

**DRAFT ENVIRONMENTAL IMPACT ASSESSMENT  
AND  
ENVIRONMENTAL MANAGEMENT PLAN  
OF  
SAND MINING PROJECT (BHOJ SON 18 SAND GHAT)  
AT RIVERBED OF SON RIVER.**

<b>PROPOSAL NO</b>	<b>SIA/BR/MIN/420261/2023</b>
<b>TOR NO</b>	<b>SIA/1(a)/2341/2023</b>
<b>AREA</b>	<b>79.0 Ha</b>
<b>PRODUCTION</b>	<b>1422000 cum/year or 2417400 TPA</b>
<b>LOCATION</b>	<b>Mauja- Khandol, Anchal- Sandesh, District- Bhojpur, Bihar.</b>
<b>Baseline Data Period</b>	<b>March 2023 to May 2023</b>

**APPLICANT**

**M/s Tirupati Petro Mart  
Prop- Rita Devi  
Add.- Mahthu Jamhor, Aurangabad,  
Dist. - Aurangabad, Bihar, Pin - 824121.**



**CONSULTANT  
P&M Solution  
C-88, Sector 65, Noida -201301 – U.P  
A QCI –NABET Accredited Organization**



**Project: Sand Mining Project (Bhoj Son 18 Sand Ghat) At Riverbed of Son River at Mauja-Khandol, Anchal- Sandesh, District- Bhojpur, Bihar.**

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## **1.0 PURPOSE OF THE REPORT**

Environment Impact Assessment (EIA) is a process used to identify the environmental, social & economic impacts of a project prior to decision making. It aims to predict environmental impacts at an early stage of project planning & design, find ways & means to reduce adverse impacts. By using EIA, we can decide the suitable mitigation measures for implementation to maintain healthy working environment and contain pollution within permissible limits.

River plays an important role in the lives of the people. The river systems provide irrigation, potable water, transportation, electricity, and the livelihoods for a large number of people all over the country and to rural areas. Apart from this, river is also a good source of construction grade material as sand & gravel.

As transportation and construction infrastructure expanded since last few decades, the demand for construction grade sand also increased exponentially. The market demand of river sand is high throughout the nation. Sand is extracted directly from the river channel and it doesn't require processing other than size grading. But it is now well understood that continued and indiscriminate sand mining can cause serious environmental impacts, particularly if the river being mined is eroded.

Environmental Impact Assessment is one of the proven management tools for integrating environmental concerns in development process and for improved decision making as there is a need to harmonize the developmental activities with the environmental concerns into the larger interest of the society. The growing awareness, over the years, on environmental protection and sustainable development, has given further emphasis to the implementation of sound environmental management practices for mitigating adverse impacts from developmental activities. EIA study plays a vital role in sustainable development of a country. Recognizing its importance, the Ministry of Environment and Forest, Government of India had formulated policies and procedures governing the industrial and other developmental activities to prevent indiscriminate exploitation of natural resources and to promote integration of environmental concern in project development.

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Environmental Impact Assessment report is prepared to comply with the Terms of Reference (TOR) received from SEIAA, Bihar under EIA notification of the MoEF & CC dated 14<sup>th</sup> September, 2006 and its subsequent amendment there-off and also the EIA Guidance Manual for Mining of Minerals of MoEF&CC, Govt. of India, for seeking environmental clearance for mining of Sand in the applied mining lease area.

### **1.1 IDENTIFICATION OF PROJECT & PROJECT PROPONENT**

The project is being proposed by M/s Tirupati Petro Mart, Prop- Rita Devi

The address of the proponent is given below:

M/s Tirupati Petro Mart

Prop- Rita Devi

Add.- Mahthu Jamhor, Aurangabad,

Dist. - Aurangabad, Bihar, Pin - 824121.

