody>
</table>

| **Sampling Location:** Coal Washery Mine Drain water | 09/09/2017 | 7.87 | 79.8 | 21.4 | 28.0 | 0.50 | 0.38 | BDL(DL 0.02 mg/l) | 0.21 | 0.15 | BDL(DL 0.01 mg/l) |
| | 23/09/2017 | 7.66 | 85.4 | 26.8 | 21.0 | 0.50 | 0.35 | BDL(DL 0.02 mg/l) | 0.18 | 0.14 | BDL(DL 0.01 mg/l) |
| **Sampling Location:** STP Water Treated | 09/09/2017 | 7.53 | 68.7 | 16.9 | 22.7 | 0.50 | 0.19 | BDL(DL 0.02 mg/l) | 0.13 | 0.09 | BDL(DL 0.01 mg/l) |
| | 23/09/2017 | 7.58 | 74.3 | 13.6 | 22.0 | 0.50 | 0.22 | BDL(DL 0.02 mg/l) | 0.20 | 0.11 | BDL(DL 0.01 mg/l) |
**STANDARD LIMITS AS PER CBCB**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Limits as per CPCB</th>
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<tbody>
<tr>
<td>pH (at 25 °C)</td>
<td>6.5 - 8.5</td>
</tr>
<tr>
<td>COD</td>
<td>250</td>
</tr>
<tr>
<td>BOD (3 Days at 27 °C)</td>
<td>30</td>
</tr>
<tr>
<td>Total Suspended Solids</td>
<td>100</td>
</tr>
<tr>
<td>Oil &amp; Grease</td>
<td>10</td>
</tr>
<tr>
<td>Copper as Cu</td>
<td>3.0</td>
</tr>
<tr>
<td>Nickel as Ni</td>
<td>3.0</td>
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<tr>
<td>Lead as Pb</td>
<td>0.1</td>
</tr>
<tr>
<td>Mercury as Hg</td>
<td>0.01</td>
</tr>
<tr>
<td>Hexavalent Chromium as Cr+6</td>
<td>0.1</td>
</tr>
</tbody>
</table>
## 1. DRINKING WATER

**Sampling Date:** 18/04/2017  
**Sample Description:** WTP Water  
**Sample Location:** Potable water Supply at Colony Area

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Parameter</th>
<th>Test-Method</th>
<th>Result</th>
<th>Unit</th>
<th>Limits of IS:10500 -2012</th>
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</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Desirable limit (Max.)</td>
</tr>
<tr>
<td>1.</td>
<td>pH (at 25 °C)</td>
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<td>6.5 to 8.5</td>
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<tr>
<td>3.</td>
<td>Turbidity</td>
<td>APHA 22nd Edition, 2130 B</td>
<td>BDL (DL 1 NTU)</td>
<td>NTU</td>
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<tr>
<td>6.</td>
<td>Total Hardness as CaCO₃</td>
<td>APHA 22nd Edition, 2340 C</td>
<td>45.25</td>
<td>mg/l</td>
<td>200</td>
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<tr>
<td>7.</td>
<td>Calcium as Ca</td>
<td>APHA 22nd Edition, 3500 Ca B</td>
<td>16.2</td>
<td>mg/l</td>
<td>75</td>
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<tr>
<td>8.</td>
<td>Alkalinity as CaCO₃</td>
<td>APHA 22nd Edition, 2320 B</td>
<td>39.4</td>
<td>mg/l</td>
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<tr>
<td>9.</td>
<td>Chloride as Cl</td>
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<td>14.0</td>
<td>mg/l</td>
<td>250</td>
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<tr>
<td>10.</td>
<td>Cyanide as CN</td>
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<tr>
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<td>Sulphate as SO₄</td>
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<td>2.8</td>
<td>mg/l</td>
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<td>14.</td>
<td>Fluoride as F</td>
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<td>0.20</td>
<td>mg/l</td>
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<tr>
<td>15.</td>
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<td>IS 3025 (P-34) 1988</td>
<td>1.00</td>
<td>mg/l</td>
<td>45</td>
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<td>16.</td>
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<td>0.12</td>
<td>mg/l</td>
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<td>17.</td>
<td>Aluminium as Al</td>
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<td>BDL(DL 0.03 mg/l)</td>
<td>mg/l</td>
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<tr>
<td>18.</td>
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<td>BDL(DL 0.01 mg/l)</td>
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<td>19.</td>
<td>Total Chromium as Cr</td>
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<td>mg/l</td>
<td>0.05</td>
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<tr>
<td>20.</td>
<td>Phenolic Compounds</td>
<td>APHA 22nd Edition, 5530 C</td>
<td>BDL(DL 0.001 mg/l)</td>
<td>mg/l</td>
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<tr>
<td>21.</td>
<td>Mineral Oil</td>
<td>Clause 6 of IS:3025(Part 39)</td>
<td>BDL(DL 0.01 mg/l)</td>
<td>mg/l</td>
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<tr>
<td>22.</td>
<td>Anionic Detergents as MBAS</td>
<td>APHA 22nd Edition, 5540 C</td>
<td>BDL(DL 0.02 mg/l)</td>
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<td>mg/l</td>
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<td>24.</td>
<td>Copper as Cu</td>
<td>APHA 22nd Edition, 3111 B</td>
<td>BDL(DL 0.02 mg/l)</td>
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<td>0.05</td>
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<tr>
<td>25.</td>
<td>Manganese as Mn</td>
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<td>Result</td>
<td>Unit</td>
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<td>Desirable limit (Max.)</td>
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<tr>
<td>1.</td>
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<tr>
<td>17.</td>
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<td>Zinc as Zn</td>
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<td>BDL(DL 0.02 mg/l)</td>
<td>mg/l</td>
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<td>Copper as Cu</td>
<td>APHA 22nd Edition, 3111 B</td>
<td>BDL(DL 0.02 mg/l)</td>
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<td>0.05</td>
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<tr>
<td>25.</td>
<td>Manganese as Mn</td>
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<td>mg/l</td>
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<td>0.003</td>
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<td>Test-Method</td>
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<tr>
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<td>pH (at 25 °C)</td>
<td>APHA 22nd Edition, 4500-H+ B</td>
<td>7.72</td>
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<td>6.5 to 8.5</td>
</tr>
<tr>
<td>3.</td>
<td>Turbidity</td>
<td>APHA 22nd Edition, 2130 B</td>
<td>BDL (DL 1 NTU)</td>
<td>NTU</td>
<td>1</td>
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<tr>
<td>6.</td>
<td>Total Hardness as CaCO₃</td>
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<td>mg/l</td>
<td>200</td>
</tr>
<tr>
<td>7.</td>
<td>Calcium as Ca</td>
<td>APHA 22nd Edition, 3500 Ca B</td>
<td>26.88</td>
<td>mg/l</td>
<td>75</td>
</tr>
<tr>
<td>8.</td>
<td>Alkalinity as CaCO₃</td>
<td>APHA 22nd Edition, 2320 B</td>
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<td>mg/l</td>
<td>200</td>
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<td>APHA 22nd Edition, 4500-Cl- B</td>
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<td>mg/l</td>
<td>250</td>
</tr>
<tr>
<td>10.</td>
<td>Cyanide as CN</td>
<td>APHA 22nd Edition, 4500- CN- D</td>
<td>BDL (DL 0.02 mg/l)</td>
<td>mg/l</td>
<td>0.05</td>
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<tr>
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<td>4.98</td>
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<tr>
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<td>Sulphate as SO₄</td>
<td>APHA 22nd Edition, 4500 E</td>
<td>6.22</td>
<td>mg/l</td>
<td>200</td>
</tr>
<tr>
<td>14.</td>
<td>Fluoride as F</td>
<td>APHA 22nd Edition, 4500- F- D</td>
<td>0.25</td>
<td>mg/l</td>
<td>1.0</td>
</tr>
<tr>
<td>15.</td>
<td>Nitrate as NO₃</td>
<td>IS 3025 (P-34) 1988</td>
<td>5.98</td>
<td>mg/l</td>
<td>45</td>
</tr>
<tr>
<td>16.</td>
<td>Iron as Fe</td>
<td>APHA 22nd Edition, 3500-Fe B</td>
<td>0.30</td>
<td>mg/l</td>
<td>0.3</td>
</tr>
<tr>
<td>17.</td>
<td>Aluminium as Al</td>
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<td>mg/l</td>
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<td>APHA 22nd Edition, 4500B C</td>
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<td>0.05</td>
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<tr>
<td>20</td>
<td>Phenolic Compounds</td>
<td>APHA 22nd Edition, 5530 C</td>
<td>BDL(DL 0.001 mg/l)</td>
<td>mg/l</td>
<td>0.001</td>
</tr>
<tr>
<td>21</td>
<td>Mineral Oil</td>
<td>Clause 6 of IS:3025(Part 39)</td>
<td>BDL(DL 0.01mg/l)</td>
<td>mg/l</td>
<td>0.5</td>
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### 2.4. GROUND WATER

**Sampling Date:** 12/04/2017  
**Sample Description:** Hand Pump Water  
**Sample Location:** Village- Parsa

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<th>S. No.</th>
<th>Parameter</th>
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<th>Result</th>
<th>Unit</th>
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<td>NTU</td>
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<tr>
<td>6.</td>
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<td>7.</td>
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<tr>
<td>8.</td>
<td>Alkalinity as CaCO₃</td>
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<td>10.</td>
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<td>APHA 22nd Edition, 4500-F-D</td>
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<td>mg/l</td>
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<tr>
<td>15.</td>
<td>Nitrate as NO₃</td>
<td>IS 3025 (P-34) 1988</td>
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<td>mg/l</td>
<td>45</td>
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<tr>
<td>16.</td>
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<td>APHA 22nd Edition, 3500-Fe B</td>
<td>0.18</td>
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<td>0.3</td>
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<td>17.</td>
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<td>APHA 22nd Edition, 3500-Al</td>
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<td>28.1</td>
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<td>4.</td>
<td>Total Dissolved Solids</td>
<td>APHA 22nd Edition, 2540 C</td>
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<td>5.</td>
<td>Dissolved Oxygen</td>
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<tr>
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<td>1.5</td>
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<tr>
<td>8.</td>
<td>Iron as Fe</td>
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<td>0.3</td>
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<td>Chromium as Cr⁶⁺</td>
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<td>BDL (DL 0.01 mg/l)</td>
<td>0.05</td>
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<td>10.</td>
<td>Anionic Detergents as MBAS</td>
<td>APHA 22nd Edition, 5540 C</td>
<td>BDL (DL 0.02 mg/l)</td>
<td>mg/l</td>
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<td>Copper as Cu</td>
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<td>mg/l</td>
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<td>mg/l</td>
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<td>BDL (DL 0.001 mg/l)</td>
<td>mg/l</td>
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</table>

3.1 SURFACE WATER

Sampling Date: 12/04/2017

Sample Discription: Surface Water

Sample Location: Village- Tara Nala
## 3.2 SURFACE WATER

**Sampling Date:** 12/04/2017  
**Sample Discription:** Atem River  
**Sample Location:** Village - Tara Nala

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<tr>
<th>S. No.</th>
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<td>250</td>
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<td>21.</td>
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<td>APHA 22nd Edition, 2540 C</td>
<td>86.00</td>
<td>mg/l</td>
<td>500</td>
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<tr>
<td>22.</td>
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<td>23.</td>
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<td>BDL(DL 0.02 mg/l)</td>
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<td>IS 3025 (P-34) 1988</td>
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## 1.DRINKING WATER

**Sampling Date:** 17/05/2017  
**Sample Description:** WTP Water  
**Sample Location:** Potable water Supply at Colony Area

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<th>S. No.</th>
<th>Parameter</th>
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<td>3.</td>
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<td>NTU</td>
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1. **DRINKING WATER**

**Sampling Date:** 15/06/2017

**Sample Description:** WTP Water

**Sample Location:** Potable water Supply at Colony Area

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**June 2017**

**Sample Description:** WTP Water

**Sample Location:** Potable water Supply at Colony Area

<table>
<thead>
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<th>S. No.</th>
<th>Parameter</th>
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<th>Result</th>
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<td>Desirable limit (Max.)</td>
</tr>
<tr>
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<td>APHA 22nd Edition, 4500 CN- D</td>
<td>BDL(DL 0.02 mg/l)</td>
<td>mg/l</td>
<td>0.05</td>
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<tr>
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<td>Magnesium as Mg</td>
<td>APHA 22nd Edition, 2340 B</td>
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<td>mg/l</td>
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<tr>
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<td>mg/l</td>
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<tr>
<td>14.</td>
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<td>mg/l</td>
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<tr>
<td>15.</td>
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<td>IS 3025 (P-34) 1988</td>
<td>1.03</td>
<td>mg/l</td>
<td>45</td>
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<tr>
<td>16.</td>
<td>Iron as Fe</td>
<td>APHA 22nd Edition, 3500-Fe B</td>
<td>0.14</td>
<td>mg/l</td>
<td>0.3</td>
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<tr>
<td>17.</td>
<td>Aluminium as Al</td>
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<td>BDL(DL 0.03 mg/l)</td>
<td>mg/l</td>
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<td>18.</td>
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<td>APHA 22nd Edition, 4500B C</td>
<td>BDL(DL 0.01 mg/l)</td>
<td>mg/l</td>
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<tr>
<td>19.</td>
<td>Total Chromium as Cr</td>
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<td>BDL(DL 0.01 mg/l)</td>
<td>mg/l</td>
<td>0.05</td>
</tr>
<tr>
<td>20.</td>
<td>Phenolic Compounds</td>
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<td>BDL(DL 0.001 mg/l)</td>
<td>mg/l</td>
<td>0.001</td>
</tr>
<tr>
<td>21.</td>
<td>Mineral Oil</td>
<td>Clause 6 of IS:3025(Part 39)</td>
<td>BDL(DL 0.01mg/l)</td>
<td>mg/l</td>
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<td>BDL(DL 0.02 mg/l)</td>
<td>mg/l</td>
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<tr>
<td>23.</td>
<td>Zinc as Zn</td>
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<td>BDL(DL 0.02 mg/l)</td>
<td>mg/l</td>
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<tr>
<td>24.</td>
<td>Copper as Cu</td>
<td>APHA 22nd Edition, 3111 B</td>
<td>BDL(DL 0.02 mg/l)</td>
<td>mg/l</td>
<td>0.05</td>
</tr>
<tr>
<td>25.</td>
<td>Manganese as Mn</td>
<td>APHA 22nd Edition, 3111 B</td>
<td>BDL(DL 0.10 mg/l)</td>
<td>mg/l</td>
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<td>mg/l</td>
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<td>27.</td>
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<td>28.</td>
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<td>mg/l</td>
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<td>29.</td>
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<td>mg/l</td>
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</tr>
<tr>
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<td>Mercury as Hg</td>
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<td>BDL(DL 0.001 mg/l)</td>
<td>mg/l</td>
<td>0.001</td>
</tr>
<tr>
<td>31.</td>
<td>Total Coliform</td>
<td>IS 1622,1981(Reaffirmed 2003)</td>
<td>&lt;2/100ml</td>
<td>MPN/100ml</td>
<td>Shall not be detectable in any 100 ml sample</td>
</tr>
<tr>
<td>32.</td>
<td>E. Coli</td>
<td>IS 1622,1981(Reaffirmed 2003)</td>
<td>Absent</td>
<td>MPN/100ml</td>
<td>Shall not be detectable in any 100 ml sample</td>
</tr>
</tbody>
</table>
## 1.1. DRINKING WATER

### Sample Description: WTP Water

### Sample Location: Potable water Supply at Colony Area

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Parameter</th>
<th>Test-Method</th>
<th>Result</th>
<th>Unit</th>
<th>Limits of IS:10500 -2012</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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<td></td>
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<td>Requirement (Acceptable Limit)</td>
</tr>
<tr>
<td>1.</td>
<td>pH (at 25 °C)</td>
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<td>7.45</td>
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<td>6.5 to 8.5</td>
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**July 2017**
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<th>No.</th>
<th>Parameter</th>
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</tr>
<tr>
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<tr>
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<td>Fluoride as F</td>
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<tr>
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<tr>
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<td>Iron as Fe</td>
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<tr>
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<td>APHA (22nd Edition) 2012, 4500B C</td>
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<td>*BDL</td>
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<tr>
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<td>*BDL</td>
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<tr>
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<td>*BDL</td>
<td></td>
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<tr>
<td>21</td>
<td>#Mineral Oil</td>
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<td>Anionic Detergents as MBAS</td>
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<td>*BDL</td>
<td></td>
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<td>*BDL</td>
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<tr>
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<td>Total Coliform</td>
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</tr>
<tr>
<td>32</td>
<td>E. Coli</td>
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<td></td>
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### 1.2. DRINKING WATER

**Sample Description:** WTP Water

**Sample Location:** Potable water Supply at Colony Area

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Parameter</th>
<th>Test-Method</th>
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<td>pH (at 25 °C)</td>
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<td>NTU</td>
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<tr>
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<td>mg/l</td>
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<tr>
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<td>mg/l</td>
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<td>mg/l</td>
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<td>IS 3025 (P-34) 2003</td>
<td>1.19</td>
<td>mg/l</td>
<td>45</td>
</tr>
<tr>
<td>16</td>
<td>Iron as Fe</td>
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<td>0.16</td>
<td>mg/l</td>
<td>0.3</td>
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<td>mg/l</td>
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<tr>
<td>18</td>
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<td>*BDL(**DL 0.1 mg/l)</td>
<td>mg/l</td>
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<tr>
<td>19</td>
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<td>mg/l</td>
<td>0.05</td>
</tr>
<tr>
<td>20</td>
<td>Phenolic Compounds</td>
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<tr>
<td>21</td>
<td>Mineral Oil</td>
<td>Clause 6 of IS:3025(Part 39)</td>
<td>*BDL(**DL 0.01mg/l)</td>
<td>mg/l</td>
<td>0.5</td>
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<tr>
<td>22</td>
<td>Anionic Detergents as MBAS</td>
<td>APHA (22nd Edition)2012, 5540 C</td>
<td>*BDL(**DL 0.02 mg/l)</td>
<td>mg/l</td>
<td>0.2</td>
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<tr>
<td>23</td>
<td>Zinc as Zn</td>
<td>APHA (22nd Edition)2012, 3111 B</td>
<td>*BDL(**DL 0.03 mg/l)</td>
<td>mg/l</td>
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</tr>
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<td>24</td>
<td>Copper as Cu</td>
<td>APHA (22nd Edition)2012, 3111 B</td>
<td>*BDL(**DL 0.03 mg/l)</td>
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<td>0.05</td>
</tr>
<tr>
<td>25</td>
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<td>*BDL(**DL 0.06 mg/l)</td>
<td>mg/l</td>
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<td>mg/l</td>
<td>0.003</td>
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<td>mg/l</td>
<td>0.01</td>
</tr>
<tr>
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<td>*BDL(**DL 0.01 mg/l)</td>
<td>mg/l</td>
<td>0.01</td>
</tr>
<tr>
<td>29</td>
<td>Arsenic as As</td>
<td>APHA (22nd Edition)2012, 3111 B</td>
<td>*BDL(**DL 0.01 mg/l)</td>
<td>mg/l</td>
<td>0.01</td>
</tr>
<tr>
<td>30</td>
<td>Mercury as Hg</td>
<td>APHA (22nd Edition)2012, 3111 B</td>
<td>*BDL(**DL 0.001 mg/l)</td>
<td>mg/l</td>
<td>0.001</td>
</tr>
<tr>
<td>31</td>
<td>Total Coliform</td>
<td>IS 1622,1981(Reaffirmed 2003)</td>
<td>Absent</td>
<td>MPN/100ml</td>
<td>Shall not be detectable in any 100 ml sample</td>
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### 1.3. DRINKING WATER

**Sample Description:** WTP Water

**Sample Location:** Potable water Supply at Colony Area

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Parameter</th>
<th>Test-Method</th>
<th>Result</th>
<th>Unit</th>
<th>Limits of IS:10500 -2012</th>
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<td></td>
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<td></td>
<td></td>
<td></td>
<td>Requirement (Acceptable Limit)</td>
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<tr>
<td>1.</td>
<td>pH (at 25 °C)</td>
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<td>6.5 to 8.5</td>
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<tr>
<td>5.</td>
<td>Taste</td>
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<td>Agreeable</td>
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<tr>
<td>6.</td>
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<td>APHA (22nd Edition)2012, 2340 C</td>
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<td>43.00</td>
<td>mg/l</td>
<td>200</td>
</tr>
<tr>
<td>9.</td>
<td>Chloride as Cl</td>
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<td>mg/l</td>
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<tr>
<td>10.</td>
<td>Cyanide as CN</td>
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<tr>
<td>14.</td>
<td>Fluoride as F</td>
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<td>0.24</td>
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<td>1.0</td>
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<td>15.</td>
<td>Nitrate as NO₃</td>
<td>IS 3025 (P-34) 2003</td>
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<td>mg/l</td>
<td>45</td>
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<td>16.</td>
<td>Iron as Fe</td>
<td>APHA (22nd Edition)2012, 3500-Fe B</td>
<td>0.17</td>
<td>mg/l</td>
<td>0.3</td>
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<tr>
<td>17.</td>
<td>Aluminium as Al</td>
<td>APHA (22nd Edition)2012, 3111 B</td>
<td>*BDL(**DL 0.03 mg/l)</td>
<td>mg/l</td>
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<td>18.</td>
<td>Boron</td>
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<td>*BDL(**DL 0.1 mg/l)</td>
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<td>19.</td>
<td>Total Chromium as Cr</td>
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<td>mg/l</td>
<td>0.05</td>
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<tr>
<td>20.</td>
<td>Phenolic Compounds</td>
<td>APHA (22nd Edition)2012, 5530 C</td>
<td>*BDL(**DL 0.001 mg/l)</td>
<td>mg/l</td>
<td>0.001</td>
</tr>
<tr>
<td>21.</td>
<td>Mineral Oil</td>
<td>Clause 6 of IS:3025(Part 39)</td>
<td>*BDL(**DL 0.01mg/l)</td>
<td>mg/l</td>
<td>0.5</td>
</tr>
<tr>
<td>22.</td>
<td>Anionic Detergents as MBAS</td>
<td>APHA (22nd Edition)2012, 5540 C</td>
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<td>mg/l</td>
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<tr>
<td>23.</td>
<td>Zinc as Zn</td>
<td>APHA (22nd Edition)2012, 3111 B</td>
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<td>Copper as Cu</td>
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<tr>
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<td>*BDL(**DL 0.06 mg/l)</td>
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<td>Selenium as Se</td>
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<td>29.</td>
<td>Arsenic as As</td>
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<td>*BDL(**DL 0.01 mg/l)</td>
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### Parameters and Results