Mob. 9279078282

Email. hptirupatipetromart@gmail.com

The proposed project is of River bed sand mining and falls under Category- “B1” as per EIA Notification 2006 and its subsequent amendments by Ministry of Environment Forests & Climate Change, GOI. Bhoj Son - 18 Sand Ghat fall in Mauja– Khandol, Anchal- Sandesh, Dist - Bhojpur, (Bihar). The details of the project are given below:

Name of Mine	Sand Mining Project (Bhoj Son 18 Sand Ghat) At Riverbed of Son River at Mauja– Khandol, Anchal- Sandesh, District- Bhojpur, Bihar
Mineral	Sand
Area (ha)	79.0 Ha
Postal Address	M/s Tirupati Petro Mart Prop- Rita Devi Add.- Mahthu Jamhor, Aurangabad, Dist. - Aurangabad, Bihar, Pin - 824121. Mob. 9279078282 Email. hptirupatipetromart@gmail.com
Status of Mine	Fresh application for Environmental Clearance.

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## 1.2 BRIEF DESCRIPTION OF PROJECT

The proposed project is Open Cast Semi-Mechanized Mining of Sand with a proposed production of 1422000 cum per annum or 2417400 Tonnes per annum.

The project has been proposed by M/s Tirupati Petro Mart, Prop- Rita Devi. The proposed project is over an area of 79.0 Ha at Khata no. – 533 Khasra No.- 4670, 4671, 4672, 4673(P) & 4674 on Son River at mauja- Khandol, Anchal- Sandesh, Dist - Bhojpur (Bihar). As per MoEF, New Delhi Gazette dated 14<sup>th</sup> September 2006 and amended thereof, the proposed mining project is categorized as **Category 'B-1'**. The estimated project cost for the proposed project is **Rs 24,65,80,000/-** (including auction cost)

**Table: 1.1 Project cost break-up**

S. No.	Description	Cost in Rs.
1	Cost of Labour & Equipment	1,18,50,000
2	Miscellaneous	1,00,000
3	Auction Cost	23,46,30,000
<b>TOTAL</b>		<b>24,65,80,000 /-</b>

The proposed mining lease area falls in Survey of India Toposheet 72C/11 & 72C/15.

The mine lease co-ordinates and connectivity details are listed below:

**Table: 1.2 Mine lease Pillar Co-ordinates**

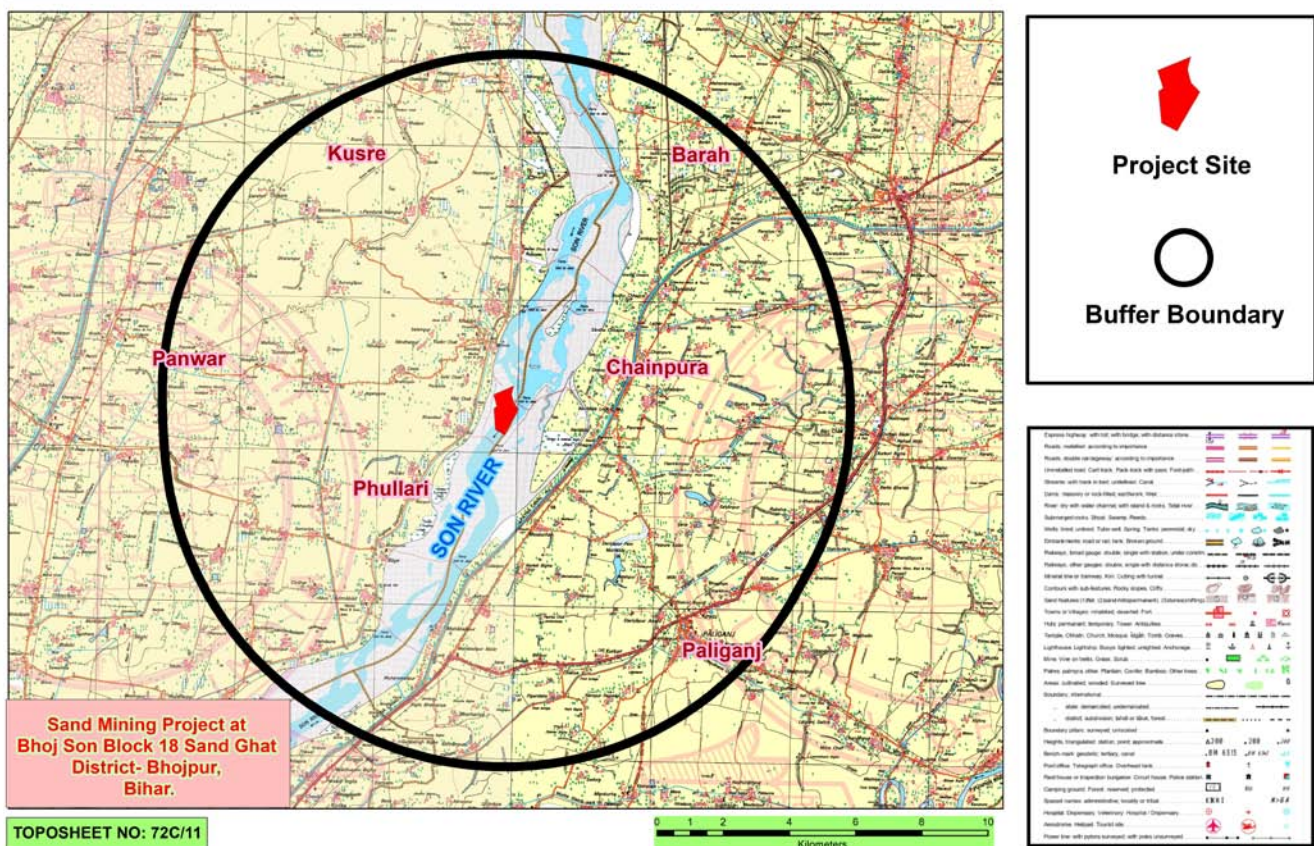
Sl. No	Coordinate	River Name
1	25° 22' 49.094" N 84° 44' 43.194" E	Son
2	25° 22' 52.628" N 84° 44' 36.220" E	
3	25° 23' 13.289" N 84° 44' 34.261" E	
4	25° 23' 15.470" N 84° 44' 37.245" E	
5	25° 23' 26.939" N 84° 44' 33.551" E	
6	25° 23' 37.776" N 84° 44' 37.990" E	
7	25° 23' 35.845" N 84° 44' 55.432" E	



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8	25° 23' 27.490" N 84° 44' 53.317" E	
9	25° 23' 18.768" N 84° 44' 55.672" E	
10	25° 23' 12.887" N 84° 45' 1.068" E	
11	25° 22' 47.465" N 84° 44' 46.407" E	

## 10 KM BUFFER MAP OF THE STUDY AREA



**FIGURE 1.1, 10 KM BUFFER MAP**

**Table: 1.3, Connectivity Details given below**

Nearest Railway Station	Garhani Railway Station, approx. 17.80 km in West direction.
Nearest Airport	Jay Prakash Narayan International Airport Patna, approx. 42 km



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	towards NE direction.
Nearest Highway	NH 139: approx. 2.50 KM towards East direction. SH 81: approx. 0.50 km towards West direction.

### 1.3 DETAILS OF ENVIRONMENTAL SETTINGS

Sl. No.	Particulars	Details
1	Elevation	65.5 ASML to 64.5 ASML
2	Ecological Sensitive Areas (National Park, Wildlife Sanctuaries)	None
3	Nearest water body	The mine site lies on the dry bed of Son river.
4	Seismic Zone	Zone- IV Source <i>BMTC</i> 2 <sup>nd</sup> edition <a href="https://www.bmtpc.org/disaster%20resistnace%20technolgie/s/ZONE%20IV.htm">https://www.bmtpc.org/disaster%20resistnace%20technolgie/s/ZONE%20IV.htm</a>

The EIA-EMP report is prepared as per the TOR granted under the EIA Notification. In order to assess the impact on environment due to proposed mine, it is necessary to ascertain present status of environment prevailing at the project site and identification and assessment of impacts on the environment of the proposed operation.