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<th>S. No.</th>
<th>Parameter</th>
<th>Test-Method</th>
<th>Result</th>
<th>Unit</th>
<th>Limit (Acceptable Limit)</th>
<th>Permissible limit in the Absence of Alternate Source</th>
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<td>1.</td>
<td>pH (at 25 °C)</td>
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<td>6.5 to 8.5</td>
<td>No Relaxation</td>
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<td>3.</td>
<td>Turbidity</td>
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<td>5.</td>
<td>Taste</td>
<td>APHA (22nd Edition)2012, 2160 B</td>
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<td>Agreeable</td>
<td>Agreeable</td>
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<tr>
<td>6.</td>
<td>Total Hardness as CaCO₃</td>
<td>APHA (22nd Edition)2012, 2340 C</td>
<td>120.25</td>
<td>mg/l</td>
<td>200</td>
<td>600</td>
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<tr>
<td>7.</td>
<td>Calcium as Ca</td>
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<td>Chloride as Cl</td>
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<td>10.</td>
<td>Cyanide as Cl</td>
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<td>mg/l</td>
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<td>No Relaxation</td>
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<tr>
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<td>13.</td>
<td>Sulphate as SO₄</td>
<td>APHA (22nd Edition)2012, 4500 E</td>
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<td>mg/l</td>
<td>200</td>
<td>400</td>
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<tr>
<td>14.</td>
<td>Fluoride as F</td>
<td>APHA (22nd Edition)2012, 4500-F° D</td>
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<td>mg/l</td>
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<td>1.5</td>
</tr>
<tr>
<td>15.</td>
<td>Nitrate as NO₃</td>
<td>IS 3025 (P-34) 2003</td>
<td>4.59</td>
<td>mg/l</td>
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<td>No Relaxation</td>
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<tr>
<td>16.</td>
<td>Iron as Fe</td>
<td>APHA (22nd Edition)2012, 3500-Fe B</td>
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<td>mg/l</td>
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<td>17.</td>
<td>Aluminium as Al</td>
<td>APHA (22nd Edition)2012, 3111 B</td>
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<td>18.</td>
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<td>APHA (22nd Edition)2012, 4500B C</td>
<td>*BDL (**DL 0.1 mg/l)</td>
<td>mg/l</td>
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<tr>
<td>20.</td>
<td>Phenolic Compounds</td>
<td>APHA (22nd Edition)2012, 5530 C</td>
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<td>Mineral Oil</td>
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<td>*BDL (**DL 0.01mg/l)</td>
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<td>Anionic Detergents as MBAS</td>
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<td>mg/l</td>
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<td>1.0</td>
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<td>23.</td>
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<td>Copper as Cu</td>
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<td>mg/l</td>
<td>0.05</td>
<td>1.5</td>
</tr>
<tr>
<td>25.</td>
<td>Manganese as Mn</td>
<td>APHA (22nd Edition)2012, 3111 B</td>
<td>*BDL (**DL 0.06 mg/l)</td>
<td>mg/l</td>
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### Table: Water Quality Parameters

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<th>S. No.</th>
<th>Parameter</th>
<th>Test-Method</th>
<th>Result</th>
<th>Unit</th>
<th>Limits of IS:10500 -2012</th>
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<td>Requirement (Acceptable Limit)</td>
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<td>pH (at 25 °C)</td>
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<tr>
<td>5.</td>
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<tr>
<td>6.</td>
<td>Total Hardness as CaCO₃</td>
<td>APHA (22nd Edition)2012, 2340 C</td>
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<td>mg/l</td>
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<tr>
<td>7.</td>
<td>Calcium as Ca</td>
<td>APHA (22nd Edition)2012, 3500 Ca B</td>
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<td>mg/l</td>
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<td>9.</td>
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<td>mg/l</td>
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<tr>
<td>10.</td>
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<tr>
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<td>13.</td>
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<td>mg/l</td>
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<tr>
<td>14.</td>
<td>Fluoride as F</td>
<td>APHA (22nd Edition)2012, 4500-F D</td>
<td>0.28</td>
<td>mg/l</td>
<td>1.0</td>
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<tr>
<td>15.</td>
<td>Nitrate as NO₃</td>
<td>IS 3025 (P-34) 2003</td>
<td>4.99</td>
<td>mg/l</td>
<td>45</td>
</tr>
<tr>
<td>16.</td>
<td>Iron as Fe</td>
<td>APHA (22nd Edition)2012, 3500-Fe B</td>
<td>0.32</td>
<td>mg/l</td>
<td>0.3</td>
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<td>17.</td>
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<td>*BDL(**DL 0.03 mg/l)</td>
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<td>*BDL(**DL 0.1 mg/l)</td>
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<tr>
<td>20.</td>
<td>Phenolic Compounds</td>
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<td>*BDL(**DL 0.001 mg/l)</td>
<td>mg/l</td>
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<td>21.</td>
<td># Mineral Oil</td>
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<td>*BDL(**DL 0.01mg/l)</td>
<td>mg/l</td>
<td>0.5</td>
</tr>
<tr>
<td>22.</td>
<td>Anionic Detergents as MBAS</td>
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<tr>
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### 2.3. GROUND WATER

**Sampling Date: 14/07/2017**  
**Sample Description: Hand Pump Water**  
**Sample Location: Village- Baigapara**

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<th>S. No.</th>
<th>Parameter</th>
<th>Test-Method</th>
<th>Result</th>
<th>Unit</th>
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<td>(Acceptable</td>
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<td>in the Absence of</td>
</tr>
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<td></td>
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<td></td>
<td>Limit)</td>
<td></td>
<td>Alternate Source)</td>
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<td>pH (at 25 °C)</td>
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<td>6.5 to 8.5</td>
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<td>3.</td>
<td>Turbidity</td>
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<td>*BDL (**DL 0.1 NTU)</td>
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<tr>
<td>5.</td>
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<td>6.</td>
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<td>APHA (22nd Edition)2012, 2340 C</td>
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<td>mg/l</td>
<td>200</td>
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<td>mg/l</td>
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<tr>
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<td>*BDL (**DL 0.02 mg/l)</td>
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<tr>
<td>11.</td>
<td>Magnesium as Mg</td>
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<td>mg/l</td>
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<tr>
<td>12.</td>
<td>Total Dissolved Solids</td>
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<td>mg/l</td>
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<td>13.</td>
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<td>mg/l</td>
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<td>APHA (22nd Edition)2012, 4500-F D</td>
<td>0.32</td>
<td>mg/l</td>
<td>1.0</td>
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<tr>
<td>15.</td>
<td>Nitrate as NO₃</td>
<td>IS 3025 (P-34) 2003</td>
<td>8.98</td>
<td>mg/l</td>
<td>45</td>
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<tr>
<td>16.</td>
<td>Iron as Fe</td>
<td>APHA (22nd Edition)2012, 3500-Fe B</td>
<td>0.28</td>
<td>mg/l</td>
<td>0.3</td>
</tr>
<tr>
<td>17.</td>
<td>#Aluminium as Al</td>
<td>APHA (22nd Edition)2012, 3111 B</td>
<td>*BDL (**DL 0.03 mg/l)</td>
<td>mg/l</td>
<td>0.03</td>
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<td>APHA (22nd Edition)2012, 4500B C</td>
<td>*BDL (**DL 0.1 mg/l)</td>
<td>mg/l</td>
<td>0.5</td>
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<tr>
<td>19.</td>
<td>Total Chromium as Cr</td>
<td>APHA (22nd Edition)2012, 3111 B</td>
<td>*BDL (**DL 0.03 mg/l)</td>
<td>mg/l</td>
<td>0.05</td>
</tr>
<tr>
<td>20.</td>
<td>Phenolic Compounds</td>
<td>APHA (22nd Edition)2012, 5530 C</td>
<td>*BDL (**DL 0.001 mg/l)</td>
<td>mg/l</td>
<td>0.001</td>
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</table>
### 2.4. GROUND WATER

**Sampling Date: 14/07/2017**

**Sample Discription: Hand Pump Water**

**Sample Location: Village- Parsa**

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Parameter</th>
<th>Test-Method</th>
<th>Result</th>
<th>Unit</th>
<th>Limits of IS:10500 -2012</th>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>Requirement (Acceptable Limit)</td>
</tr>
<tr>
<td>1.</td>
<td>pH (at 25 °C)</td>
<td>APHA (22nd Edition)2012, 4500-H+ B</td>
<td>7.65</td>
<td>--</td>
<td>6.5 to 8.5</td>
</tr>
<tr>
<td>3.</td>
<td>Turbidity</td>
<td>APHA (22nd Edition)2012, 2130 B</td>
<td>*BDL (**DL 0. 1 NTU)</td>
<td>NTU</td>
<td>1</td>
</tr>
<tr>
<td>5.</td>
<td>Taste</td>
<td>APHA (22nd Edition)2012, 2160 B</td>
<td>Agreeable</td>
<td>--</td>
<td>Agreeable</td>
</tr>
<tr>
<td>6.</td>
<td>Total Hardness as CaCO₃</td>
<td>APHA (22nd Edition)2012, 2340 C</td>
<td>92.46</td>
<td>mg/l</td>
<td>200</td>
</tr>
<tr>
<td>7.</td>
<td>Calcium as Ca</td>
<td>APHA (22nd Edition)2012, 3500 Ca B</td>
<td>24.62</td>
<td>mg/l</td>
<td>75</td>
</tr>
<tr>
<td>8.</td>
<td>Alkalinity as CaCO₃</td>
<td>APHA (22nd Edition)2012, 2320 B</td>
<td>69.69</td>
<td>mg/l</td>
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<tr>
<td>9.</td>
<td>Chloride as Cl</td>
<td>APHA (22nd Edition)2012, 4500-Cl⁻ B</td>
<td>17.56</td>
<td>mg/l</td>
<td>250</td>
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<tr>
<td>10.</td>
<td>#Cyanide as CN</td>
<td>APHA (22nd Edition)2012, 4500 CN⁻ D</td>
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<td>mg/l</td>
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<tr>
<td>11.</td>
<td>Magnesium as Mg</td>
<td>APHA (22nd Edition)2012, 3500 Mg B</td>
<td>7.54</td>
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<td>12.</td>
<td>Total Dissolved Solids</td>
<td>APHA (22nd Edition)2012, 2540 C</td>
<td>140.00</td>
<td>mg/l</td>
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<tr>
<td>14.</td>
<td>Fluoride as F</td>
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<td>0.22</td>
<td>mg/l</td>
<td>1.0</td>
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<tr>
<td>15.</td>
<td>Nitrate as NO₃</td>
<td>IS 3025 (P-34) 2003</td>
<td>4.50</td>
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<td>45</td>
</tr>
<tr>
<td>S. No.</td>
<td>Parameter</td>
<td>Test-Method</td>
<td>Result</td>
<td>Unit</td>
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<tr>
<td>-------</td>
<td>-----------------------------------</td>
<td>------------------------------</td>
<td>----------</td>
<td>----------</td>
<td>----------------</td>
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<tr>
<td>3.</td>
<td>Chloride as Cl</td>
<td>APHA 22nd Edition, 4500-Cl- B</td>
<td>28.1</td>
<td>mg/l</td>
<td>250</td>
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<td>4.</td>
<td>Total Dissolved Solids</td>
<td>APHA 22nd Edition, 2540 C</td>
<td>135.0</td>
<td>mg/l</td>
<td>500</td>
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<tr>
<td>5.</td>
<td>Dissolved Oxygen</td>
<td>APHA 22nd Edition, 4500</td>
<td>4.7</td>
<td>mg/l</td>
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<tr>
<td>6.</td>
<td>Sulphate as SO₄</td>
<td>APHA 22nd Edition, 4500 E</td>
<td>25.44</td>
<td>mg/l</td>
<td>400</td>
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<tr>
<td>7.</td>
<td>Fluoride as F</td>
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<td>mg/l</td>
<td>1.5</td>
</tr>
<tr>
<td>8.</td>
<td>Iron as Fe</td>
<td>APHA 22nd Edition, 3500-Fe B</td>
<td>0.19</td>
<td>mg/l</td>
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<tr>
<td>9.</td>
<td>Chromium as Cr⁶⁺</td>
<td>APHA 22nd Edition, 3111 B</td>
<td>BDL(DL 0.01 mg/l)</td>
<td>0.05</td>
<td></td>
</tr>
<tr>
<td>10.</td>
<td>Anionic Detergents as MBAS</td>
<td>APHA 22nd Edition, 5540 C</td>
<td>BDL(DL 0.02 mg/l)</td>
<td>mg/l</td>
<td>0.2</td>
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<tr>
<td>11.</td>
<td>Zinc as Zn</td>
<td>APHA 22nd Edition, 3111 B</td>
<td>0.24</td>
<td>mg/l</td>
<td>15</td>
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<tr>
<td>12.</td>
<td>Copper as Cu</td>
<td>APHA 22nd Edition, 3111 B</td>
<td>BDL(DL 0.02 mg/l)</td>
<td>mg/l</td>
<td>1.5</td>
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<tr>
<td>13.</td>
<td>Oil &amp; Grease</td>
<td>APHA 22nd Edition, 5220 E</td>
<td>BDL</td>
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<tr>
<td>14.</td>
<td>Nitrate as NO₃</td>
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<td>15.</td>
<td>Arsenic as As</td>
<td>APHA 22nd Edition, 3111 B</td>
<td>BDL(DL 0.01 mg/l)</td>
<td>mg/l</td>
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<tr>
<td>16.</td>
<td>Lead as Pb</td>
<td>APHA 22nd Edition, 3111 B</td>
<td>BDL(DL 0.01 mg/l)</td>
<td>mg/l</td>
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</tbody>
</table>

### 3.1. SURFACE WATER

**Sampling Date:** 14/07/2017  
**Sample Description:** Surface Water  
**Sample Location:** Tara Nala
### 3.2. SURFACE WATER

**Sampling Date:** 14/07/2017  
**Sample Description:** Surface Water  
**Sample Location:** Atem River

<table>
<thead>
<tr>
<th>S. No.</th>
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<td>APHA 22nd Edition, 4500-Cl- B</td>
<td>14.32</td>
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<td>4.</td>
<td>Total Dissolved Solids</td>
<td>APHA 22nd Edition, 2540 C</td>
<td>89.50</td>
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<td>500</td>
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<td>Dissolved Oxygen</td>
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<td>6.</td>
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<tr>
<td>7.</td>
<td>Fluoride as F</td>
<td>APHA 22nd Edition, 4500-F- D</td>
<td>0.29</td>
<td>mg/l</td>
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<tr>
<td>8.</td>
<td>Iron as Fe</td>
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<td>0.20</td>
<td>mg/l</td>
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<td>9.</td>
<td>Chromium as Cr⁶⁺</td>
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<td>BDL(DL 0.01 mg/l)</td>
<td>0.05</td>
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<td>10.</td>
<td>Anionic Detergents as MBAS</td>
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<td>BDL(DL 0.02 mg/l)</td>
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<td>BDL(DL 0.02 mg/l)</td>
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<td>15</td>
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<tr>
<td>12.</td>
<td>Copper as Cu</td>
<td>APHA 22nd Edition, 3111 B</td>
<td>BDL(DL 0.02 mg/l)</td>
<td>mg/l</td>
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<tr>
<td>14.</td>
<td>Nitrate as NO₃</td>
<td>IS 3025 (P-34) 1988</td>
<td>6.50</td>
<td>mg/l</td>
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<tr>
<td>15.</td>
<td>#Arsenic as As</td>
<td>APHA 22nd Edition, 3111 B</td>
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<td>mg/l</td>
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<tr>
<td>16.</td>
<td>Lead as Pb</td>
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<td>BDL(DL 0.01mg/l)</td>
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<td>17.</td>
<td>Cadmium as Cd</td>
<td>APHA 22nd Edition, 3111 B</td>
<td>BDL(DL 0.001mg/l)</td>
<td>mg/l</td>
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### August 2017

#### 1.1. DRINKING WATER

**Sampling Date:** 02/08/2017  
**Sample Description:** WTP Water  
**Sample Location:** Potable water Supply at Colony Area

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Parameter</th>
<th>Test-Method</th>
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<td>(Acceptable Limit)</td>
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<td>Permissible limit in</td>
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<td></td>
<td></td>
<td></td>
<td>the Absence of</td>
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<td>pH (at 25 °C)</td>
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<td>6.5 to 8.5</td>
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<td>3.</td>
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<td>*BDL (*DL 0. 1 NTU)</td>
<td>NTU</td>
<td>1</td>
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<tr>
<td>No.</td>
<td>Parameter</td>
<td>Test-Method</td>
<td>Result</td>
<td>Unit</td>
<td>Requirement (Acceptable Limit)</td>
</tr>
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<td>-----</td>
<td>-----------</td>
<td>-------------</td>
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<td>------</td>
<td>---------------------------------</td>
</tr>
<tr>
<td>5.</td>
<td>Taste</td>
<td>APHA (22nd Edition) 2012, 2160 B</td>
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<td>--</td>
<td>Agreeable</td>
</tr>
<tr>
<td>6.</td>
<td>Total Hardness as CaCO₃</td>
<td>APHA (22nd Edition) 2012, 2340 C</td>
<td>41.78</td>
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<tr>
<td>7.</td>
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<td>APHA (22nd Edition) 2012, 3500 Ca B</td>
<td>13.50</td>
<td>mg/l</td>
<td>75</td>
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<tr>
<td>8.</td>
<td>Alkalinity as CaCO₃</td>
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<td>44.6</td>
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<td>200</td>
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<td>9.</td>
<td>Chloride as Cl</td>
<td>APHA (22nd Edition) 2012, 4500-Cl B</td>
<td>13.40</td>
<td>mg/l</td>
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<tr>
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<td>#Cyanide as CN</td>
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<td>*BDL (**DL 0.02 mg/l)</td>
<td>mg/l</td>
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<td>Magnesium as Mg</td>
<td>APHA (22nd Edition) 2012, 3500 Mg B</td>
<td>1.96</td>
<td>mg/l</td>
<td>30</td>
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<tr>
<td>13.</td>
<td>Sulphate as SO₄</td>
<td>APHA (22nd Edition) 2012, 4500 E</td>
<td>3.58</td>
<td>mg/l</td>
<td>200</td>
</tr>
<tr>
<td>14.</td>
<td>Fluoride as F</td>
<td>APHA (22nd Edition) 2012, 4500-F D</td>
<td>0.27</td>
<td>mg/l</td>
<td>1.0</td>
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<tr>
<td>15.</td>
<td>Nitrate as NO₃</td>
<td>IS 3025 (P-34) 2003</td>
<td>1.23</td>
<td>mg/l</td>
<td>45</td>
</tr>
<tr>
<td>16.</td>
<td>Iron as Fe</td>
<td>APHA (22nd Edition) 2012, 3500-Fe B</td>
<td>0.14</td>
<td>mg/l</td>
<td>0.3</td>
</tr>
<tr>
<td>17.</td>
<td>#Aluminium as Al</td>
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<td>*BDL (**DL 0.01 mg/l)</td>
<td>mg/l</td>
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<td>Boron</td>
<td>APHA (22nd Edition) 2012, 4500B C</td>
<td>*BDL (**DL 0.1 mg/l)</td>
<td>mg/l</td>
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<tr>
<td>19.</td>
<td>Total Chromium as Cr</td>
<td>APHA (22nd Edition) 2012, 3111 B</td>
<td>*BDL (**DL 0.03 mg/l)</td>
<td>mg/l</td>
<td>0.05</td>
</tr>
<tr>
<td>20.</td>
<td>Phenolic Compounds</td>
<td>APHA (22nd Edition) 2012, 5530 C</td>
<td>*BDL (**DL 0.001 mg/l)</td>
<td>mg/l</td>
<td>0.001</td>
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<tr>
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<td>#Mineral Oil</td>
<td>Clause 6 of IS:3025(Part 39)</td>
<td>*BDL (**DL 0.01mg/l)</td>
<td>mg/l</td>
<td>0.5</td>
</tr>
<tr>
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<td>Anionic Detergents as MBAS</td>
<td>APHA (22nd Edition) 2012, 5540 C</td>
<td>*BDL (**DL 0.02 mg/l)</td>
<td>mg/l</td>
<td>0.2</td>
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<tr>
<td>23.</td>
<td>Zinc as Zn</td>
<td>APHA (22nd Edition) 2012, 3111 B</td>
<td>*BDL (**DL 0.03 mg/l)</td>
<td>mg/l</td>
<td>5</td>
</tr>
<tr>
<td>24.</td>
<td>Copper as Cu</td>
<td>APHA (22nd Edition) 2012, 3111 B</td>
<td>*BDL (**DL 0.03 mg/l)</td>
<td>mg/l</td>
<td>0.05</td>
</tr>
<tr>
<td>25.</td>
<td>Manganese as Mn</td>
<td>APHA (22nd Edition) 2012, 3111 B</td>
<td>*BDL (**DL 0.06 mg/l)</td>
<td>mg/l</td>
<td>0.1</td>
</tr>
<tr>
<td>26.</td>
<td>Cadmium as Cd</td>
<td>APHA (22nd Edition) 2012, 3111 B</td>
<td>*BDL (**DL 0.06 mg/l)</td>
<td>mg/l</td>
<td>0.003</td>
</tr>
<tr>
<td>27.</td>
<td>Lead as Pb</td>
<td>APHA (22nd Edition) 2012, 3111 B</td>
<td>*BDL (**DL 0.13mg/l)</td>
<td>mg/l</td>
<td>0.01</td>
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<tr>
<td>28.</td>
<td>#Selenium as Se</td>
<td>APHA (22nd Edition) 2012, 3111 B</td>
<td>*BDL (**DL 0.01 mg/l)</td>
<td>mg/l</td>
<td>0.01</td>
</tr>
<tr>
<td>29.</td>
<td>#Arsenic as As</td>
<td>APHA (22nd Edition) 2012, 3111 B</td>
<td>*BDL (**DL 0.01 mg/l)</td>
<td>mg/l</td>
<td>0.01</td>
</tr>
<tr>
<td>30.</td>
<td>#Mercury as Hg</td>
<td>APHA (22nd Edition) 2012, 3111 B</td>
<td>*BDL (**DL 0.001 mg/l)</td>
<td>mg/l</td>
<td>0.001</td>
</tr>
<tr>
<td>31.</td>
<td>Total Coliform</td>
<td>IS 1622.1981(Reaffirmed 2003)</td>
<td>Absent</td>
<td>MPN/100ml</td>
<td>Shall not be detectable in any 100 ml sample</td>
</tr>
<tr>
<td>32.</td>
<td>E. Coli</td>
<td>IS 1622.1981(Reaffirmed 2003)</td>
<td>Absent</td>
<td>MPN/100ml</td>
<td>Shall not be detectable in any 100 ml sample</td>
</tr>
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</table>

1.2. DRINKING WATER

Sampling Date: 16/08/2017

Sample Description: WTP Water

Sample Location: Potable water Supply at Colony Area
<table>
<thead>
<tr>
<th>Sample Location: Potable water Supply at Colony Area</th>
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</thead>
<tbody>
<tr>
<td><strong>1.3. DRINKING WATER</strong></td>
</tr>
<tr>
<td><strong>Sampling Date:</strong> 30/08/2017</td>
</tr>
<tr>
<td><strong>Sample Description:</strong> WTP Water</td>
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</tbody>
</table>

<table>
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<tr>
<th>Parameter</th>
<th>Standard/Method Reference</th>
<th>Result</th>
<th>Unit</th>
<th>Limit/Standard</th>
<th>Compliance</th>
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<td>pH (at 25 °C)</td>
<td>APHA (22nd Edition) 2012, 4500-H</td>
<td>7.30</td>
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<td>6.5 to 8.5</td>
<td>No Relaxation</td>
</tr>
<tr>
<td>Colours</td>
<td>APHA (22nd Edition) 2012, 2120 B</td>
<td>*BDL (**DL 5Hazen)</td>
<td>Hazen</td>
<td>5</td>
<td>15</td>
</tr>
<tr>
<td>Turbidity</td>
<td>APHA (22nd Edition) 2012, 2130 B</td>
<td>*BDL (**DL 0.1 NTU)</td>
<td>NTU</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>Odour</td>
<td>APHA (22nd Edition) 2012, 2150 B</td>
<td>Agreement</td>
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<td>Agreeable</td>
<td>Agreeable</td>
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<tr>
<td>Taste</td>
<td>APHA (22nd Edition) 2012, 2160 B</td>
<td>Agreement</td>
<td>---</td>
<td>Agreeable</td>
<td>Agreeable</td>
</tr>
<tr>
<td>Total Hardness as CaCO₃</td>
<td>APHA (22nd Edition) 2012, 2340 C</td>
<td>48.63</td>
<td>mg/l</td>
<td>200</td>
<td>600</td>
</tr>
<tr>
<td>Calcium as Ca</td>
<td>APHA (22nd Edition) 2012, 3500 Ca B</td>
<td>17.10</td>
<td>mg/l</td>
<td>75</td>
<td>200</td>
</tr>
<tr>
<td>Alkalinity as CaCO₃</td>
<td>APHA (22nd Edition) 2012, 2320 B</td>
<td>50.17</td>
<td>mg/l</td>
<td>200</td>
<td>600</td>
</tr>
<tr>
<td>Chloride as Cl</td>
<td>APHA (22nd Edition) 2012, 4500-Cl B</td>
<td>17.28</td>
<td>mg/l</td>
<td>250</td>
<td>1000</td>
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<tr>
<td>Total Coliform</td>
<td>IS 1622,1981(Reaffirmed 2003)</td>
<td>Absent</td>
<td>MPN/100ml</td>
<td>Shall not be detectable in any 100 ml sample</td>
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<tr>
<td>Phenolic Compounds</td>
<td>APHA (22nd Edition) 2012, 5530 C</td>
<td>*BDL(**DL 0.01 mg/l)</td>
<td>mg/l</td>
<td>0.001</td>
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<tr>
<td>Iron as Fe</td>
<td>APHA (22nd Edition) 2012, 3500-Fe B</td>
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<td>mg/l</td>
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<tr>
<td>Total Dissolved Solids</td>
<td>APHA (22nd Edition) 2012, 2540 C</td>
<td>78.00</td>
<td>mg/l</td>
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<td>2000</td>
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<tr>
<td>Sulphate as SO₄</td>
<td>APHA (22nd Edition) 2012, 4500 E</td>
<td>3.98</td>
<td>mg/l</td>
<td>200</td>
<td>400</td>
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<tr>
<td>Fluoride as F</td>
<td>APHA (22nd Edition) 2012, 4500-F' D</td>
<td>0.29</td>
<td>mg/l</td>
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<td>1.5</td>
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<tr>
<td>Nitrates as NO₃</td>
<td>IS 3025 (P-34) 2003</td>
<td>1.27</td>
<td>mg/l</td>
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<td>No Relaxation</td>
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<tr>
<td>Magnesium as Mg</td>
<td>APHA (22nd Edition) 2012, 3500 Mg B</td>
<td>1.45</td>
<td>mg/l</td>
<td>30</td>
<td>100</td>
</tr>
<tr>
<td>Anionic Detergents as MBAS</td>
<td>APHA (22nd Edition) 2012, 5540 C</td>
<td>*BDL(**DL 0.02 mg/l)</td>
<td>mg/l</td>
<td>0.03</td>
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<tr>
<td>aluminium as Al</td>
<td>APHA (22nd Edition) 2012, 3111 B</td>
<td>*BDL(**DL 0.03 mg/l)</td>
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<td>Boron</td>
<td>APHA (22nd Edition) 2012, 4500B C</td>
<td>*BDL(**DL 0.1 mg/l)</td>
<td>mg/l</td>
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<td>No Relaxation</td>
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<tr>
<td>Total Chromium as Cr</td>
<td>APHA (22nd Edition) 2012, 3111 B</td>
<td>*BDL(**DL 0.03 mg/l)</td>
<td>mg/l</td>
<td>0.05</td>
<td>No Relaxation</td>
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<tr>
<td>Copper as Cu</td>
<td>APHA (22nd Edition) 2012, 3111 B</td>
<td>*BDL(**DL 0.03 mg/l)</td>
<td>mg/l</td>
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<td>1.5</td>
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<tr>
<td>Manganese as Mn</td>
<td>APHA (22nd Edition) 2012, 3111 B</td>
<td>*BDL(**DL 0.06 mg/l)</td>
<td>mg/l</td>
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<td>0.3</td>
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<td>Cadmium as Cd</td>
<td>APHA (22nd Edition) 2012, 3111 B</td>
<td>*BDL(**DL 0.06 mg/l)</td>
<td>mg/l</td>
<td>0.003</td>
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<td>Lead as Pb</td>
<td>APHA (22nd Edition) 2012, 3111 B</td>
<td>*BDL(**DL 0.13 mg/l)</td>
<td>mg/l</td>
<td>0.01</td>
<td>No Relaxation</td>
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<td>Zinc as Zn</td>
<td>APHA (22nd Edition) 2012, 3111 B</td>
<td>*BDL(**DL 0.03 mg/l)</td>
<td>mg/l</td>
<td>0.01</td>
<td>No Relaxation</td>
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<td>#Selenium as Se</td>
<td>APHA (22nd Edition) 2012, 3111 B</td>
<td>*BDL(**DL 0.01 mg/l)</td>
<td>mg/l</td>
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<td>0.05</td>
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<td>#Arsenic as As</td>
<td>APHA (22nd Edition) 2012, 3111 B</td>
<td>*BDL(**DL 0.01 mg/l)</td>
<td>mg/l</td>
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<td>0.05</td>
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<td>#Mercury as Hg</td>
<td>APHA (22nd Edition) 2012, 3111 B</td>
<td>*BDL(**DL 0.001 mg/l)</td>
<td>mg/l</td>
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<td>No Relaxation</td>
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<tr>
<td>Taste</td>
<td>APHA (22nd Edition) 2012, 2160 B</td>
<td>Agreement</td>
<td>---</td>
<td>Agreeable</td>
<td>Agreeable</td>
</tr>
<tr>
<td>Taste</td>
<td>APHA (22nd Edition) 2012, 2160 B</td>
<td>Agreement</td>
<td>---</td>
<td>Agreeable</td>
<td>Agreeable</td>
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*BDL (**DL 0.02 mg/l)
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<th>S. No.</th>
<th>Parameter</th>
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<th>Result</th>
<th>Unit</th>
<th>Limits of IS:10500 -2012</th>
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<td></td>
<td></td>
<td></td>
<td>Requirement (Acceptable</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>Limit)</td>
</tr>
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<td>1.</td>
<td>pH (at 25 °C)</td>
<td>APHA (22nd Edition)2012, 4500-H* B</td>
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<td>6.5 to 8.5</td>
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<td>2.</td>
<td>Colour</td>
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<td>*BDL (**DL 0.03 mg/l)</td>
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<td>3.</td>
<td>Turbidity</td>
<td>APHA (22nd Edition)2012, 2130 B</td>
<td>*BDL (**DL 0.1 NTU)</td>
<td>NTU</td>
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<td>5.</td>
<td>Taste</td>
<td>APHA (22nd Edition)2012, 2160 B</td>
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<td>Agreeable</td>
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<tr>
<td>6.</td>
<td>Total Hardness as CaCO₃</td>
<td>APHA (22nd Edition)2012, 2340 C</td>
<td>38.12</td>
<td>mg/l</td>
<td>200</td>
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<tr>
<td>7.</td>
<td>Calcium as Ca</td>
<td>APHA (22nd Edition)2012, 3500 Ca B</td>
<td>11.74</td>
<td>mg/l</td>
<td>75</td>
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<tr>
<td>8.</td>
<td>Alkalinity as CaCO₃</td>
<td>APHA (22nd Edition)2012, 2320 B</td>
<td>42.50</td>
<td>mg/l</td>
<td>200</td>
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<tr>
<td>9.</td>
<td>Chloride as Cl</td>
<td>APHA (22nd Edition)2012, 4500-Cl B</td>
<td>12.98</td>
<td>mg/l</td>
<td>250</td>
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<tr>
<td>10.</td>
<td>Cyanide as CN</td>
<td>APHA (22nd Edition)2012, 4500 CN D</td>
<td>*BDL (**DL 0.02 mg/l)</td>
<td>mg/l</td>
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<tr>
<td>11.</td>
<td>Magnesium as Mg</td>
<td>APHA (22nd Edition)2012, 3500 Mg B</td>
<td>2.14</td>
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<td>13.</td>
<td>Sulphate as SO₄</td>
<td>APHA (22nd Edition)2012, 4500 E</td>
<td>3.10</td>
<td>mg/l</td>
<td>200</td>
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<tr>
<td>14.</td>
<td>Fluoride as F</td>
<td>APHA (22nd Edition)2012, 4500-F D</td>
<td>0.21</td>
<td>mg/l</td>
<td>1.0</td>
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<tr>
<td>15.</td>
<td>Nitrate as NO₃</td>
<td>IS 3025 (P-34) 2003</td>
<td>0.12</td>
<td>mg/l</td>
<td>45</td>
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<tr>
<td>16.</td>
<td>Iron as Fe</td>
<td>APHA (22nd Edition)2012, 3500-Fe B</td>
<td>0.12</td>
<td>mg/l</td>
<td>0.3</td>
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<td>17.</td>
<td>Aluminium as Al</td>
<td>APHA (22nd Edition)2012, 3111 B</td>
<td>*BDL (**DL 0.03 mg/l)</td>
<td>mg/l</td>
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<td>18.</td>
<td>Boron</td>
<td>APHA (22nd Edition)2012, 4500B C</td>
<td>*BDL (**DL 0.1 mg/l)</td>
<td>mg/l</td>
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<td>19.</td>
<td>Total Chromium as Cr</td>
<td>APHA (22nd Edition)2012, 3111 B</td>
<td>*BDL (**DL 0.03 mg/l)</td>
<td>mg/l</td>
<td>0.05</td>
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<tr>
<td>20.</td>
<td>Phenolic Compounds</td>
<td>APHA (22nd Edition)2012, 5530 C</td>
<td>*BDL (**DL 0.001 mg/l)</td>
<td>mg/l</td>
<td>0.001</td>
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<tr>
<td>21.</td>
<td>Mineral Oil</td>
<td>Clause 6 of IS:3025(Part 39)</td>
<td>*BDL (**DL 0.01mg/l)</td>
<td>mg/l</td>
<td>0.5</td>
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<tr>
<td>22.</td>
<td>Anionic Detergents as MBAS</td>
<td>APHA (22nd Edition)2012, 5540 C</td>
<td>*BDL (**DL 0.02 mg/l)</td>
<td>mg/l</td>
<td>0.2</td>
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<tr>
<td>23.</td>
<td>Zinc as Zn</td>
<td>APHA (22nd Edition)2012, 3111 B</td>
<td>*BDL (**DL 0.03 mg/l)</td>
<td>mg/l</td>
<td>5</td>
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<tr>
<td>24.</td>
<td>Copper as Cu</td>
<td>APHA (22nd Edition)2012, 3111 B</td>
<td>*BDL (**DL 0.03 mg/l)</td>
<td>mg/l</td>
<td>0.05</td>
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<tr>
<td>25.</td>
<td>Manganese as Mn</td>
<td>APHA (22nd Edition)2012, 3111 B</td>
<td>*BDL (**DL 0.06 mmg/l)</td>
<td>mg/l</td>
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<td>26.</td>
<td>Cadmium as Cd</td>
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<td>*BDL (**DL 0.06 mg/l)</td>
<td>mg/l</td>
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<td>27.</td>
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<td>APHA (22nd Edition)2012, 3111 B</td>
<td>*BDL (**DL 0.13mg/l)</td>
<td>mg/l</td>
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<td>Selenium as Se</td>
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<td>*BDL (**DL 0.01 mg/l)</td>
<td>mg/l</td>
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<tr>
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<td>APHA (22nd Edition)2012, 3111 B</td>
<td>*BDL (**DL 0.01 mg/l)</td>
<td>mg/l</td>
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<tr>
<td>30.</td>
<td>Mercury as Hg</td>
<td>APHA (22nd Edition)2012, 3111 B</td>
<td>*BDL (**DL 0.001 mg/l)</td>
<td>mg/l</td>
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<tr>
<td>31.</td>
<td>Total Coliform</td>
<td>IS 1622.1981(Reaffirmed 2003)</td>
<td>Absent</td>
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<td>Shall not be detectable in any 100 ml sample</td>
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<tr>
<td>32.</td>
<td>E. Coli</td>
<td>IS 1622.1981(Reaffirmed 2003)</td>
<td>Absent</td>
<td></td>
<td>Shall not be detectable in any 100 ml sample</td>
</tr>
</tbody>
</table>
### September 2017

#### 1.1. DRINKING WATER

**Sampling Date:** 02/09/2017  
**Sample Description:** WTP Water  
**Sample Location:** Potable water Supply at Colony Area

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Parameter</th>
<th>Test-Method</th>
<th>Result</th>
<th>Unit</th>
<th>Limits of IS:10500 -2012 Permissible limit in the Absence of Alternate Source</th>
</tr>
</thead>
</table>
| 33.    | pH (at 25 °C)                    | APHA (22nd Edition)2012, 4500-H+ B | 7.45    | --   | 6.5 to 8.5  
| 35.    | Turbidity                        | APHA (22nd Edition)2012, 2130 B   | *BDL (**DL 0. 1 NTU) | NTU | 1  
| 38.    | Total Hardness as CaCO₃          | APHA (22nd Edition)2012, 2340 C   | 44.09   | mg/l | 200  
| 39.    | Calcium as Ca                   | APHA (22nd Edition)2012, 3500 Ca B | 11.76   | mg/l | 75  
| 40.    | Alkalinity as CaCO₃             | APHA (22nd Edition)2012, 2320 B   | 41.00   | mg/l | 200  
| 41.    | Chloride as Cl                  | APHA (22nd Edition)2012, 4500-Cl B | 10.09   | mg/l | 250  
| 42.    | #Cyanide as CN                   | APHA (22nd Edition)2012, 4500 CN- D | *BDL(**DL 0.02 mg/l) | mg/l | 0.05  
| 43.    | Magnesium as Mg                 | APHA (22nd Edition)2012, 3500 Mg B | 3.58    | mg/l | 30  
| 44.    | Total Dissolved Solids          | APHA (22nd Edition)2012, 2540 C   | 65.00   | mg/l | 500  
| 45.    | Sulphate as SO₄                 | APHA (22nd Edition)2012, 4500 E   | 4.09    | mg/l | 200  
| 46.    | Fluoride as F                   | APHA (22nd Edition)2012, 4500-F D | 0.21    | mg/l | 1.0  
| 47.    | Nitrate as NO₃                  | IS 3025 (P-34) 2003              | 1.03    | mg/l | 45  
| 48.    | Iron as Fe                      | APHA (22nd Edition)2012, 3500-Fe B | 0.12    | mg/l | 0.3  
| 49.    | #Aluminium as Al                | APHA (22nd Edition)2012, 3111 B   | *BDL(**DL 0.03 mg/l) | mg/l | 0.03  
| 50.    | Boron                            | APHA (22nd Edition)2012, 4500B C  | *BDL(**DL 0.1 mg/l) | mg/l | 0.5  
| 51.    | Total Chromium as Cr            | APHA (22nd Edition)2012, 3111 B   | *BDL(**DL 0.03 mg/l) | mg/l | 0.05  
| 52.    | Phenolic Compounds              | APHA (22nd Edition)2012, 5530 C   | *BDL(**DL 0.001 mg/l) | mg/l | 0.001  
| 53.    | #Mineral Oil                    | Clause 6 of IS:3025(Part 39)     | *BDL(**DL 0.01mg/l) | mg/l | 0.5  
| 54.    | Anionic Detergents as MBAS      | APHA (22nd Edition)2012, 5540 C   | *BDL(**DL 0.02 mg/l) | mg/l | 0.2  
| 55.    | Zinc as Zn                      | APHA (22nd Edition)2012, 3111 B   | *BDL(**DL 0.03 mg/l) | mg/l | 5  
| 56.    | Copper as Cu                    | APHA (22nd Edition)2012, 3111 B   | * BDL(**DL 0.03 mg/l) | mg/l | 0.05  
| 57.    | Manganese as Mn                 | APHA (22nd Edition)2012, 3111 B   | *BDL(**DL 0.06 mg/l) | mg/l | 0.1  
| 58.    | Cadmium as Cd                   | APHA (22nd Edition)2012, 3111 B   | *BDL(**DL 0.06 mg/l) | mg/l | 0.003 
| 59.    | Lead as Pb                      | APHA (22nd Edition)2012, 3111 B   | *BDL(**DL 0.13mg/l) | mg/l | 0.01 
| 60.    | #Selenium as Se                 | APHA (22nd Edition)2012, 3111 B   | *BDL(**DL 0.01 mg/l) | mg/l | 0.01 
| 61.    | #Arsenic as As                  | APHA (22nd Edition)2012, 3111 B   | *BDL(**DL 0.01 mg/l) | mg/l | 0.01
### 1.2. DRINKING WATER

**Sampling Date:** 11/09/2017  
**Sample Description:** WTP Water  
**Sample Location:** Potable water Supply at Colony Area

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
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<tr>
<td>33.</td>
<td>pH (at 25 °C)</td>
<td>APHA (22nd Edition)2012, 4500-H+ B</td>
<td>7.21</td>
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<td></td>
<td>6.5 to 8.5</td>
<td>No Relaxation</td>
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<tr>
<td>34.</td>
<td>Colour</td>
<td>APHA (22nd Edition)2012, 2120 B</td>
<td>*BDL (**DL 0.001 mg/l)</td>
<td>mg/l</td>
<td></td>
<td>5</td>
<td></td>
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<tr>
<td>35.</td>
<td>Turbidity</td>
<td>APHA (22nd Edition)2012, 2130 B</td>
<td>*BDL (**DL 0. 1 NTU)</td>
<td>NTU</td>
<td></td>
<td>1</td>
<td></td>
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<tr>
<td>38.</td>
<td>Total Hardness as CaCO3</td>
<td>APHA (22nd Edition)2012, 2340 C</td>
<td>52.90</td>
<td>mg/l</td>
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<td>200</td>
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<td>39.</td>
<td>Calcium as Ca</td>
<td>APHA (22nd Edition)2012, 3500 Ca B</td>
<td>15.88</td>
<td>mg/l</td>
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<td>75</td>
<td>200</td>
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<td>40.</td>
<td>Alkalinity as CaCO3</td>
<td>APHA (22nd Edition)2012, 2320 B</td>
<td>48.00</td>
<td>mg/l</td>
<td></td>
<td>200</td>
<td>600</td>
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<td>41.</td>
<td>Chloride as Cl</td>
<td>APHA (22nd Edition)2012, 4500-Cl B</td>
<td>14.87</td>
<td>mg/l</td>
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<td>250</td>
<td>1000</td>
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<tr>
<td>42.</td>
<td>#Cyanide as CN</td>
<td>APHA (22nd Edition)2012, 4500-CN D</td>
<td>*BDL(**DL 0.02 mg/l)</td>
<td>mg/l</td>
<td></td>
<td>0.05</td>
<td>No Relaxation</td>
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<tr>
<td>43.</td>
<td>Magnesium as Mg</td>
<td>APHA (22nd Edition)2012, 3500 Mg B</td>
<td>3.23</td>
<td>mg/l</td>
<td></td>
<td>30</td>
<td>100</td>
</tr>
<tr>
<td>44.</td>
<td>Total Dissolved Solids</td>
<td>APHA (22nd Edition)2012, 2540 C</td>
<td>75.00</td>
<td>mg/l</td>
<td></td>
<td>500</td>
<td>2000</td>
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<td>45.</td>
<td>Sulphate as SO4</td>
<td>APHA (22nd Edition)2012, 4500 E</td>
<td>3.58</td>
<td>mg/l</td>
<td></td>
<td>200</td>
<td>400</td>
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<td>46.</td>
<td>Fluoride as F</td>
<td>APHA (22nd Edition)2012, 4500-F D</td>
<td>0.24</td>
<td>mg/l</td>
<td></td>
<td>1.0</td>
<td>1.5</td>
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<tr>
<td>47.</td>
<td>Nitrate as NO3</td>
<td>IS 3025 (P-34) 2003</td>
<td>1.11</td>
<td>mg/l</td>
<td></td>
<td>45</td>
<td>No Relaxation</td>
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<tr>
<td>48.</td>
<td>Iron as Fe</td>
<td>APHA (22nd Edition)2012, 3500-Fe B</td>
<td>0.13</td>
<td>mg/l</td>
<td></td>
<td>0.3</td>
<td>No relaxation</td>
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<tr>
<td>49.</td>
<td>#Aluminium as Al</td>
<td>APHA (22nd Edition)2012, 3111 B</td>
<td>*BDL(**DL 0.03 mg/l)</td>
<td>mg/l</td>
<td></td>
<td>0.03</td>
<td>0.2</td>
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<tr>
<td>50.</td>
<td>Boron</td>
<td>APHA (22nd Edition)2012, 4500B C</td>
<td>*BDL(**DL 0.1 mg/l)</td>
<td>mg/l</td>
<td></td>
<td>0.5</td>
<td>1</td>
</tr>
<tr>
<td>51.</td>
<td>Total Chromium as Cr</td>
<td>APHA (22nd Edition)2012, 3111 B</td>
<td>*BDL(**DL 0.03 mg/l)</td>
<td>mg/l</td>
<td></td>
<td>0.05</td>
<td>No Relaxation</td>
</tr>
<tr>
<td>52.</td>
<td>Phenolic Compounds</td>
<td>APHA (22nd Edition)2012, 5530 C</td>
<td>*BDL(**DL 0.001 mg/l)</td>
<td>mg/l</td>
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<tr>
<td>53.</td>
<td>#Mineral Oil</td>
<td>Clause 6 of IS:3025(Part 39)</td>
<td>*BDL(**DL 0.01mg/l)</td>
<td>mg/l</td>
<td></td>
<td>0.5</td>
<td>No Relaxation</td>
</tr>
<tr>
<td>54.</td>
<td>Anionic Detergents as MBAS</td>
<td>APHA (22nd Edition)2012, 5540 C</td>
<td>*BDL(**DL 0.02 mg/l)</td>
<td>mg/l</td>
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<td>0.2</td>
<td>1.0</td>
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<tr>
<td>55.</td>
<td>Zinc as Zn</td>
<td>APHA (22nd Edition)2012, 3111 B</td>
<td>*BDL(**DL 0.03 mg/l)</td>
<td>mg/l</td>
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<tr>
<td>56.</td>
<td>Copper as Cu</td>
<td>APHA (22nd Edition)2012, 3111 B</td>
<td>*BDL(**DL 0.03 mg/l)</td>
<td>mg/l</td>
<td></td>
<td>0.05</td>
<td>1.5</td>
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<tr>
<td>57.</td>
<td>Manganese as Mn</td>
<td>APHA (22nd Edition)2012, 3111 B</td>
<td>*BDL(**DL 0.06 mmg/l)</td>
<td>mg/l</td>
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<td>0.1</td>
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### 1.3. DRINKING WATER

**Sampling Date:** 20/09/2017

**Sample Description:** WTP Water

**Sample Location:** Potable Water Supply at Colony Area

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Parameter</th>
<th>Test-Method</th>
<th>Result</th>
<th>Unit</th>
<th>Limits of IS:10500 -2012</th>
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<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Requirement (Acceptable Limit)</td>
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<td>33.</td>
<td>pH (at 25 °C)</td>
<td>APHA (22nd Edition)2012, 4500-H* B</td>
<td>7.27</td>
<td>--</td>
<td>6.5 to 8.5</td>
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<tr>
<td>34.</td>
<td>Colour</td>
<td>APHA (22nd Edition)2012, 2120 B</td>
<td>*BDL (**DL 5 Hazen)</td>
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<tr>
<td>35.</td>
<td>Turbidity</td>
<td>APHA (22nd Edition)2012, 2130 B</td>
<td>*BDL (**DL 0.1 NTU)</td>
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<tr>
<td>37.</td>
<td>Taste</td>
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<td>38.</td>
<td>Total Hardness as CaCO₃</td>
<td>APHA (22nd Edition)2012, 2340 C</td>
<td>47.09</td>
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<tr>
<td>39.</td>
<td>Calcium as Ca</td>
<td>APHA (22nd Edition)2012, 3500 Ca B</td>
<td>14.95</td>
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<td>40.</td>
<td>Alkalinity as CaCO₃</td>
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<td>50.00</td>
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<tr>
<td>41.</td>
<td>Chloride as Cl</td>
<td>APHA (22nd Edition)2012, 4500-Cl* B</td>
<td>15.04</td>
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<td>42.</td>
<td>#Cyanide as CN</td>
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<td>43.</td>
<td>Magnesium as Mg</td>
<td>APHA (22nd Edition)2012, 3500 Mg B</td>
<td>2.38</td>
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<td>44.</td>
<td>Total Dissolved Solids</td>
<td>APHA (22nd Edition)2012, 2540 C</td>
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<tr>
<td>45.</td>
<td>Sulphate as SO₄</td>
<td>APHA (22nd Edition)2012, 4500 E</td>
<td>3.10</td>
<td>mg/l</td>
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<td>46.</td>
<td>Fluoride as F</td>
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<td>0.21</td>
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<td>47.</td>
<td>Nitrate as NO₃</td>
<td>IS 3025 (P-34) 2003</td>
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<td>48.</td>
<td>Iron as Fe</td>
<td>APHA (22nd Edition)2012, 3500-Fe B</td>
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<td>49.</td>
<td>#Aluminium as Al</td>
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<td>*BDL (**DL 0.03 mg/l)</td>
<td>mg/l</td>
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<td>50.</td>
<td>Boron</td>
<td>APHA (22nd Edition)2012, 4500B C</td>
<td>*BDL (**DL 0.1 mg/l)</td>
<td>mg/l</td>
<td>0.5</td>
</tr>
<tr>
<td>51.</td>
<td>Total Chromium as Cr</td>
<td>APHA (22nd Edition)2012, 3111 B</td>
<td>*BDL (**DL 0.03 mg/l)</td>
<td>mg/l</td>
<td>0.05</td>
</tr>
<tr>
<td>52.</td>
<td>Phenolic Compounds</td>
<td>APHA (22nd Edition)2012, 5530 C</td>
<td>*BDL (**DL 0.001 mg/l)</td>
<td>mg/l</td>
<td>0.001</td>
</tr>
<tr>
<td>53.</td>
<td>#Mineral Oil</td>
<td>Clause 6 of IS:3025 (Part 39)</td>
<td>*BDL (**DL 0.01 mg/l)</td>
<td>mg/l</td>
<td>0.5</td>
</tr>
<tr>
<td>54.</td>
<td>Anionic Detergents as MBAS</td>
<td>APHA (22nd Edition)2012, 5540 C</td>
<td>*BDL (**DL 0.02 mg/l)</td>
<td>mg/l</td>
<td>0.2</td>
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<tr>
<td>No.</td>
<td>Element as Abbreviation</td>
<td>Source</td>
<td>Standard</td>
<td>Unit</td>
<td>Limit</td>
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<tr>
<td>-----</td>
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<td>--------</td>
<td>----------</td>
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</tr>
<tr>
<td>55</td>
<td>Zinc as Zn</td>
<td>APHA (22nd Edition) 2012, 3111 B</td>
<td>*BDL(**DL 0.03 mg/l)</td>
<td>mg/l</td>
<td>5</td>
</tr>
<tr>
<td>56</td>
<td>Copper as Cu</td>
<td>APHA (22nd Edition) 2012, 3111 B</td>
<td>*BDL(**DL 0.03 mg/l)</td>
<td>mg/l</td>
<td>0.05</td>
</tr>
<tr>
<td>57</td>
<td>Manganese as Mn</td>
<td>APHA (22nd Edition) 2012, 3111 B</td>
<td>*BDL(**DL 0.06 mmg/l)</td>
<td>mg/l</td>
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<tr>
<td>58</td>
<td>Cadmium as Cd</td>
<td>APHA (22nd Edition) 2012, 3111 B</td>
<td>*BDL(**DL 0.06 mg/l)</td>
<td>mg/l</td>
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<td>59</td>
<td>Lead as Pb</td>
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<td>*BDL(**DL 0.13 mg/l)</td>
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<td>60</td>
<td>Selenium as Se</td>
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<td>*BDL(**DL 0.01 mg/l)</td>
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<td>61</td>
<td>Arsenic as As</td>
<td>APHA (22nd Edition) 2012, 3111 B</td>
<td>*BDL(**DL 0.01 mg/l)</td>
<td>mg/l</td>
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<td>62</td>
<td>Mercury as Hg</td>
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<td>mg/l</td>
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<td>63</td>
<td>Total Coliform</td>
<td>IS 1622.1981 (Reaffirmed 2003)</td>
<td>Absent</td>
<td>MPN/100ml</td>
<td>Shall not be detectable in any 100 ml sample</td>
</tr>
<tr>
<td>64</td>
<td>E. Coli</td>
<td>IS 1622.1981 (Reaffirmed 2003)</td>
<td>Absent</td>
<td>MPN/100ml</td>
<td>Shall not be detectable in any 100 ml sample</td>
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## CSR Activity / Project wise Expenses up to 1st April to 30th Sept. 2017

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Action Head</th>
<th>CSR Activity / Project</th>
<th>Amount in Rs.</th>
<th>Total</th>
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<tr>
<td>A</td>
<td>EDUCATION SUPPORT INITIATIVES</td>
<td>AVM Operative Exp</td>
<td>3,666,552.88</td>
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<td></td>
<td>Education Support Initiatives Total</td>
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<td>3,666,552.88</td>
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<td>B</td>
<td>HEALTH SUPPORT INITIATIVE</td>
<td>Ambulance Operative Exp.</td>
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<td></td>
<td>Exp towards Project Sanjivani-W</td>
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<td></td>
<td>Exp towards Project Swachhagrah</td>
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<td></td>
<td>Exp. towards PAPs referred patient</td>
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<td></td>
<td>Expenses towards Project Su-poshan</td>
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<td></td>
<td>Mobile Medical Dispensary Operative Exp.</td>
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<td></td>
<td>Health Support Initiative Total</td>
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<td>C</td>
<td>LIVELIHOOD SUPPORT INITIATIVE</td>
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<td></td>
<td>Exp towards Project Saksham</td>
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<td></td>
<td>Expenses towards Adani Resource Center operation</td>
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<td></td>
<td>Expenses towards Co-operative Formation</td>
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<td></td>
<td>Expenses towards Project Annapurna</td>
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<td></td>
<td>Expenses towards Project Vasundhara</td>
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<td></td>
<td>Livelihood Support Initiative Total</td>
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<td>D</td>
<td>BASIC FACILITY / INFRASTRUCTURE SUPPORT INITIATIVE</td>
<td>Construction of Govt Multipurpose School Building Ambikapur</td>
<td>1,890,936.45</td>
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<td></td>
<td>Exp towards Project Jeevan Aamit</td>
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<td></td>
<td>Exp. towards VTC Establishment and Operation</td>
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<td>Exp. towards Wall Painting work in PAVs</td>
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<td></td>
<td>Expenses towards Stage Construction at Ramgarh</td>
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<td></td>
<td>Shed Construction at Playground Parsa</td>
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<td></td>
<td>Basic Facility / Infrastructure Support Initiative Total</td>
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<td>E</td>
<td>SPORTS, CULTURAL EVENTS / WELFARE EXP.</td>
<td>Expenses towards Cultural Events at PAVs</td>
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<td>Expenses towards Football Academy</td>
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<td></td>
<td>Expenses towards Organising Football Event At Parsa</td>
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<td>Expenses towards organizing Ramgarh Mahotsav</td>
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<td>Expenses towards World Yoga Day Celebration</td>
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<td>Sports / Cultural Events / Welfare Exp. Total</td>
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<td>5,844,826.00</td>
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<td>F</td>
<td>ADMINISTRATIVE EXPENSES</td>
<td>Office stationaries</td>
<td>5,078.21</td>
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<td></td>
<td>Project Administrative Expenses for Hiring of Manpower</td>
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<td></td>
<td>Project Overhead / Administrative Expenses</td>
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<td></td>
<td>Administrative Expenses Total</td>
<td></td>
<td>2,039,193.46</td>
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<td></td>
<td>Grand Total</td>
<td></td>
<td>19,452,150.87</td>
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Human Development Index Study
Parsa East & Kanta Basan Opencast Coal Mine

Rajasthan Rajya Vidyut Utpadan Nigam Limited
Vidyut Bhawan, Janpath, Jyoti Nagar, Jaipur-302005

April 2017
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Executive summary
This report summarises the main findings of the Human Development Index (HDI) study carried out in February 2017 in 6 core villages of Parsa East and Kanta Basan mines in Udaipur Tehsil of Surguja. Parsa East and Kanta Basan Coal Blocks (PEKB), Surguja, Chhattisgarh was allotted to Rajasthan Rajya Vidyut Utpadan Nigam Limited (RRVUNL) by the Ministry of Coal in 2007 for coal requirement of its Thermal Power Stations in Rajasthan. RRVUNL appointed Adani Enterprises Limited as Mine Developer cum Operator (MDO) for PEKB coal block in Chhattisgarh.

CII-CESD also calculated quality of life index (QLI) of the 6 core villages. The CSR interventions are in the areas of Education, Health, Sustainable Livelihood Development, Rural Infrastructure Development and Sports Initiative - Adani Surguja Football Academy in Surguja.

The CSR initiatives are aligned to the vision of nation building and to impact maximum stakeholders. The Company has implemented initiatives such as AVM Surguja, Mobile Health Van, Project Unnayan, Project Vasundhara, Project Annapurna, Project Digital Gram, Vocational Training Centre and Adani Surguja Football Academy. Company’s work has been appreciated by project affected people during interview and group interactions. At present, the Company is providing maximum benefits to project affected people through its CSR initiatives. These activities have positive impact on the communities as mentioned by respondents.

With increased income opportunities and the interventions by company, the quality of life is expected to continuously improve year by year in the villages surrounding the PEKB mines leading to improved human development indices. It is expected that the improvement in human development indicators will be measured on regular basis. This report will act as a baseline for the future HDI and QLI studies.

The aim of the study was to measure human development index of six core villages around Parsa East & Kanta Basan mines. A total of 213 households (1,097 population) were interviewed for the household survey. Human Development Index (HDI) was calculated as geometric mean of three indices viz., Education Index, Health Index and Income Index. The overall HDI of 6 villages is 0.479 which is close to that of Chhattisgarh and Surguja which are 0.471 and 0.418 respectively as per Human Development Report of Chhattisgarh 2005. The HDI of India is 0.609 as per HDR 2015 of UNDP.

HDI of Parogia is lowest (0.322) due to limited resources in terms of education and income opportunities, while it is highest in Parsa (0.508) due to better facilities available in terms of connectivity, education and income opportunities. The education index of Parogia is least (0.228) while it is highest (0.568) in Ghatabarra. Parogia has one primary school only and most of the students leave studies after class 8 due to non-availability of middle school in the nearby areas as well. Ghatabarra has highest education index due to availability of four schools including one high school and better awareness among community members.

The life expectancy is estimated to be 62.6 years for the sample size of 1,097 population surveyed. There were 41 deaths among 213 surveyed households in last five years in six project villages. Life expectancy of India was 68.3 years in 2015.¹ The life expectancy of Chhattisgarh was 64.8 years in 2014.²

Primary occupation among surveyed households is agriculture (42.25%), followed by service (31.46%), labour (16.43%), livestock (1.41%), business (3.29%), Mason (0.47%) and others (4.69%) in project villages. The income index of Parogia is the least (0.223) due to limited income sources, while it is highest for Parsa (0.407) due to more number of people in service. The overall Income Index of project villages is 0.355 which is better than the Income Index of Surguja (0.132) as per Chhattisgarh HDR 2005. The Income Index of Chhattisgarh is 0.310 as per Chhattisgarh HDR 2005.

¹ UNDP HDR 2015
HUMAN DEVELOPMENT INDEX STUDY

Overall HDI of project villages 0.479

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Index</th>
</tr>
</thead>
<tbody>
<tr>
<td>Education</td>
<td>0.471</td>
</tr>
<tr>
<td>Health</td>
<td>0.655</td>
</tr>
<tr>
<td>Income</td>
<td>0.355</td>
</tr>
</tbody>
</table>

QLI study presents an analysis of 10 dimensions which can be measured statistically to represent the different aspects of quality of life. The ten of these dimensions can be considered to reflect people’s well-being, which are education, health, income, land, housing condition, cooking fuel, sanitation (toilet availability), clean drinking water availability, assets (assets for mobility, information and other major household assets) and livestock. These parameters can be measured over a period of time and compared with the baseline indices being presented in this study.

Project affected and non-affected people mentioned during focus group discussions and interviews that there is a need to focus on primary, middle and secondary education, especially girls’ education; continuing health initiatives including anaemia and malnutrition; alcoholism; transportation support for school going children in Parogia and efforts for enrolling more children in schools with facilities like AVM Surguja.

Overall QLI of Project villages 4.84

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Index</th>
</tr>
</thead>
<tbody>
<tr>
<td>Education</td>
<td>0.28</td>
</tr>
<tr>
<td>Health</td>
<td>0.70</td>
</tr>
<tr>
<td>Income</td>
<td>0.29</td>
</tr>
<tr>
<td>Land</td>
<td>0.27</td>
</tr>
<tr>
<td>Livestock</td>
<td>0.66</td>
</tr>
<tr>
<td>Asset</td>
<td>0.39</td>
</tr>
<tr>
<td>House</td>
<td>0.38</td>
</tr>
<tr>
<td>Water</td>
<td>0.91</td>
</tr>
<tr>
<td>Fuel</td>
<td>0.06</td>
</tr>
<tr>
<td>Toilet</td>
<td>0.92</td>
</tr>
</tbody>
</table>

Women SHG promotion for sustainable livelihood
Introduction
This report comprises the human development index study conducted by CII-ITC Centre of Excellence for Sustainable Development (CII-ITC CESD) for RVUNL. Adani Enterprises Limited has developed and is operating Parsa East & Kanta Basan (PEKB) coal mine of Rajasthan Rajya Vidyut Utpadan Nigam Ltd. The study covers six core villages of PEKB mines. The district headquarters is in Ambikapur.

These six core villages are Parsa, Salhi, Parogia, Ghatabarra, Basen and Hariharpur. The HDI study was conducted by using UNDP's 2015 HDR methodology for measuring education, income and health indices of six project villages. Methods such as household survey, focus group discussion and interview with key resource persons were used for data collection. Secondary research was also used to complement findings of primary survey. Data was collected from Gram Panchayat, Sachiv office and block office Udaipur. Sources like Census 2011 and School report cards were also used for the study. This report details HDI study, QLI study, information sourced through secondary data and the primary survey which comprises data tables. The report also covers impact of CSR initiatives and recommendations.

Objectives of the study
To measure socio-economic development of six core villages by using three parameters - Life expectancy, education and income per capita. Measuring Human Development Index of the six core villages using UNDP's methodology at PEKB mines.

Project location
Profile of Villages
Population and Gender ratio

As per Census 2011, six core villages have a population of 4,985 in 1,135 households. Out of 4,985, 49% are females and 51% are males. The overall gender ratio is 946 females to 1,000 males in six project villages.

Gender ratio is highest in Parogia (1077) and lowest in Basen (875).

![Gender Ratio Graph]

Highest male population is in Ghatabarra (710) and lowest in Hariharpur (151). Highest women population is in Ghatabarra (685).

Total children population in six village is 896. In age group 0-6 years, child gender ratio is highest in Parogia (1103) and lowest in Hariharpur (618).

![Child Sex Ratio Graph]

<table>
<thead>
<tr>
<th>Name of Village</th>
<th>Male</th>
<th>Female</th>
<th>Total population</th>
<th>Sex Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basen</td>
<td>304</td>
<td>266</td>
<td>570</td>
<td>875</td>
</tr>
<tr>
<td>Ghatabarra</td>
<td>710</td>
<td>685</td>
<td>1395</td>
<td>965</td>
</tr>
<tr>
<td>Hariharpur</td>
<td>151</td>
<td>147</td>
<td>298</td>
<td>974</td>
</tr>
<tr>
<td>Parogia</td>
<td>155</td>
<td>167</td>
<td>322</td>
<td>1077</td>
</tr>
<tr>
<td>Parsa</td>
<td>567</td>
<td>518</td>
<td>1085</td>
<td>914</td>
</tr>
<tr>
<td>Salhi</td>
<td>674</td>
<td>641</td>
<td>1315</td>
<td>951</td>
</tr>
<tr>
<td></td>
<td><strong>2561</strong></td>
<td><strong>2424</strong></td>
<td><strong>4985</strong></td>
<td><strong>946</strong></td>
</tr>
</tbody>
</table>

Source: Census 2011
Social categories
Out of total population (4,598), 78% are ST, 12% are OBC, 7% are from the general category and only 3% are SC. The major tribal communities are Gond, Mannewar, Kawar, Pando, Saunta, Pardhi, Kharia, Agariya, Kanwar and Paliha. 263 families in Salhi, 215 in Ghatabarra and 187 families in Parsa are Scheduled Tribe. In Ghatabarra and Parsa, 18 & 15 families are Scheduled Caste respectively.

Education
The overall literacy rate is 58.39%, with female literacy rate much lower at 46.35%, whereas male literacy rate is 69.87%. Each project village has access to a government primary school while middle school is available in Parsa, Salhi, Ghatabarra and Basen. High school available in Parsa only, students from nearby villages (more than 5 km) come for pursuing their secondary and senior secondary education. There are 11 primary school, 4 middle school and 2 high school in six project villages.

Adani Vidya Mandir School is in Salhi. Out of 461 students, 262 boys and 199 girls are enrolled in session 2016-17. The company has opened ITI and vocational training centre in Udaipur which is 8 km far from the project villages. Students learn Basic Fitter & Machinist Course and Industrial Sewing Machine Operator Course there. There are 2,029 illiterates in the population of 4,598 and only 78 people have completed graduation and above. Literacy rate is highest in Salhi (66.36%) and lowest in Basen (48%).

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3 Document provided by AVM Surguja
Profile of Surveyed Households

Out of 1135 households, 213 households were covered under primary survey. 65 households from Parsa, 23 households from Parogia, 21 households from Basen, 29 households from Ghatabarra, 19 households from Hariharpur and 56 households from Salhi were included in the survey.

Demography

213 households have 1,097 population, out of that, 52% were male and 48% female. The surveyed households comprised 570 males and 527 females. Overall gender ratio is 925 females over 1000 males. Gender ratio of Parogia and Ghatabarra villages is quite high. Basen has lowest gender ratio, i.e., 842.

<table>
<thead>
<tr>
<th>Village</th>
<th>Males</th>
<th>Females</th>
<th>Total population</th>
<th>Gender Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basen</td>
<td>57</td>
<td>48</td>
<td>105</td>
<td>842</td>
</tr>
<tr>
<td>Ghatabarra</td>
<td>76</td>
<td>84</td>
<td>160</td>
<td>1105</td>
</tr>
<tr>
<td>Hariharpur</td>
<td>57</td>
<td>49</td>
<td>106</td>
<td>860</td>
</tr>
<tr>
<td>Parogia</td>
<td>62</td>
<td>66</td>
<td>128</td>
<td>1065</td>
</tr>
<tr>
<td>Parsa</td>
<td>155</td>
<td>140</td>
<td>295</td>
<td>903</td>
</tr>
<tr>
<td>Salhi</td>
<td>163</td>
<td>140</td>
<td>303</td>
<td>859</td>
</tr>
<tr>
<td>Total</td>
<td>570</td>
<td>527</td>
<td>1097</td>
<td>925</td>
</tr>
</tbody>
</table>

Source: CESD Sample Household Survey
Social categories

70% families are ST, 22% families are OBC, 5% families are SC and 3% families are General in category. The dominant castes were Gond, Mannewar, Nai and Kanwar.

Land holding pattern

44 (21%) families among surveyed households are landless and earn livelihood through job at coal mines, labour work and collection of forest produce. Most of the families (61%) are marginal and own land less than 1 ha, 12% families are under small category and own land up to 2-5 ha, 4% families are in medium category and have 1-2 ha land and only 2% families are under big category and have more than 5 ha land.

<table>
<thead>
<tr>
<th>Village</th>
<th>Total Families</th>
<th>Landless</th>
<th>Marginal</th>
<th>Small</th>
<th>Medium</th>
<th>Big</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basen</td>
<td>21</td>
<td>4</td>
<td>13</td>
<td>3</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Ghatabarra</td>
<td>29</td>
<td>2</td>
<td>14</td>
<td>5</td>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td>Hariharpur</td>
<td>19</td>
<td>5</td>
<td>13</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Parogia</td>
<td>23</td>
<td>6</td>
<td>14</td>
<td>2</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Parsa</td>
<td>65</td>
<td>19</td>
<td>34</td>
<td>9</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Salhi</td>
<td>56</td>
<td>8</td>
<td>42</td>
<td>6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>213</td>
<td>44</td>
<td>130</td>
<td>26</td>
<td>8</td>
<td>5</td>
</tr>
</tbody>
</table>
Human Development Index of 6 Core Villages

Human Development Index (HDI) is calculated as geometric mean of three indices viz., Education Index, Health Index and Income Index. Detailed methodology for measuring human development index is annexed. This section presents the findings of HDI.
Education Index

Education Index is the arithmetic mean of “Mean Years of Schooling” and “Expected years of Schooling” from the surveyed households.

Overall education scenario is not very impressive in the 6 project villages. Only five boys have completed engineering course. 40 boys and 6 girls have completed graduation in all six project villages in last few years. However, 19 boys and 8 girls are pursuing graduation in six core villages. Overall, awareness about importance of education is low in project villages and very few pursue education after Class 12. Only few girls pursue graduation in comparison to boys.

Mean Years of Schooling (MYS)
The number of years of schooling of each family member in age group above 24 years is added and then divided by population in the villages separately for male and female to obtain Mean years of Schooling (MYS). The MYS for men is much higher, 5.89 as compared to that of women which is only 3.24. MYS is least in Basen, i.e., 2.91, while it is highest in Ghatabarra, i.e., 6.53. The MYS for sample population is 4.81 which is less than that of India (5.4) as per 2015 HDR of UNDP. Parogia is lagging behind in education as there is only one primary School and the Middle and High Schools are at a distance. There was no proper road as well and the only nearby Middle Schools has been shifted to a distance.

### Mean Years of Schooling in the villages

<table>
<thead>
<tr>
<th>Village</th>
<th>Male</th>
<th>Female</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>MYS</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Number &gt;24 yrs</td>
<td>Number &gt; 24 yrs</td>
<td>Total Years of Schooling for population</td>
</tr>
<tr>
<td>Basen</td>
<td>5.12</td>
<td>25</td>
<td>2.71</td>
</tr>
<tr>
<td>Ghatabarra</td>
<td>8.19</td>
<td>36</td>
<td>4.86</td>
</tr>
<tr>
<td>Hariharpur</td>
<td>6.41</td>
<td>22</td>
<td>2.67</td>
</tr>
<tr>
<td>Parogia</td>
<td>3.20</td>
<td>30</td>
<td>2.56</td>
</tr>
<tr>
<td>Parsa</td>
<td>6.26</td>
<td>66</td>
<td>3.93</td>
</tr>
<tr>
<td>Salhi</td>
<td>6.18</td>
<td>72</td>
<td>2.73</td>
</tr>
<tr>
<td>Total</td>
<td>5.89</td>
<td>251</td>
<td>3.24</td>
</tr>
</tbody>
</table>

MYS for sample population (Total Years of Schooling/ total population) 4.81

Source: CESD Sample Household Survey

Expected Years of Schooling (EYS)

Expected years of Schooling (EYS) is derived from sum of enrolment ratios for each year for students currently studying among population from 6 to 24 years of age from the surveyed households. The expected years of schooling is least, only 4.72 in Parogia while it is highest in Salhi (12.73).

The EYS for the total population is 11.2 which is marginally less than that of India (11.7) as per 2015 HDR of UNDP. The EYS of Parogia is very poor which can be attributed to the reason that there is only one Primary School and the Middle and High Schools are at a distance. The absence of proper approach road is also one of the cause. However, the construction of approach road was to Parogia from main road was underway and is going to contribute to higher EYS in future when the children will be enrolled. Additional efforts however required to strengthen the primary education in the village and motivate the children to continue education.
Expected year of schooling in the villages

<table>
<thead>
<tr>
<th>Village</th>
<th>Population enrolled in different education level in age group 6 to 24 years</th>
<th>Total Population in age group 6 – 24</th>
<th>Expected Years of Schooling (EYS) (yrs)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Prima ry</td>
<td>Middle</td>
<td>High School</td>
</tr>
<tr>
<td>Basen</td>
<td>15</td>
<td>8</td>
<td>3</td>
</tr>
<tr>
<td>Ghatabarra</td>
<td>20</td>
<td>12</td>
<td>11</td>
</tr>
<tr>
<td>Hariharpur</td>
<td>17</td>
<td>8</td>
<td>3</td>
</tr>
<tr>
<td>Parogia</td>
<td>9</td>
<td>7</td>
<td>1</td>
</tr>
<tr>
<td>Parsa</td>
<td>25</td>
<td>20</td>
<td>20</td>
</tr>
<tr>
<td>Salhi</td>
<td>45</td>
<td>27</td>
<td>15</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>131</td>
<td>82</td>
<td>53</td>
</tr>
</tbody>
</table>

Source: CESD Sample Households Survey

Education Index

As discussed under methodology, maximum value of MYS is considered to be 15 and minimum 0 while maximum value of EYS is considered to be 18 and minimum 0. The education index of Parogia is least (0.228) while it is highest (0.568) in Ghatabarra. Though Parogia is not going to be relocated and people are not directly impacted, however, strengthening education in Parogia is important to improve overall education index which is 0.471. The education index of Basen is low 0.436 as compared to other villages and needs special attention. The present generation is however interested in higher education and therefore, the population which is in 22 to 24 years of age group will come under MYS calculation thus positively impacting education index. Motivation is required for enrolment in education beyond 12th standard in all villages while in Parogia, motivation is required from primary education itself and means to provide access to middle and secondary education need to be explored.

Edication index in project villages

<table>
<thead>
<tr>
<th>Village</th>
<th>Mean Years of Schooling (MYS)</th>
<th>MYS Index</th>
<th>Expected Years of Schooling (EYS)</th>
<th>EYS Index</th>
<th>Education Index</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basen</td>
<td>4.14</td>
<td>0.276</td>
<td>10.73</td>
<td>0.596</td>
<td>0.436</td>
</tr>
<tr>
<td>Ghatabarra</td>
<td>6.53</td>
<td>0.435</td>
<td>12.62</td>
<td>0.701</td>
<td>0.568</td>
</tr>
<tr>
<td>Hariharpur</td>
<td>4.73</td>
<td>0.315</td>
<td>11.45</td>
<td>0.636</td>
<td>0.476</td>
</tr>
<tr>
<td>Parogia</td>
<td>2.91</td>
<td>0.194</td>
<td>4.72</td>
<td>0.262</td>
<td>0.228</td>
</tr>
<tr>
<td>Parsa</td>
<td>5.14</td>
<td>0.343</td>
<td>11.50</td>
<td>0.639</td>
<td>0.491</td>
</tr>
<tr>
<td>Salhi</td>
<td>4.58</td>
<td>0.305</td>
<td>12.73</td>
<td>0.707</td>
<td>0.506</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>4.81</strong></td>
<td><strong>0.321</strong></td>
<td><strong>11.20</strong></td>
<td><strong>0.622</strong></td>
<td><strong>0.471</strong></td>
</tr>
</tbody>
</table>

Source: CESD Sample Households Survey

Adani Vidya Mandir School, Surguja
Health Index/ Life expectancy

The overall health scenario is considerably good in the project villages as per the discussion held with communities during FGD. The Medical Health van is reaching out to all villages and people have appreciated the same. As a result, in the surveyed households few people reported diseases.

Life Expectancy (LE) is used to calculate Health Index as per HDR 2015 of UNDP. To derive life expectancy, the age group wise number of deaths in 213 families surveyed in last five years along with age wise total population (mid-term) multiplied by 5 is put in Chang (II) method of Life Table.

The life expectancy is estimated to be 62.6 years for the sample size of 1,097 population surveyed. There were 41 deaths among 213 surveyed households in last five years in six project villages. Life expectancy of India was 68.3 years in 2015. The life expectancy of Chhattisgarh was 64.8 years in 2014. Health Index is then estimated to be 0.655 which is same for all villages. Life Expectancy is a slow-moving indicator, therefore, the impact of health services such as medical van, project Sanjwani, etc. may be seen after some years.

Details of age group wise number of deaths in 213 families surveyed in last five years

<table>
<thead>
<tr>
<th>Age Group</th>
<th>Present population in age group</th>
<th>Midterm population (2014 population)</th>
<th>Deaths in last 5 years among sample</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;1</td>
<td>27</td>
<td>64</td>
<td>3</td>
</tr>
<tr>
<td>1-4</td>
<td>89</td>
<td>80</td>
<td>1</td>
</tr>
<tr>
<td>5-9</td>
<td>134</td>
<td>137</td>
<td>1</td>
</tr>
<tr>
<td>10-14</td>
<td>131</td>
<td>129</td>
<td>1</td>
</tr>
<tr>
<td>15-19</td>
<td>136</td>
<td>134</td>
<td>0</td>
</tr>
<tr>
<td>20-24</td>
<td>110</td>
<td>122</td>
<td>2</td>
</tr>
<tr>
<td>25-29</td>
<td>96</td>
<td>101</td>
<td>3</td>
</tr>
<tr>
<td>30-34</td>
<td>86</td>
<td>80</td>
<td>5</td>
</tr>
<tr>
<td>35-39</td>
<td>66</td>
<td>56</td>
<td>0</td>
</tr>
<tr>
<td>40-44</td>
<td>59</td>
<td>64</td>
<td>0</td>
</tr>
<tr>
<td>45-49</td>
<td>56</td>
<td>41</td>
<td>0</td>
</tr>
<tr>
<td>50-54</td>
<td>39</td>
<td>29</td>
<td>1</td>
</tr>
<tr>
<td>55-59</td>
<td>25</td>
<td>27</td>
<td>4</td>
</tr>
<tr>
<td>60-64</td>
<td>25</td>
<td>13</td>
<td>3</td>
</tr>
<tr>
<td>65-69</td>
<td>10</td>
<td>6</td>
<td>3</td>
</tr>
<tr>
<td>70-74</td>
<td>4</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>75-79</td>
<td>1</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>80-84</td>
<td>2</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>85+</td>
<td>1</td>
<td>8</td>
<td>8</td>
</tr>
<tr>
<td>Total</td>
<td>1097</td>
<td>1100</td>
<td>41</td>
</tr>
</tbody>
</table>

Source: CESD Sample Households Survey
The annual income of each family was obtained with triangulating three parameters, viz, income from various sources, income of individual family member, earning from land and forest produce (the information for which was first estimated through FGD). Total population of each village then divided the total income of all families to obtain Per Capita Income in the village. Per capita Income (PPP 2011 $) was obtained by dividing the PCI by 15.11, the conversion factor as in 2011. It is assumed that the studies to be conducted in future will use same conversion factor for comparing growth in Income Index. The income index is calculated as mentioned in the methodology.

People have been reluctant to mention correct income, however, with triangulation, the team has fairly been able to arrive on the income from each family. The income from agriculture was mentioned to be nil initially and the crop production was kept for own consumption, however, the estimate of value was considered for income from agriculture. Similarly, income from forest produce was estimated with individual family by assessing forest produce collected in a season.

The income index of Parogia was the least (0.223), while it is highest for Parsa (0.407). The overall Income Index is 0.355 which is better than Surguja (0.132) and Chhattisgarh (0.310) as per Chhattisgarh HDR 2005.

<table>
<thead>
<tr>
<th>Village</th>
<th>PCI (Rs.)</th>
<th>PCI $ (@ Rs. 44.6 as on 31 March 2011)</th>
<th>Per capita Income (PPP 2011 $ @ 15.11)</th>
<th>Income Index</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basen</td>
<td>10,972</td>
<td>246</td>
<td>726</td>
<td>0.299</td>
</tr>
<tr>
<td>Ghatabarra</td>
<td>14,168</td>
<td>318</td>
<td>938</td>
<td>0.338</td>
</tr>
<tr>
<td>Hariharpur</td>
<td>15,074</td>
<td>338</td>
<td>998</td>
<td>0.347</td>
</tr>
<tr>
<td>Parogia</td>
<td>6,634</td>
<td>149</td>
<td>439</td>
<td>0.223</td>
</tr>
<tr>
<td>Parsa</td>
<td>22,308</td>
<td>500</td>
<td>1,476</td>
<td>0.407</td>
</tr>
<tr>
<td>Salhi</td>
<td>16,300</td>
<td>365</td>
<td>1,079</td>
<td>0.359</td>
</tr>
<tr>
<td>Total</td>
<td>15,848</td>
<td>355</td>
<td>1,049</td>
<td>0.355</td>
</tr>
</tbody>
</table>

Source: CESD Sample Households Survey
Human Development Index (HDI)

Human Development Index was calculated as geometric mean of the three indices. HDI of Parogia is lowest (0.322) while it is highest in Parsa (0.508). The overall HDI of 6 villages is 0.479 which is close to that of Chhattisgarh and Surguja which were 0.471 and 0.418 respectively as per Human Development Report of Chhattisgarh 2005\(^4\), while HDI of Chhattisgarh was 0.358 as per UNDP factsheet - Chhattisgarh (2007-08 figures).\(^5\) The HDI of India is 0.609 as per HDR 2015 of UNDP.\(^6\)

<table>
<thead>
<tr>
<th>Village</th>
<th>PCI (Rs)</th>
<th>Income Index</th>
<th>Mean Years of Schooling (MYS)</th>
<th>MYS Index</th>
<th>Expected Years of Schooling (EYS)</th>
<th>EYS Index</th>
<th>Education Index</th>
<th>Life Expectancy at Birth (EYS)</th>
<th>Health Index</th>
<th>HDI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basen</td>
<td>10,972</td>
<td>0.299</td>
<td>4.14</td>
<td>0.276</td>
<td>10.73</td>
<td>0.596</td>
<td>0.436</td>
<td>62.60</td>
<td>0.655</td>
<td>0.441</td>
</tr>
<tr>
<td>Ghatabarra</td>
<td>14,168</td>
<td>0.338</td>
<td>6.53</td>
<td>0.435</td>
<td>12.62</td>
<td>0.701</td>
<td>0.568</td>
<td>62.60</td>
<td>0.655</td>
<td>0.501</td>
</tr>
<tr>
<td>Harhipur</td>
<td>15,074</td>
<td>0.347</td>
<td>4.73</td>
<td>0.315</td>
<td>11.45</td>
<td>0.636</td>
<td>0.476</td>
<td>62.60</td>
<td>0.655</td>
<td>0.477</td>
</tr>
<tr>
<td>Parogia</td>
<td>6,634</td>
<td>0.223</td>
<td>2.91</td>
<td>0.194</td>
<td>4.72</td>
<td>0.262</td>
<td>0.228</td>
<td>62.60</td>
<td>0.655</td>
<td>0.322</td>
</tr>
<tr>
<td>Parsa</td>
<td>22,308</td>
<td>0.407</td>
<td>5.14</td>
<td>0.343</td>
<td>11.50</td>
<td>0.639</td>
<td>0.491</td>
<td>62.60</td>
<td>0.655</td>
<td>0.508</td>
</tr>
<tr>
<td>Sali</td>
<td>16,300</td>
<td>0.359</td>
<td>4.58</td>
<td>0.305</td>
<td>12.73</td>
<td>0.707</td>
<td>0.506</td>
<td>62.60</td>
<td>0.655</td>
<td>0.492</td>
</tr>
<tr>
<td>Total</td>
<td>15,848</td>
<td>0.355</td>
<td>4.81</td>
<td>0.321</td>
<td>11.20</td>
<td>0.622</td>
<td>0.471</td>
<td>62.60</td>
<td>0.655</td>
<td>0.479</td>
</tr>
<tr>
<td>India *</td>
<td>5,497</td>
<td>0.605</td>
<td>5.40</td>
<td>0.360</td>
<td>11.70</td>
<td>0.650</td>
<td>0.505</td>
<td>68.00</td>
<td>0.738</td>
<td>0.609</td>
</tr>
</tbody>
</table>

Source: CESD Sample Households Survey, * India Indices 2014 (Latest 2015 HDR)

<table>
<thead>
<tr>
<th>Village</th>
<th>Income Index</th>
<th>Education Index</th>
<th>Health Index</th>
<th>HDI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Surguja (Chhattisgarh HDR 2005)</td>
<td>0.132</td>
<td>0.590</td>
<td>0.532</td>
<td>0.418</td>
</tr>
<tr>
<td>Chhattisgarh (Chhattisgarh HDR 2005)</td>
<td>0.310</td>
<td>0.711</td>
<td>0.392</td>
<td>0.471</td>
</tr>
</tbody>
</table>

---

5http://www.in.undp.org/content/dam/india/docs/chhattisgarh_factsheet.pdf - There were different parameters and
goal posts used to calculate HDI in 2005 in Chhattisgarh HDR and in IHDR 2011 (2007-08 figures).
Quality of life index
Quality of life indicators provide information on the quality of life. The study presents an analysis of 10 dimensions which can be measured statistically to represent the different aspects of quality of life. The ten of these dimensions can be considered to reflect people’s well-being, which are education, health, income, land, housing condition, fuel used for cooking, sanitation (toilet availability), clean drinking water availability, assets (for mobility, information and other major household assets), livestock. These parameters can be measured over a period of time and compared with the baseline index being presented in this study.

Looking at overall Quality of life, Basen seems to be lagging behind with QLI index of 4.28 out of 10 points while Ghatabarra is leading with 5.3 points. The low QLI of Basen is attributed to low income mentioned by the people and less assets ownership as compared to other villages. Incidentally Parogia has better QLI despite having less income because of more livestock, better water availability and toilet facilities. Although the livestock ownership does not translate in income or nutrition as people neither drink nor sell milk. Ghatabarra leads in three parameters, viz., Education, land and House, though it is not far behind in other parameters as compared to other villages. Hariharpur leads in Health and assets while Salhi leads in water and toilets. Parsa is leading in income probably due to the reason that more people from the village are working in the company. The Overall QLI (total sample mean) of 6 villages is 4.84 out of 10 points.
1. Education

While estimating Education QLI, total years of education received by all family members has been considered which is divided by number of members in each family. For village, the average of the QLI of each family is considered. Education QLI is least in Parogia (0.20) and is highest in Ghatabarra (0.33).

**QLI - Education**

<table>
<thead>
<tr>
<th>Village</th>
<th>QLI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basen</td>
<td>0.31</td>
</tr>
<tr>
<td>Ghatabarra</td>
<td>0.33</td>
</tr>
<tr>
<td>Hariharpur</td>
<td>0.24</td>
</tr>
<tr>
<td>Parogia</td>
<td>0.2</td>
</tr>
<tr>
<td>Parsa</td>
<td>0.29</td>
</tr>
<tr>
<td>Salhi</td>
<td>0.26</td>
</tr>
</tbody>
</table>

**Education Pattern**

Considering education pattern of all 6 villages, it is evident from surveyed households that only 2% are graduates and 1% are Post Graduate and above. There are 7 post graduates and 23 graduates among the sample households.

**Education Pattern In Surveyed Households**

<table>
<thead>
<tr>
<th></th>
<th>22%</th>
<th>21%</th>
<th>19%</th>
<th>9%</th>
<th>13%</th>
<th>2%</th>
<th>1%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Illiterate</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Primary</td>
<td>22%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Middle</td>
<td></td>
<td>21%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intermediate</td>
<td></td>
<td></td>
<td>19%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>High School</td>
<td></td>
<td></td>
<td></td>
<td>9%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Graduate</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>13%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Post Graduate</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2%</td>
<td>1%</td>
</tr>
</tbody>
</table>
Enrolment ratio declines among surveyed households after 14 years of age and sharply declines after 17 years. This clearly indicates that there is a need to enhance efforts for improving enrolment in higher education. There is however, also need to strengthen primary and middle education so that interest in higher education is maintained.

**Literacy Rate**
Overall literacy rate among the surveyed households is 74% (80% among men and 67% among women). The literacy rate among men is highest in Ghatabarra (91%) while it is lowest in Parogia (57%). The literacy rate among women is also highest in Ghatabarra (74%) while it is lowest in Parogia (58%). Incidentally while literacy rate among women is significantly less in all villages, it is almost equal in Parogia among men and women.
Drop Out
Although, there are very few children between age 6 and 14 who are not enrolled in School, in Parogia, many children both boys and girls who are not going to school. As per the discussion during FGD, absence of road and distance of middle school from the village was the prime reason for considerable number of drop-outs. As the approach road was under construction during the time of survey, the situation is going to improve, however, efforts are required to inculcate interest in education among children.

2. Health
For calculating health parameter of Quality of Life, illness in last one year in the family, any member having physical disability, any malnourished member in the family, and death of a child below five years in last five years were considered. Considering these parameters, Basen has scored least (0.58) while Hariharpur has scored best (0.88).
Illness
Apart from general fever, malaria was reported by considerable number of family members (66) and therefore need to be given special focus. There are three cases of TB among the surveyed households and it was observed during the discussion that there are quite a few cases of TB in every village. There was also tendency of people to hide the disease because of stigma associated with it as discussed during FGD. Therefore, there is a need to sensitise communities and encourage them to get the treatment in time. There was a case among the surveyed household where the person suffering from TB had recovered. Typhoid, anaemia and kidney stone were also reported in the surveyed villages by 10, 11, and 7 members respectively.

People with physical disability in surveyed Households
There is a need to support people with disability as 19 persons from 1,097 members have been reported to have some form of disability. There is a need to design sustainable support system, especially, for those who genuinely deserves support.
Malnutrition

There are five cases of malnutrition as mentioned by the people during household survey, two each in Parsa and Salhi and one in Parogia. Special efforts are required to address the issue of malnutrition among children and women.

Death of Children below 5 years in last five years

There were deaths of children below five years among two families each in Ghatabarra and Salhi, and one each in Parsa and Basen. In Basen, one family lost two children below five years of age.
3. Income

Total income of family from all the sources has been considered to arrive at Income QLI of each family. Income level is given score as mentioned in the methodology. The analysis shows that income parameter of Quality of Life is lowest in Parogia (0.16) and Highest in Parsa (0.36).

Per Capita Income

Per Capita Annual Income (PCI) is lowest in Parogia (Rs. 6,634), while it is highest (Rs.22,308) in Parsa, overall average PCI being Rs. 15,848.

Sources of Income Among Surveyed Families

As can be seen from graph ahead, income from agriculture is merely 13% and from labour, it is 9%. The income from agriculture here is estimated based on the value of crops produced which is mainly for their own consumption as people do not sell in the market. Most of the income in the villages is from service. There is hardly any income from livestock, as most of the people do not sell milk. There are very few business opportunities as yet in the villages. There is six percent income from sale of forest produce which is shown as other income in above graph, which is the main activity for most of the families in all villages during the season except Parsa where people mentioned that the forest is far and people are not much involved in collection of forest produce.
Primary Occupation of Surveyed Households

Agriculture is the primary occupation in surveyed villages. Around 42% families are dependent on agriculture for livelihood, although most of the agricultural production is used for own consumption by families as discussed during FGD and household survey. Around 32% families are in service category, these families work in the mining company. Around 16% families are engaged in labour work, 1.4% families are dependent on livestock, 3.3% families have business and around 5% families are engaged in other occupation. Most of the families are also engaged in forest produce collection during the season. It can be seen from the analysis of occupation pattern of members of family that there are 12% unemployed population. Among unemployed, only 3 are graduate and above, 14 are high school and intermediate pass. As discussed earlier, if the present trend of enrolment ratio in higher studies continues, there will be large number of unemployed youth in the villages in future with qualification less than high school.

Although, vocational training courses are being run by the company and better facilities for the training courses are also being established, but there will be large number of unemployable youth with no skills may be left out, as many skill development courses require minimum high school qualification.
Loan

More number of families among the surveyed families have taken loan in Parogia (48%) and Ghatabarra (41%).

Most of the families have taken loan from Government banks. Only one family has taken loan from money lender and 7 from micro finance.

Percentage of Families Who Have Taken Loan
4. Land Ownership

The land QLI is highest in Ghatabarra, while Hariharpur have lowest land ownership. Land ownership QLI is in the range of 0.23 to 0.26 in rest of the villages.

![QLI - Land Ownership](image)

5. Livestock Ownership

Livestock QLI is highest in Parogia while it is lowest in Parsa. However, as per FGD, and discussion during household survey, people mentioned that they do not drink/ sell milk. People mostly use the animal dung as manure and for applying on floor. 29% families own cows, 41% families own bullocks and 19% own Buffalo. Goats are owned by 29% families while sheep are not reared by only 0.4% families in the surveyed villages.

![QLI - Livestock Ownership](image)

![Percentage Of Families Owning Livestock](image)
6. Ownership of Assets

Asset QLI is score of one third weightage of three parameters, viz., assets for mobility (four-wheeler, two-wheeler and three-wheeler), assets for information (TV, radio and mobile) and other major assets (AC, fridge and washing machine). Asset QLI is highest in Hariharpur (0.51) while it is lowest in Parogia (0.26).

Assets for Mobility

44.4% families own motor cycle while only 3% own 4-wheeler and only 1.7% own tractor in the six villages among surveyed households. With regards to bicycle also, it is surprising to find out that only 45.5% families do not own bicycle. Only five families in Parsa, and 1 family each in Salhi and Ghatabarra own car. Only three families in Parsa and one family in Salhi own tractor. Motorcycle ownership is highest in Hariharpur (79%) while only 24% families in Basen and 26% in Parogia own motorcycle which is lowest.
Assets for Information
Overall 64% families own mobile and only 24% families own TV. Use of radio is limited to only 4% families. Village wise distribution of mobile shows that 79% families in Ghatabarra own mobile while only 48% families in Basen own mobile.

Percentage Of Families Owning Assets For Information

Percentage of Families Having Mobile
Ownership of other major assets

Penetration of assets like Fridge, cooler, washing machine is very less in the surveyed households. However, LPG is available in 41% families in Ghatabarra, 32% Hariharpur, 30% Salhi, 12% Parsa and 5% in Basen. None of the families in Parogia reported any of the four assets. Fridge is available with three families each of Ghatabarra and Salhi, two families in Parsa and one family in Basen. Cooler is available with four families in Parsa, three families each in Ghatabarra and Salhi. Washing machine is available in one family each in Ghatabarra and Parsa.

<table>
<thead>
<tr>
<th>Village</th>
<th>Fridge</th>
<th>Cooler</th>
<th>Washing Machine</th>
<th>LPG</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basen</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Ghatabarra</td>
<td>3</td>
<td>3</td>
<td>1</td>
<td>12</td>
</tr>
<tr>
<td>Hariharpur</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>6</td>
</tr>
<tr>
<td>Parogia</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Parsa</td>
<td>2</td>
<td>4</td>
<td>1</td>
<td>8</td>
</tr>
<tr>
<td>Salhi</td>
<td>3</td>
<td>3</td>
<td>0</td>
<td>17</td>
</tr>
</tbody>
</table>

7. Housing Condition

For housing quality of Life, house type, roof, floor, and number of rooms were considered to get score on quality of housing. The Housing QLI is almost similar in all villages, though it is least in Basen and Salhi with 0.35 scoring and highest in Ghatabarra with scoring of 0.41.

Almost all the houses in the six villages are Kutcha houses with tiled roof and mud floor. There are only 1% Pucca houses and 2% Semi Pucca houses among surveyed households.

There are only 1% houses with cement floor among surveyed households. There were no tiled or stone floor was found in survey. Only 1% of houses had cemented roof. Around 40% houses had 2 rooms and around 29% houses had three to four rooms. 14% houses had only one room while around 17% houses had four or more rooms.
8. Availability of Clean Drinking Water
Around 89% families among surveyed households mentioned that the clean drinking water is available. Although 17% families are dependent on wells and few families also drink water from river as per discussion during FGD. Around 40% families use hand pump while around 26% use borewell for drinking water. Around 13% families have tap water available near their homes.
9. Cooking Fuel Used

**QLI - Type of Cooking Fuel Used**

<table>
<thead>
<tr>
<th>Village</th>
<th>Bore Well</th>
<th>Handpump</th>
<th>Own Tank</th>
<th>Tap</th>
<th>Water Tank</th>
<th>Well</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basen</td>
<td>25.82%</td>
<td>40.38%</td>
<td>0.47%</td>
<td>13.15%</td>
<td>2.82%</td>
<td>17.37%</td>
</tr>
</tbody>
</table>

It is observed that villages in the proximity of mines have more number of LPG users.
Wood is the main cooking fuel used in the surveyed households in all the villages. Only 6% families in the surveyed households use LPG. As a result, the Fuel QLI is very low in the villages with Hariharpur having Highest QLI of 0.16 followed by Parsa (0.09), Salhi (0.05) and Ghatabarra (0.03), while Basen and Parogia have 0 score on Fuel QLI.

10. Availability of Toilets

Most of the surveyed households had toilets and as a result, as compared to other parameters, Toilet QLI is higher in surveyed villages with Salhi having highest score of 0.98 and Parogia having least score of 0.87. The open defecation free drive has been successful and people are using the toilets as mentioned by them during the survey.

Overall there are only 6% families who are going for open defecation. 6 families from Parsa, 2 from Ghatabarra and 1 each from Parogia, Hariharpur and Basen among surveyed families mentioned that they go for open defecation. Salhi as mentioned by people during FGD, is 100% open defecation free village and had also received Nirmal Gram Puraskar in 2011. The name and shame against open defecation has really worked in Salhi where whistle was blown if someone was found defecating in open.
Impact of CSR Initiatives

“Education is the movement from the darkness to light”
Since the CSR initiatives are being implemented for last two years and some of the initiatives have been initiated last year, it will take some time to see impact on the communities of the project villages. In-depth household information on impact indicators, along with stakeholder consultations is required to assess impact of CSR for which evaluation/impact assessment study can be conducted.

However, in terms of overall impact of the company and its initiatives on the villages, it was clearly visible from the fact that the team could move freely in all villages without any obstruction. The company representatives were with the survey team throughout the field visits and knew each and every member of the village by name which reflects sound and strong community relations.

**Medical health van** had a significant impact on the communities in all villages and was highly appreciated by them. The access to timely treatment ensured that the days of illness were reduced which otherwise would have affected earnings of members who need to work daily for survival.

**Adani Vidya Mandir** also had significant impact on the community of villages from where children were enrolled. People were highly eulogizing efforts of team of AVM in bringing out the best in their wards. People demanded more schools of similar kind.

Impact of **Project Annapurna** was also significant as some of the farmers could earn even up to Rs. 40,000/- in a season from potato cultivation. The outcomes here however, depends more on the people, since they need to do efforts as well as give own contribution. More awareness and successful cases will result in high impact in the long run as the project will not only augment income but will also contribute to augment nutrition if cultivation of more vegetable varieties is promoted in the villages.

Impact of **toilet construction** is clearly visible in all the villages though it is comparatively low in Parogia. The open defecation is substantially reduced and there is even penalty for the same. The Quality of life indicator of 0.92 for toilets reflects the achievement. The impact in terms of reduced occurrence of diseases caused by open defecation, however requires a separate study.
Impact of vocational training will be visible after some time when trained youth continue employment for longer duration and are able to face challenges post-employment.

As per discussion with communities, the income generation through Self Help Groups has been initiated and activities like mushroom cultivation, stitching, forest produce, Mid-day meal etc. are being carried out by some of the groups while training is being provided to other groups. The impact though will be visible when sustained income is generated.

The availability of water in all the project villages is reflected by high water QLI of 0.91. The impact of the availability of water near door step can be seen from the fact that people now do not have to travel much to fetch water. As per discussions, earlier it used to take an average of 15-30 minutes of walk to collect water. In all the villages, water was mentioned to be sweet and no water borne diseases were mentioned.

Project Vasundhara is aimed at ensuring environment friendly alternate livelihood avenue for the villagers with a focus on tribal community. The goal of the project was “Gainful engagement of people in environmental friendly income generating activities” whereas the mission was “Developing sustainable livelihood opportunities for participating villagers focusing tribal communities through remunerative self-employment to prevent migration”.

Vocational Training Centre: Udaipur

Hariharpur: “Project Unnayan: Stitching training to local women”

Hariharpur: “Hand Pump Installation”
Considering successful implementation of these activities along with infrastructure development such as approach road construction, Digital Gram, sports initiatives and other cultural & welfare activities, there is a profound impact on community and on the image of the company.
Recommendations
Recommendations are grouped into the following categories based on dimensions of short term, long term, immediate, and later. Term refers the duration required to complete the activity.

<table>
<thead>
<tr>
<th>Later</th>
<th>Group 3: Later and short term</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>★ Many anaemic cases were found during survey; awareness for food and eating habits required among women and children.</td>
</tr>
<tr>
<td></td>
<td>★ Linking with Govt. schemes for livestock development.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Later</th>
<th>Group 4: Later and long term</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>★ Enrolment of children of non-PAP families in AVM</td>
</tr>
<tr>
<td></td>
<td>★ Clean drinking water supply required in Parogia during rainy season.</td>
</tr>
<tr>
<td></td>
<td>★ Sustainable support for disabled people</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Immediate</th>
<th>Group 1: Immediate and Short-term</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>★ Awareness programmes required for parents and community to reduce drop-outs after class 8, especially girl child.</td>
</tr>
<tr>
<td></td>
<td>★ School van may be provided to children of Parogia to reduce drop-out rate.</td>
</tr>
<tr>
<td></td>
<td>★ People have very limited sources of income. Company may provide skill and entrepreneurship development training to the youth and poorest families.</td>
</tr>
<tr>
<td></td>
<td>★ Company may plant more trees outside the boundary as a wind barrier.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Immediate</th>
<th>Group 2: Immediate and Long-term</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>★ Workshops and awareness sessions are required to reduce the alcohol consumption.</td>
</tr>
<tr>
<td></td>
<td>★ New CSR initiatives may implement in sustainable manner.</td>
</tr>
<tr>
<td></td>
<td>★ Vocational training may be imparted to school drop-outs.</td>
</tr>
<tr>
<td></td>
<td>★ Entrepreneurship programme for unemployed youth with less qualification is required.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Short term</th>
<th>Long term</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>necessary to ensure that students continue higher education. The issue of unemployable youth in the project villages will lead to larger problems in future if not addressed.</td>
</tr>
<tr>
<td></td>
<td>There is one primary school in Parogia and children used to go Ghatabarra for middle school, however, recently this school has been shifted from Ghatabarra to other location which is 55 km away from the Parogia. Children of Parogia village have stopped their schooling after 5th class as the school distance has increased and no mode of transportation available. Company may provide school van to drop-outs so that they could continue their education after primary as company is providing at Dandgaon, Shivnagar and Udaipur Tehsil.</td>
</tr>
<tr>
<td></td>
<td>It is observed that economic condition of some households has improved after</td>
</tr>
</tbody>
</table>
mining started in the area. These households have more income from job. On the other hand, lots of people have very limited income source. There are people dependent on labour work, forest produce and PDS for their survival. As the company has already initiated income generation activities recently, more women from poor families may be included in the programme from all six villages.

- Company may plant more trees outside the boundary as a wind barrier which will help to improve environment.

Group 2: Immediate and long-term

- It is observed during survey that people including women were drunk during day time as well. During group discussions, people mentioned that these women did not take care of children’s health which causes malnutrition and anaemia. There is a need to strengthen existing de-addiction program of the company which will help in improving education, health and economic condition of families.

- Ongoing CSR initiatives have been successful in impacting lives and people appreciated and recognised efforts of the company. It is also observed that people's expectations have soared high and they did not want to do any effort to improve their economic condition and taking undue advantage of facilities being provided. The people have become dependent on the Company to the extent that they look forward to company to maintain the assets provided by company under CSR and R&R. It is recommended to enhance ownership of the community for which village development committees should be empowered to maintain the assets. To increase ownership, company may start taking contribution from beneficiaries which will help in sustainability of CSR activities.

- If the present trend of low higher education enrolment ratio continues, there will be large number of unemployed youth in the villages in future with qualification less than high school. Although, company is running vocational training courses and is also establishing better facilities for the training courses, there still will be large number of unemployable youth with no skills who will be left out, as many skill development courses require minimum high school qualification. It is therefore important to strengthen middle and secondary level education in all villages along with primary education.

- At present, there are 12% unemployed youth among population of working age among surveyed households. Company may devise strategy to impart livelihood opportunity through skill development matching qualification requirement. For those with lesser qualification, entrepreneurship development can be explored so that they are productively engaged.

Group 3: Later and short-term

- Many anaemic and malnutrition cases were found during FGDs. Company has started programme for anaemic women and malnourished children in the villages. There is a need for motivation and to create awareness among whole community for nutritious food and eating habits. Such programmes must happen frequently, Company may use ICT tools for bringing awareness and connect people with the ongoing government schemes in the project area for improving health of people.

- Benefit of Project Annapurna where vegetable cultivation is being promoted with the objective of income enhancement, can also be linked to augment nutrition in diet. Efforts can also be made to promote milk in diet. Livestock development programme may also be considered for which Chhattisgarh Livestock Development Department can be approached so that the livestock can also augment income.

Group 4: Later and long-term

- Some non-beneficiaries mentioned that their children should also get opportunity to study in AVM, at present only children of project affected people were allowed in AVM Surguja. They also mentioned that AVM is the only
school in the area which provides quality education and they do not want their children to be left out. Non-beneficiaries/ migrated families were quite unhappy with the current situation, as their children were not eligible for admission due to not having address proof, birth certificate etc. Company may consider providing education to both project affected and non-affected people to restore societal balance.

- In Parogia, 78 families reside and are dependent on river for drinking water, water is muddy during rainy season and it becomes non-drinkable. However, people are forced to drink this water. Therefore, there is a need to provide clean drinking water to these families during rainy season.

- There is a need to support people with disability as 19 persons from 1,097 members have been reported to have some form of disability. There is a need to design sustainable support system, especially, for those who genuinely deserves support.

Education is the most powerful weapon which you can use to change the world

- Nelson Mandela
Annexures
Methodology

Desk Review
The documents provided by client were studied prior to designing the survey. The documents included, environment clearance letter, R&R plan, baseline and needs assessment report, environmental impact assessment report, green foot step brochure Dec 2016 and documents related to CSR awards. The important aspects were noted down for use during conducting survey and in designing questionnaire.

Questionnaire Design
Structured questionnaires were designed to collect household data as well as village information as a support during focus group discussion (FGD). All the aspects required to assess human development indices such as income index, education and health index were carefully incorporated in the questionnaire format including demographic details such as caste, occupation pattern, etc.

The questionnaire was designed to cross check information provided by respondents so as to arrive nearly possible correct information. This included asking about land details, income sources as well as income from individual family members to arrive at total family income. Similarly, education level of each member in the family along with gender, age, marital status and occupation patterns etc. were included. For health aspects, the information of family members suffering from illness as well as details of members if having physical disability were included. Number of deaths occurred in the family in last 5 years were recorded to calculate life expectancy at birth.

The village questionnaire included demographic details of village, people in different income groups, education levels, enrolments, housing pattern including toilets facility and electricity availability, occupation pattern of the village, migration, sources of income in the village, livestock and production levels, major crops grown and production levels, self-help groups in the villages, drinking water facility, diseases prevalent in the village, and expenditure.

Team Orientation
The 4-member expert team from CII-ITC Centre of Excellence for Sustainable Development was directly involved in the survey of household survey. Care was taken that the community provides information without bias. The survey members as well as FGD in the villages. The team was oriented by the team leader on the way of asking questions and the things to be kept in mind while asking the questions. The observations from FGD were incorporated during orientation from time to time to arrive at family income such as crop production, price level, income from forest produce etc.

Sampling
Six core villages had population of 4,958 in 1,135 households. CESD undertook a sample size of 220 during secondary data analysis, however, 213 households were covered during the survey. This was 18.76% of the total number of households, which satisfies statistical validity of sample.

The respondents were selected through random sampling method which is most widely used method as it gives each member of the population an equal opportunity to be selected in the study. Initially it was planned to conduct survey in 30 households in each of the core villages, however, looking at the scenario that 2 villages viz., Hariharpur and Parogia had very few families (62 and 78 respectively), more number of families were considered for conducting the survey in other villages. As very few people were available in Ghatabarra, more number of families were covered in Parsa, where the population is expected to stay for life of mining project.

<table>
<thead>
<tr>
<th>Village</th>
<th>Sample size (No of families surveyed)</th>
<th>Total No. of Households in villages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basen</td>
<td>21</td>
<td>123</td>
</tr>
<tr>
<td>Ghatabarra</td>
<td>29</td>
<td>310</td>
</tr>
<tr>
<td>Hariharpur</td>
<td>19</td>
<td>62</td>
</tr>
<tr>
<td>Parogia</td>
<td>23</td>
<td>78</td>
</tr>
<tr>
<td>Parsa</td>
<td>65</td>
<td>262</td>
</tr>
<tr>
<td>Salhi</td>
<td>56</td>
<td>300</td>
</tr>
<tr>
<td>Total</td>
<td>213</td>
<td>1135</td>
</tr>
</tbody>
</table>

Conducting Survey
The survey was conducted from 6 to 10 February 2017 by four members of CII-ITC Centre of Excellence for Sustainable Development. Team from the company assisted during the survey and were on the field with the CESD team throughout the included household survey, focus group discussion and semi structured interviews.
Household Survey
Door to door household survey of sample households was conducted by team using structured questionnaire. The questionnaire was so designed to arrive at critical information such as family income by triangulating variables which included, income from various sources, individual family income, and cross checking with production from land if available. Although most of the families mentioned that the crops grown by them are mostly used for own consumption, the value of production was assumed in consultation of the respondent and the same was captured as agricultural income. Few families however, declined to accept the income calculation from agriculture and were thus considered nil.

Focus Group Discussion (FGD)
Focus Group Discussions were held in six villages with Sarpanch, Sachiv and other informed persons such as teachers etc., along with other people available at the time of survey including women. Structured village format was also used for assistance and to capture information during the discussion. This helped in collecting all relevant information from community for the purpose of assistance in calculation of HDI, e.g., income from sale of various forest produce, crop production in quintal per Acre and value in terms of rupees per quintal for various crops. This information was used while filling household formats to arrive at estimated income from agriculture by each family. Important points emerged during the discussion were captured separately and are presented in recommendations.

Semi-structured interview
Semi-structured interviews were conducted with the key resource persons i.e., Company officials, health workers, teachers and community members and their responses were recorded for triangulation.

Calculating Human Development Index (HDI)
Human Development Index (HDI) is a summary measure of achievements in key dimensions of human development: a long and healthy life, access to knowledge and a decent standard of living. The HDI is the geometric mean of normalized indices for each of the three dimensions. Description of the steps to calculating the HDI as used in Human Development Report 2015 of UNDP, data sources and the methodology used to estimate missing values is mentioned ahead. There are two steps to calculating the HDI.

Step 1. Creating the dimension indices
Minimum and maximum values (goalposts) are set in order to transform the indicators expressed in different units into indices between 0 and 1. These goalposts act as the ‘natural zeroes’ and ‘aspirational goals’, respectively, from which component indicators are standardized. They are set at the following values:

**HDI Goal posts**

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Indicator</th>
<th>Minimum</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Health</td>
<td>Life expectancy (years)</td>
<td>20</td>
<td>85</td>
</tr>
<tr>
<td>Education</td>
<td>Expected years of schooling</td>
<td>0</td>
<td>18</td>
</tr>
<tr>
<td></td>
<td>Mean years of schooling</td>
<td>0</td>
<td>15</td>
</tr>
<tr>
<td>Standard of living</td>
<td>Gross national income per capita (PPP 2011 $)</td>
<td>100</td>
<td>75,000</td>
</tr>
<tr>
<td></td>
<td>Per capita Income (PPP $) of all families in village is considered for the study.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The justification for placing the natural zero for life expectancy at 20 years is based on historical evidence that no country in the 20th century had a life expectancy of less than 20 years (Oeppen and Vaupel 2002; Maddison 2010; Riley 2005). Societies can subsist without formal education, justifying the education minimum of 0 years. The maximum for mean years of schooling, 15, is the projected maximum of this indicator for 2025. The maximum for expected years of schooling, 18, is equivalent to achieving a master’s degree in most countries. The low minimum value for gross national income (GNI) per capita, $100, is justified by the considerable amount of unmeasured subsistence and nonmarket production in economies close to the minimum, which is not captured in the official data. The maximum is set at $75,000 per capita. Kahneman and Deaton (2010) have shown that there is a virtually no gain in human development and well-being from annual income beyond $75,000. Assuming annual growth rate of 5 percent, only three countries
are projected to exceed the $75,000 ceiling in the next five years. Having defined the minimum and maximum values, the dimension indices are calculated as:

\[
\text{Dimension index} = \frac{(\text{actual value} - \text{minimum value})}{(\text{maximum value} - \text{minimum value})}
\]

………Eq. 1

For the education dimension, equation No.1 is first applied to each of the two indicators, and then the arithmetic mean of the two resulting indices is taken. Because each dimension index is a proxy for capabilities in the corresponding dimension, the transformation function from income to capabilities is likely to be concave (Anand and Sen 2000)—that is, each additional dollar of income has a smaller effect on expanding capabilities. Thus, for income, the natural logarithm of the actual, minimum and maximum values is used.

Life expectancy is derived using life table of Chang (II) method. The number of deaths among surveyed families of all villages in last five years in different age groups were taken along with the total population distribution (midterm) in same age groups in sample households multiplied by 5. These two data were entered in the life table - Chang (II) method to derive Life Expectancy.

For calculating Expected Years of Schooling (EYS), enrolment ratios in each year of age group from 6 to 24 were added for students who were continuing education from surveyed villages. Overall sample mean was considered for calculating overall EYS.

For calculating Mean Years of Schooling, number of years of education received by each member of surveyed families above age group 24 were added and then divided by total population in that age group of the surveyed villages. Overall sample mean was considered for calculating overall MYS.

The Per Capita Income (PCI) was calculated by adding income of each family surveyed in the village and divided by total population of the surveyed households in the village. The PCI was divided by the 2011 values of conversion factor for $ PPP ($ purchasing Power Parity) which was 15.11 to arrive at Per Capita Income (PPPS). It is presumed that studies to be conducted in future will also use this conversion factor for calculating per capita income (PPP $).

Overall sample mean was considered for calculating overall Per capita income.

**Step 2. Aggregating the dimensional indices to produce the Human Development Index**

The HDI is the geometric mean of the three-dimensional indices:

\[
\text{HDI} = (\text{Health} \times \text{Education} \times \text{Income})^{1/3}
\]

**Example: Parsa**

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Indicator</th>
<th>Values</th>
</tr>
</thead>
<tbody>
<tr>
<td>Health</td>
<td>Life expectancy (years)</td>
<td>63.3</td>
</tr>
<tr>
<td>Education</td>
<td>Expected years of schooling</td>
<td>11.5</td>
</tr>
<tr>
<td></td>
<td>Mean years of schooling</td>
<td>5.14</td>
</tr>
<tr>
<td>Standard of living</td>
<td>Gross national income per capita (PPP 2011 $)</td>
<td>1476</td>
</tr>
<tr>
<td></td>
<td>Per capita Income (PPP 2011 $)</td>
<td></td>
</tr>
</tbody>
</table>

Health index = \((63.3-20)/(85-20) = 0.666\)

Mean years of schooling index = \((5.14-0)/(15-0) = 0.343\)

Expected years of schooling index = \((11.5-0)/(18-0) = 0.639\)

Education index = \((0.343+0.639)/2 = 0.491\)

Income index = \(\ln(1476) - \ln(100)/\ln(75,000) - \ln(100) = 0.407\)

**Human Development Index** = \(\sqrt[3]{0.666 \times 0.491 \times 0.407} = 0.510\)
Calculating Quality of Life Index (QLI)

Human Development Index has some limitations in measuring progress in human development for small populations since parameters like life expectancy is calculated considering number of deaths in different age groups in last five years; while mean years of schooling and expected years of schooling may not vary significantly.

Hence, in order to measure changes living standard of people, 10 parameters of quality of life have been covered in this study and are given value from 0 to 1 each, thus a maximum value of 10 for each household is obtained.

The parameters included are Income, land, Housing condition (Number of rooms, type of house, type of floor, type of roof), fuel used for cooking, sanitation (toilet availability), Clean drinking water availability, Assets (Assets for mobility, information and other major household assets), Livestock (especially important in rural areas), education level and good health.

For health QLI, malnourished children in family, death of child of less than five years of age in last five years, family members reported sickness in last one year, and any member having physical disability have been considered. The family which has no such occurrence is given 0 point and the score of 1 is given, while the family which has maximum of such occurrences got 1 point and the score is 0.

QLI parameters gives better picture of project area in terms of progress as it comprises more number of indicators than HDI study. For each village average of scores of the ten parameters are considered and added to get QLI of a village out of total 10 points.

The parameters are given score as given in the following table:

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Range</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Income Parameter s – (income in Rs.)</td>
<td>&lt;35000</td>
<td>0.1</td>
</tr>
<tr>
<td></td>
<td>35000 - 50000</td>
<td>0.2</td>
</tr>
<tr>
<td></td>
<td>50000 - 75000</td>
<td>0.3</td>
</tr>
<tr>
<td></td>
<td>75000 - 100000</td>
<td>0.4</td>
</tr>
<tr>
<td></td>
<td>100000 - 200000</td>
<td>0.5</td>
</tr>
<tr>
<td></td>
<td>200000 - 300000</td>
<td>0.6</td>
</tr>
<tr>
<td></td>
<td>300000 - 500000</td>
<td>0.7</td>
</tr>
<tr>
<td></td>
<td>500000 - 800000</td>
<td>0.8</td>
</tr>
<tr>
<td></td>
<td>800000 - 1000000</td>
<td>0.9</td>
</tr>
<tr>
<td></td>
<td>&gt;1000000</td>
<td>1.0</td>
</tr>
<tr>
<td>Land</td>
<td>Landless</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Marginal</td>
<td>0.25</td>
</tr>
<tr>
<td></td>
<td>Small</td>
<td>0.5</td>
</tr>
<tr>
<td></td>
<td>Medium</td>
<td>0.75</td>
</tr>
<tr>
<td></td>
<td>Big</td>
<td>1</td>
</tr>
<tr>
<td>Housing</td>
<td>Floor</td>
<td>Cement</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Stone</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Mud</td>
</tr>
<tr>
<td></td>
<td>Roof</td>
<td>Cement</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Tiles</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Thatch</td>
</tr>
<tr>
<td></td>
<td>House Type</td>
<td>Kutch</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Semi Pucca</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Pucca</td>
</tr>
<tr>
<td></td>
<td>Room per member</td>
<td>&lt;0.5</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0.5 – 1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>=1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>&gt;1</td>
</tr>
<tr>
<td>Fuel</td>
<td>LPG</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Wood/ Charcoal</td>
<td>0</td>
</tr>
<tr>
<td>Toilet</td>
<td>Available</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Not Available</td>
<td>0</td>
</tr>
<tr>
<td>Water</td>
<td>Available</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Not Available</td>
<td>0</td>
</tr>
<tr>
<td>Assets availability</td>
<td>Mobility Assets</td>
<td>If any Available</td>
</tr>
<tr>
<td></td>
<td>Assets for Info</td>
<td>If any Available</td>
</tr>
<tr>
<td></td>
<td>Other assets</td>
<td>If any Available</td>
</tr>
<tr>
<td>Livestock</td>
<td>Available</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Not Available</td>
<td>0</td>
</tr>
<tr>
<td>Education (Average years of Schooling of family)</td>
<td>If 0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>0-4</td>
<td>0.1</td>
</tr>
<tr>
<td></td>
<td>4-5</td>
<td>0.2</td>
</tr>
<tr>
<td></td>
<td>5-6</td>
<td>0.3</td>
</tr>
<tr>
<td></td>
<td>6-7</td>
<td>0.4</td>
</tr>
<tr>
<td></td>
<td>7-10</td>
<td>0.6</td>
</tr>
<tr>
<td></td>
<td>10-12</td>
<td>0.8</td>
</tr>
<tr>
<td></td>
<td>12-15</td>
<td>0.9</td>
</tr>
<tr>
<td></td>
<td>&gt;15</td>
<td>1.0</td>
</tr>
<tr>
<td>Health points*</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>between 0 - 0.25</td>
<td>0.75</td>
</tr>
<tr>
<td></td>
<td>between 0.25 - 0.51</td>
<td>0.5</td>
</tr>
<tr>
<td></td>
<td>between 0.5 – 1</td>
<td>0.25</td>
</tr>
<tr>
<td></td>
<td>If &gt; 1</td>
<td>0</td>
</tr>
</tbody>
</table>
HUMAN DEVELOPMENT INDEX STUDY
CII-ITC Centre of Excellence for Sustainable Development

Household Survey

07-02-20

Household Survey

08-02-20
HUMAN DEVELOPMENT INDEX STUDY
CII-ITC Centre of Excellence for Sustainable Development

Village Survey
Focus Group Discussion
CSR Initiatives

Education support initiative
The focus of this initiative is to educate the children of peripheral villages of the coal mining block.

- In 2013 Company established Adani Vidya Mandir in Surguja, Chhattisgarh for project affected children.
- AVM provides quality education and mid-day meal for free of cost.
- AVM also provides support to other schools in region through infrastructure, material, and program support.
- Free transport support to more than 500 students to go to schools situated at distance of 5-20 km at Dandgaon, Shiv Nagar and Udaipur Tehsil Headquarters.
- Special coaching facility is provided to students of core villages for board exams preparations.

Adult Education for Village Women: Adult education program was started in Salhi, Hariharpur, Parsa, Basen and Ghatabarra to make village women literate.

Community Health Support Initiative

This initiative creates awareness about preventive and curative health measure for ensuring better health.

- Preventive health care: RVUNL facilitated village women and men to participate in awareness programs on health-hygiene and sanitation, causes and control of Malaria, Dengue, Diarrhoea and Dysentery etc.
- Curative health care: Villagers failing ill were facilitated to undergo medical treatment at the dispensary set up by RVUNL at Shivnagar village and for higher level of medical treatment, the referral service was ensured for the concerned patients.
- Project Sanjiwani W: The goal of project is the preventive and curative care of people residing the core zone and buffer zone villages and thus leading to quality of life.
- 24*7 Ambulance service: was ensured for the village patients whereas the dispensary was kept open for 365 days for medical treatment and counselling of the villagers.
- De-addiction campaign: A campaign was organized by RVUNL team with the aim of reducing alcoholism. It was organized with companies’ medical support team, village health workers and self-help groups.

Sustainable Livelihood development initiative

The initiative of livelihood promotion was the major component that was focused on for economic gainful engagement of the local youth, tribal community and village women in their village locations.

Women SHG promotion for sustainable livelihood:

- Women SHGs were formed in coordination with the Gram panchayats and the concerned Govt. departments for their thrifts savings and start small enterprises for income generations.
- With the help of skilled training and support; 16 women out of 30 trainee SHG members have benefited from this program and have emerged as skilled entrepreneurs by starting up their own enterprise of mass production of dresses for schools and apparels worn by women.

Project UNNAYAN: RVUNL launched the project Unnayan on 26th January 2016.

- The goal of project was institutionalizing women in self-help groups for their socio-economic empowerment through economic and social activities.
- The mission of this project is to empower women in working age with life skills and occupational capabilities.
- RVUNL believes in always giving back to the society and empowering women is the best way to do so.
Project Vasundhara:

- The project aimed at ensuring environment friendly alternate livelihood avenue for villagers with a focus on tribal community.
- The goal of the project was gainful engagement of people in environment friendly income generating activities.
- The mission was developing sustainable livelihood opportunities for participating villagers focusing tribal communities through remunerative self-employment to prevent migration.

Project ANNAPURNA:

- With the implementation of the project, the village youths and farmers were facilitated to do vegetable cultivation and cultivation of paddy following SRI (Systemic Rice Intensification) method.
- The goal of the project was continual enhancement of crop production with restoration of soil health and farmer’s institutions for farmer’s income enhancement.
- The mission was promoting best agricultural practices and improved technology based farming as a choice of sustainable economic gainful engagement for farmers.

Sports, Culture and Welfare initiative

- For physical development and moral encouragement these initiatives were carried out by RVUNL for development of sports and local culture.
- Culture development initiative: Development and preservation of the local culture play the role of catalyst for mobilization and sensitization of the people to come forward for participation in the development drive.
- RVUNL promotes local cultural events.

Sports initiative- Adani Surguja Football Academy (ASFA)

- The academy was started with the goal of promoting and preparing rural players for national and international level sports with a focus on football.
- The mission was creation of enabling environment for rural youth to get opportunities for sports.
- Adani Sport football academy was established at Ambikapur, to provide football training free cost to the aspiring players with a focus on underprivileged youths of the region aged between 10-17 years.
- The achievements of the academy were state championship of the school level tournament, winner in under 14 Subrato cup defeating Delhi, Winner in 17 state level school tournaments, 9 players selected in state team, 2 players selected in Army boys sports signal training Centre, Jabalpur and one player of academy Master Balsai played in DANA Cup-2016 conducted in Denmark.

Welfare initiative

- Keeping in view the genuine needs of the people such as the physically challenged, old person, poor children, RVUNL provisioned for welfare support
as a result of which financial support was provided to the needy, poor, age old persons for their medical treatment.

- Crutches were given to the physically challenged man who had lost his one leg.
- Disabled persons were facilitated to get disability certificates.
- Blankets/clothes were distributed in winter season to 200 poor people giving priority to the old women and men.
- Artificial limbs were provided to 25 physically challenged people.

Vocational Training Centre

- Continuing on its mission to ensure sustainable livelihood, RVUNL has recently started a vocational training Centre at Udaipur, Surguja.
- The Centre was inaugurated on June 2015–16.
- The Centre has a capacity to train 500 youths per year.
- Skill trainings in the fields related to sewing machine operator, fitters, welders, electricians, hospitality, trades, etc. will be made available for the youths of the region.

- In one current event, the first batch of 30 trained girls from the rural area of the peripheral villages of Parsa and Surguja district, post completing their sewing training successfully; have been placed at a renowned garment factory in Chennai. Embarking on their new journey of professional life, the girls had left for Chennai on September 24, 2016.
### Data Tables - Schools (Village wise)

<table>
<thead>
<tr>
<th>Parosa (Total Schools – 5)</th>
<th>Name of school</th>
<th>Girls</th>
<th>Boys</th>
<th>Total</th>
<th>Teachers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary</td>
<td>P.S. Keshipara</td>
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<tr>
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<td>P.S. Mahadevpara</td>
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<tr>
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<td>M.S. Parsa</td>
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<td>23</td>
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<td>High School</td>
<td>Govt. high school Parsa</td>
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<td>30</td>
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<table>
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<th>Salhi (Total Schools – 4)</th>
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<th>Girls</th>
<th>Boys</th>
<th>Total</th>
<th>Teachers</th>
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<tr>
<td></td>
<td>P.S. Emlipara</td>
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<td>26</td>
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<tr>
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<table>
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<th>Girls</th>
<th>Boys</th>
<th>Total</th>
<th>Teachers</th>
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<td>9</td>
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<table>
<thead>
<tr>
<th>Ghatabarra (Total Schools – 4)</th>
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<th>Girls</th>
<th>Boys</th>
<th>Total</th>
<th>Teachers</th>
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<tr>
<td>Primary</td>
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<table>
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<th>Boys</th>
<th>Total</th>
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<td>17</td>
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<table>
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<th>Girls</th>
<th>Boys</th>
<th>Total</th>
<th>Teachers</th>
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</thead>
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<td>Sr. KG</td>
<td>Std I</td>
<td>Std II</td>
<td>Std III</td>
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<tr>
<td>Boys</td>
<td>42</td>
<td>50</td>
<td>19</td>
<td>36</td>
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<td><strong>88</strong></td>
<td><strong>36</strong></td>
<td><strong>68</strong></td>
<td><strong>58</strong></td>
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<td></td>
<td><strong>Grand Total</strong></td>
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<tr>
<td></td>
<td><strong>Total</strong></td>
<td><strong>Boys</strong></td>
<td>262</td>
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| Total strength | 461 |
### Data Tables - Village Profile

#### Caste wise number of families per village

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<thead>
<tr>
<th>Name of village</th>
<th>Caste wise number of families</th>
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<td>Ghatabarra</td>
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</tr>
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<td>Parogia</td>
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<td>Parsa</td>
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<tr>
<td>Salhi</td>
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<tr>
<td>Total</td>
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#### Caste wise Male populations

<table>
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<tr>
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<td>Basen</td>
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</tr>
<tr>
<td>Ghatabarra</td>
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<tr>
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<td>1</td>
</tr>
<tr>
<td>Parogia</td>
<td>0</td>
</tr>
<tr>
<td>Parsa</td>
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<tr>
<td>Salhi</td>
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#### Caste wise female populations per village

<table>
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<tr>
<td>Parogia</td>
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<tr>
<td>Parsa</td>
<td>29</td>
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<tr>
<td>Salhi</td>
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</tr>
<tr>
<td>Total</td>
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</table>

#### Caste wise total population per village

<table>
<thead>
<tr>
<th>Name of village</th>
<th>Caste Wise Total Population</th>
</tr>
</thead>
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<tr>
<td></td>
<td>SC</td>
</tr>
<tr>
<td>Basen</td>
<td>0</td>
</tr>
<tr>
<td>Ghatabarra</td>
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</tr>
<tr>
<td>Hariharpur</td>
<td>3</td>
</tr>
<tr>
<td>Parogia</td>
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</tr>
<tr>
<td>Parsa</td>
<td>60</td>
</tr>
<tr>
<td>Salhi</td>
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### Children Population (0-6 years)

<table>
<thead>
<tr>
<th>Name of village</th>
<th>Children Population (0-6years)</th>
<th>Male</th>
<th>Female</th>
<th>Total</th>
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</thead>
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<tr>
<td>Basen</td>
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<td>60</td>
<td>120</td>
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<td>Ghatabarra</td>
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<td>131</td>
<td>123</td>
<td>254</td>
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<td></td>
<td>34</td>
<td>21</td>
<td>55</td>
</tr>
<tr>
<td>Parogia</td>
<td></td>
<td>29</td>
<td>32</td>
<td>61</td>
</tr>
<tr>
<td>Parsa</td>
<td></td>
<td>99</td>
<td>92</td>
<td>191</td>
</tr>
<tr>
<td>Salhi</td>
<td></td>
<td>114</td>
<td>101</td>
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<tr>
<td>Total</td>
<td></td>
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<td>429</td>
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### Religion wise total population

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<th>Hindu</th>
<th>Muslim</th>
<th>Sikh</th>
<th>Christian</th>
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<tr>
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</tr>
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<td>0</td>
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<tr>
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<td>1</td>
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<td>Parsa</td>
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<td>0</td>
<td>0</td>
<td>1</td>
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<tr>
<td>Salhi</td>
<td>299</td>
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<td>0</td>
</tr>
<tr>
<td>Total</td>
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### Benefits received/ social status

<table>
<thead>
<tr>
<th>Name of Village</th>
<th>BPL</th>
<th>Antyodaya</th>
<th>Female Headed</th>
<th>Widow pension</th>
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</thead>
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<td>22</td>
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<tr>
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<td>2</td>
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<td>0</td>
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<td>Salhi</td>
<td>133</td>
<td>73</td>
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<td>22</td>
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### Village wise Income

<table>
<thead>
<tr>
<th>Name of Village</th>
<th>Parsa</th>
<th>Salhi</th>
<th>Parogia</th>
<th>Ghatabarra</th>
<th>Basen</th>
<th>Hariharpur</th>
<th>Total</th>
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<tr>
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<td>20</td>
<td>20</td>
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<td>7</td>
<td>132</td>
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<td>35000 to 50000</td>
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<td>100</td>
<td>30</td>
<td>110</td>
<td>30</td>
<td>10</td>
<td>330</td>
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<td>20</td>
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<td>8</td>
<td>5</td>
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<td>5</td>
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<td>Total</td>
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<td>78</td>
<td>310</td>
<td>123</td>
<td>62</td>
<td>1132</td>
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### No. of farmers in each land holding group

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<tr>
<th>Name of Village</th>
<th>Landless</th>
<th>Marginal</th>
<th>Small</th>
<th>Medium</th>
<th>Big</th>
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<td>70</td>
<td>75</td>
<td>100</td>
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<td>0</td>
<td>0</td>
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<td><strong>143</strong></td>
<td><strong>104</strong></td>
<td><strong>100</strong></td>
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### Number of people completed/studying graduation and higher studies

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<tr>
<th>Name of Village</th>
<th>Engineering Completed Male</th>
<th>Engineering Completed Female</th>
<th>Engineering Studying Male</th>
<th>Engineering Studying Female</th>
<th>Graduation Completed Male</th>
<th>Graduation Completed Female</th>
<th>Graduation Studying Male</th>
<th>Graduation Studying Female</th>
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<td>Basen</td>
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<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Ghatabarra</td>
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<td>0</td>
<td>0</td>
<td>0</td>
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<td>6</td>
<td>12</td>
<td>3</td>
</tr>
<tr>
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<td>0</td>
</tr>
<tr>
<td>Parogia</td>
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<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
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</tr>
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<td>0</td>
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<td>0</td>
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</tr>
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<td>0</td>
<td>5</td>
<td>0</td>
<td>6</td>
<td>4</td>
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<tr>
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<td><strong>6</strong></td>
<td><strong>19</strong></td>
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### No of people completed/ studying intermediate and High school

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<th>Intermediate Studying Male</th>
<th>Intermediate Studying Female</th>
<th>High Completed Male</th>
<th>High Completed Female</th>
<th>High studying Male</th>
<th>High studying Female</th>
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<td>5</td>
<td>10</td>
<td>5</td>
<td>7</td>
<td>3</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>Ghatabarra</td>
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<td>7</td>
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### No of people completed/studying middle and primary school

<table>
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<tr>
<th>Name of Village</th>
<th>Middle Completed Male</th>
<th>Middle Completed Female</th>
<th>Middle Studying Male</th>
<th>Middle Studying Female</th>
<th>Primary Completed Male</th>
<th>Primary Completed Female</th>
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<th>Primary Studying Female</th>
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<td>5</td>
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<td><strong>143</strong></td>
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No of illiterate people and infants enrolled in Anganwadi

<table>
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<tr>
<td></td>
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<td>173</td>
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<td>397</td>
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Student teacher ratio

<table>
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<th>High School</th>
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<td>student</td>
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<td>Ghatabarra</td>
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<td>6</td>
<td>85</td>
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<td>Hariharpur</td>
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<td>Parogia</td>
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<td>0</td>
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<td>45</td>
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<td>77</td>
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Student teacher ratio

<table>
<thead>
<tr>
<th>Name of Village</th>
<th>Anganwadi Teachers</th>
<th>Adani Vidya Mandir (no. of students) Primary school</th>
<th>Middle school</th>
</tr>
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<td>Students</td>
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<td></td>
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<tr>
<td>Ghatabarra</td>
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<td>98</td>
<td>14</td>
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<td>77</td>
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School Dropout

<table>
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<tr>
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<th>Primary dropout</th>
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<th>Secondary dropout</th>
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<td>Basen</td>
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</tr>
<tr>
<td>Ghatabarra</td>
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<td>10.00</td>
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<td>-</td>
</tr>
<tr>
<td>Parogia</td>
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<td>0</td>
<td>-</td>
</tr>
<tr>
<td>Parsa</td>
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<td>10.00</td>
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<tr>
<td>Salhi</td>
<td>0</td>
<td>0</td>
<td>-</td>
</tr>
<tr>
<td><strong>Total</strong></td>
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</table>
### House, Roof and floor type and toilet access

<table>
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<th>Floor type</th>
<th>Toilet</th>
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<tr>
<td></td>
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<td>Pucca</td>
<td>Semi Pucca</td>
<td>Cement</td>
</tr>
<tr>
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<td>2</td>
</tr>
<tr>
<td>Ghatabarra</td>
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<td>0</td>
<td>13</td>
<td>0</td>
</tr>
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<td>0</td>
<td>0</td>
</tr>
<tr>
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<td>0</td>
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### Electricity supply and street lights

<table>
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<th>Electricity</th>
<th>Periodicity (Hrs)</th>
<th>Street Light</th>
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<td>Basen</td>
<td>75</td>
<td>24</td>
<td>Y</td>
</tr>
<tr>
<td>Ghatabarra</td>
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<td>18 to 22</td>
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<tr>
<td>Parogia</td>
<td>55</td>
<td>10</td>
<td>Y</td>
</tr>
<tr>
<td>Parsa</td>
<td>105</td>
<td>24</td>
<td>Y</td>
</tr>
<tr>
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<td>Y</td>
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### Major Occupations

<table>
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<th>Parsa</th>
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<th>Parogia</th>
<th>Ghatabarra</th>
<th>Basen</th>
<th>Hariharpur</th>
<th>Total</th>
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<td>0</td>
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<td>0</td>
<td>74</td>
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<td>610</td>
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<td>3</td>
<td>2</td>
<td>9</td>
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<td>41</td>
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### Caste Category sample surveyed

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<th>SC</th>
<th>ST</th>
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<td>2</td>
<td>1</td>
<td>24</td>
</tr>
<tr>
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<td>0</td>
<td>8</td>
<td>1</td>
<td>10</td>
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<td>30</td>
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### Total Family income

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<th>Livestock</th>
<th>Business</th>
<th>Service</th>
<th>Pensión</th>
<th>Artisan</th>
<th>Other</th>
<th>Total</th>
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<tr>
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<td>290,850</td>
<td>7,000</td>
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### Per Capita Income (PCI)

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<th>Total Family Members</th>
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<td>19</td>
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<td>65</td>
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<td>16,300.13</td>
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<td><strong>Total</strong></td>
<td><strong>17,385,800</strong></td>
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### Farmer Category

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<th>Marginal</th>
<th>Small</th>
<th>Medium</th>
<th>Big</th>
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<tr>
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<td>13</td>
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<td>21</td>
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<tr>
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<td>14</td>
<td>5</td>
<td>3</td>
<td>5</td>
<td>29</td>
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<tr>
<td>Hariharpur</td>
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<td>13</td>
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<td>--</td>
<td>--</td>
<td>19</td>
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<td>23</td>
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<tr>
<td>Parsa</td>
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<td>34</td>
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<td>3</td>
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<td>65</td>
</tr>
<tr>
<td>Salhi</td>
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<td>42</td>
<td>6</td>
<td>--</td>
<td>--</td>
<td>56</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>44</strong></td>
<td><strong>130</strong></td>
<td><strong>26</strong></td>
<td><strong>200</strong></td>
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</table>
## Land area, irrigation pattern and sources of irrigation

### Land Distribution

<table>
<thead>
<tr>
<th>Village</th>
<th>Land Area</th>
<th>Irrigated</th>
<th>Un-irrigated</th>
<th>Barren</th>
<th>Wells</th>
<th>Borewells</th>
<th>Diesel pump</th>
<th>Total HH</th>
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<tr>
<td>Basen</td>
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<td>0</td>
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### Clean drinking water

#### Clean drinking water available

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### Distance from water source more than 30 minutes' walk

#### Drinking water available at distance more than 30 minutes' walk

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### House, Roof and Floor types

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### No of people have their own house in each village

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### Village wise Toilet facility available in households

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### Number of families using toilet

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### Electricity supply available in total no of houses

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### Solar lighting

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### Assets for Information

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### Livestock

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<th>Bullock</th>
<th>Goat</th>
<th>Sheep</th>
<th>Poultry</th>
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## Total number of people have taken Loan

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## Various Sources from where villagers prefer to take loan

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## Average amount of loan, interest rate and no of households

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<th>Avg. Of Interest rate</th>
<th>Total Households</th>
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## Primary Occupation

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<th>Live stock</th>
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### Occupations of individual family members

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### Mean Years of schooling

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### Benefits received from Company and Govt.

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### Gender wise Marital status

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Major illness reported for individual Family members in last one year

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| Var from birth including the last interval (95%) | 5.4074 |
| Var from birth excluding the last interval (85+) | 2.3249 |

| width of CI interval 95% | 4.5578 |
| variance beyond age 85 | 0.0024 |
# HUMAN DEVELOPMENT INDEX STUDY

## Household Data Collection Format

### Details of Family members

<table>
<thead>
<tr>
<th>Name</th>
<th>Relation with head</th>
<th>Gender (M/F)</th>
<th>Age</th>
<th>Marital Status (Code)</th>
<th>Highest level of education</th>
<th>Continuing (Y/N)</th>
<th>Education (Code)</th>
<th>Occupation</th>
<th>Annual Income (Rs.)</th>
<th>Living outside (&quot;Tick&quot; if permanently living outside the village)</th>
<th>Any Benefit from Govt. Scheme/Company</th>
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<tbody>
<tr>
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</tbody>
</table>

### Other

- **Any death in last 5 years in the family due to natural cause (Not accidental or Suicide Death)**
  - **Name**
  - **Year of death**
  - **Age at the time of death**
  - **Gender (M/F)**
  - **Reason**

### Summary

- **Number of members who have completed six years of schooling**
- **Number of school-age children (<14yrs) not enrolled in school (up to 8th Std)**
- **Number of members if malnourished**
- **Any Child in the family below 5 years of age died in last 5 years**
- **Number of members if malnourished**

### Occupation

- **Agriculture**
- **Labor**
- **Business**
- **Service**
- **Artisan**
- **Carpenter**
- **Mason**
- **Blacksmith**
- **Fisheries**
- **Other**

### Physical Handicap/ Mental Illness

- **Eyes**
- **Hearing**
- **Speeching**
- **Walking**
- **Limb**
- **Mental disease**

### Illness in Past year

- **Diarrhea**
- **Skin**
- **DE**
- **TB**
- **Malaria**
- **Rheumatic fever**
- **Other**

### Benefit from Govt. / Company

- **1 Nutrition/Midday meal**
- **2 Scholarship**
- **3 Pension**
- **4 MGNREGA**
- **5 Livelihood**
- **6 Sports**
- **7 Health**
- **8 LPG**
- **9 Tuition/Coaching**
- **10 Transport to School**
- **11 Bicycle**
- **12**
- **13**

### Other

- **Please mention Nil where applicable**

---

### Notes

- *Please refer to the Household Data Collection Format for detailed instructions.*
- *Ensure to fill in all the mandatory fields.*
- *For family members, use the appropriate code for relationship.*
- *For education level, use codes 1st, 2nd, 3rd, 4th, 5th, 6th, 7th, 8th, 9th, 10th, 11th, 12th.*
- *For occupation, use codes A, B, C, D, etc.*
- *For physical handicap/mental illness, use codes E, H, S, etc.*
- *For illness in past year, use codes D, S, W, etc.*
- *For benefit from Govt. / Company, use codes 1, 2, 3, etc.*

---

*Image of the data collection format with handwritten entries.*
### Farmer Category

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<th>Medium Farmer (5 to 10 Acre)</th>
<th>Big Farmer (&gt; 10 acre)</th>
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### Land Details (Acre)

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### Water Resources Irrigation

- Wells
- Borewell
- Solar pump
- Diesel/electric pump
- Drip
- Sprinkler

### Drinking Water Sources (Main Source - Please Tick only one)

- Tap Water
- Water tank govt.
- Own tank
- Handpump
- Well
- Tanker

### Is the Drinking water available is clean? (Yes/No)

### Is the source of clean drinking water located more than 30 minutes away by walking? (Yes/No)

### Details of livestock

- Goat
- Pig
- Sheep
- Horse
- Poultry
- Other

### Other Household Assets

- AC
- Solar panel
- Cooler
- Washing Machine
- Landline
- TV
- Radio

### Assets for Access for Information

- Mobile
- Radio
- Land line
- TV

### Assets for Mobility

- Car/jeep
- Three wheeler
- Motor cycle/Scooter

### Other Households Assets

- Other Fuel

### Water Resources Irrigation

- Drinking water sources
- Tap water
- Water tank govt.
- Own tank
- Handpump
- Well
- Tanker

### Details of Livestock

- Cow
- Goat
- Pig
- Buffalo
- Sheep
- Horse
- Poultry
- Other

### Loan Amount (Rs)

### Interest Rate (% per Anum)

### Have you taken loan (Tick)

- Yes
- No

If Yes, From where (Tick)

<table>
<thead>
<tr>
<th>Source</th>
<th>Govt Bank</th>
<th>Private Bank</th>
<th>Sahkari Bank</th>
<th>Local money lender</th>
<th>Micro finance institution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Loan Amount (Rs)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Interest Rate (%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Filled by: KK | AB | SI | SB

Checked by team leader: (code and signature)

Data entry: (code and signature)
## Household Database

### Household Database Surguja

<table>
<thead>
<tr>
<th>ID</th>
<th>Village</th>
<th>Father/Husband</th>
<th>Caste</th>
<th>BPL</th>
<th>Migrated from outside</th>
<th>HHID</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td></td>
<td>Pavan Sai</td>
<td>ST</td>
<td></td>
<td></td>
<td>1001</td>
</tr>
</tbody>
</table>

**Details of Family Members**

<table>
<thead>
<tr>
<th>Member ID</th>
<th>HHID</th>
<th>Member Name</th>
<th>Relation</th>
<th>Gender</th>
<th>Age</th>
<th>Marital Status</th>
<th>Education Continuation</th>
<th>Expected Reduction</th>
<th>Occupation</th>
<th>Income</th>
<th>Living Outside</th>
<th>Benefit</th>
<th>Malnourished</th>
<th>Handicap</th>
<th>Illness</th>
<th>Specify Illness</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>1001</td>
<td>Budhman Ram</td>
<td>Self</td>
<td>M</td>
<td>55</td>
<td>M</td>
<td>Illiterate</td>
<td></td>
<td>Labor</td>
<td>Rs.30,000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>1001</td>
<td>Kalahso Bai</td>
<td>W</td>
<td>F</td>
<td>50</td>
<td>M</td>
<td>Illiterate</td>
<td></td>
<td>Housewife</td>
<td>Rs.0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>1001</td>
<td>Jaijal</td>
<td>S</td>
<td>M</td>
<td>32</td>
<td>M</td>
<td>10+</td>
<td></td>
<td>Service</td>
<td>Rs.120,000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>1001</td>
<td>Mohan</td>
<td>S</td>
<td>M</td>
<td>28</td>
<td>M</td>
<td>12+</td>
<td></td>
<td>Service</td>
<td>Rs.120,000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>1001</td>
<td>Rama Bai</td>
<td>DIL</td>
<td>F</td>
<td>30</td>
<td>M</td>
<td>8th</td>
<td></td>
<td>Housewife</td>
<td>Rs.0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>1001</td>
<td>Devaki Bai</td>
<td>DIL</td>
<td>F</td>
<td>25</td>
<td>M</td>
<td>Illiterate</td>
<td></td>
<td>Housewife</td>
<td>Rs.0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Deaths in Family**

<table>
<thead>
<tr>
<th>ID</th>
<th>HHID</th>
<th>Name of person died</th>
<th>Which year</th>
<th>Gender</th>
<th>Reason</th>
</tr>
</thead>
<tbody>
<tr>
<td>(New)</td>
<td>1001</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Farmer Category**

- **Small**
  - Land Area: 2.5
  - Irrigated: 1
  - Unirrigated: 1.5
  - Barren: 0
  - Wells: 0
  - Borewells: 1
  - Solar pump: 0
  - Drip: 0
  - Sprinkler: 0
  - Drinking water Source: Yes
    - Water clean: Yes
    - Source located far: No

- **Number of members completed 6 yrs schooling**: 4
- **Number of School age Children not enrolled**: 0
- **Any child under (below 3 yrs age) in last 3 years**: 0
- **Number of members if malnourished**: 0
The Confederation of Indian Industry (CII) works to create and sustain an environment conducive to the development of India, partnering industry, Government, and civil society, through advisory and consultative processes. CII is a non-government, not-for-profit, industry-led and industry-managed organisation, playing a proactive role in India’s development process.

www.cii.in

CII-ITC Centre of Excellence for Sustainable Development

CII-ITC Centre of Excellence for Sustainable Development is a not-for-profit, industry-led institution that helps business become sustainable organisations. It is on a mission to catalyse innovative ideas and solutions, in India, and globally, to enable business, and its stakeholders, in sustainable value creation. It’s knowledge, action and recognition activities enable companies to be future ready, improve footprints profiles, and advocate policymakers and legislators to improve standards of sustainable business through domestic and global policy interventions. CESD leverages its role of all-inclusive ecosystem player, partnering industry, government, and civil society. It has been a pioneer of environment management systems, biodiversity mapping, sustainability reporting, integrated reporting, and social & natural capital valuation in India, thus upgrading business in India to sustainable competitiveness. With three locations in India, CESD operates across the country and has also been active in parts of South and South East Asia, Middle East, and Africa. It has held institutional partnerships and memberships of the United Nations Global Compact, Global Reporting Initiative, International Integrated Reporting Council, Carbon Disclosure Project, development agencies of Canada, the USA, the UK, and Germany.

www.sustainabledevelopment.in
Mine Developer cum Operator: Adani Enterprises Limited
<table>
<thead>
<tr>
<th>Expenditure done by M/s RVUNL</th>
<th>Rs.</th>
</tr>
</thead>
<tbody>
<tr>
<td>NALLA SILT CLEANIN</td>
<td>2,190,450.84</td>
</tr>
<tr>
<td>Settling pond cleaning</td>
<td>887,102.52</td>
</tr>
<tr>
<td>Plantation cost</td>
<td>7,544,173.00</td>
</tr>
<tr>
<td>Garland drain cost</td>
<td>3,745,587.05</td>
</tr>
<tr>
<td>Geo textile</td>
<td>2,300,436.00</td>
</tr>
<tr>
<td>Environment Monitoring by third party</td>
<td>2,289,756.00</td>
</tr>
<tr>
<td>Dust Suppurations</td>
<td>1,000,000.00</td>
</tr>
<tr>
<td>ENVIORNMENT DAY CELEBRATION</td>
<td>565,042.00</td>
</tr>
<tr>
<td>water treatment plant for</td>
<td>30,680.00</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>20,553,227.41</strong></td>
</tr>
</tbody>
</table>