#### **Project's importance to the country and the region**

Sands are ubiquitous material; available everywhere and is being used from the time immemorial for wide applications in our daily life; infrastructures, building construction, highways, roads, townships, multiplexes, foundations of buildings and industrial units etc. and is an integral part of development. Life without sand is unthinkable. Over the millennia, the weathering effect, the flow of water at high velocities in rivers and the pressure of water from the high mountainous reservoirs converted and pushed the hard ground underneath into sands, etc. which travelled as sediments with the flow. This sand got deposited along the river course wherever conditions were favorable. In the deep past this settled sand was not extracted in a quantity in which it deposited; since due to less population the requirements was not enough. As a result of continuous deposit of sand , the rivers went on changing

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their course, widening by itself, eroding the fields and expanding, resulting in flooding, inundation and breaking their banks, causing devastation of property and loss of life. There has been a severe impact on every aspect of the environment. The rivers thus, needed channelization and therefore, extraction of these minor minerals through mining was expedient. The haphazard mining of sands being practiced now for long, through unregulated, uncontrolled and illegal way added almost an irreversible damage to the environment, which became a cause of serious concern to everyone. Though sands are very important mineral source for development, its mining through scientific methods has also become equally imperative.

It is for this purpose that 'mining plan' is being drawn so that all its aspects are taken care of justifiably, according to law, protecting the environment, removing all adverse impacts and creating a direct and indirect employment opportunities, improving socio-economic conditions of the local inhabitants and all-around status of life, achieving thereby a sustainable development.

Besides the above, the process of mining of minor minerals (Sand) is a constant source of revenue generation to the State Government through Royalty.

#### **1.4 SCOPE OF THE STUDY**

The project proposal was submitted to State Level Environment Impact Assessment Authority-Bihar for its appraisal. Based on which, presentation was held for Terms of Reference (TOR). Based on the data provided and presentation made, the SEIAA-Bihar has issued the Terms of dated 06.04.2023 attached as **Annexure-1**

Followings are the point wise compliance of the ToR provided by the SEIAA Bihar.

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**Table: 1.4 Point wise compliance for TOR**

<b>S. No</b>	<b>TOR</b>	<b>Compliance</b>	<b>Reference in the Report</b>
1	Year-wise production details since 1994 should be given, clearly stating the highest production achieved in any	This is fresh LOI, Mine is yet to be operate. It will operate only after getting environmental	--

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	one year prior to 1994. It may also be categorically informed whether there had been any increase in production after the EIA Notification 1994 came into force, w.r.t. the highest production achieved prior to 1994.	clearance.	
2	A copy of the document in support of the fact that the Proponent is the rightful lessee of the mine should be given.	State Govt. has given consent for mining vide letter no. 4960 dated 14-12-2022 in favor of M/s Tirupati Petro Mart, Prop- Rita Devi	<b>Annexure II, LOI</b>
3	All documents including approved mine plan, EIA and public hearing should be compatible with one another in terms of the mine lease area, production levels, waste generation and its management and mining technology and should be in the name of the lessee.	<p>The documents including mine plan and EIA report submitted are compatible with one another w.r.t. to following information:</p> <p>Mining Lease Area- 79.0 Hectare.</p> <p>Lessee: M/s Tirupati Petro Mart, Prop- Rita Devi.</p> <p>Proposed Production- 1422000 cum per annum or 2417400 TPA.</p> <p>Waste generation-</p> <p>No waste will be generated.</p> <p>Mining Method-Open Cast semi-mechanized/OTFM Method</p>	<p><b>Annexure- III</b></p> <p>Mine plan</p> <p>All details has been complied in chapter-2</p>
4	All corner coordinates of the mine lease area, superimposed on a High Resolution Imagery toposheet,	All Corner Coordinates of mining lease area superimposed on High Resolution Imagery has	<p>Refer Chapter 2</p> <p>Fig: 2.1, Corner</p>

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	topographic sheet, geomorphology and geology of the area should be provided. Such an Imagery of the proposed area should clearly show the land use and other ecological features of the study area (core and buffer zone).	been incorporated in EIA/EMP Report.	Coordinates map
5	Information should be provided in Survey of India Toposheet in 1:50,000 scale indicating geological map of the area, geomorphology of land forms of the area, existing minerals and mining history of the area, important water bodies, streams and rivers and soil characteristics.	The land use map showing salient features of the area is given in the report.  The geological map of the mine lease area is also given in the report showing geomorphology	Land-use of the study area Figure 3.1.
6	Details about the land proposed for mining activities should be given with information as to whether mining conforms to the land use policy of the State; land diversion for mining should have approval from State land use board or the concerned authority.	The Lease area is dry part of River bed.  The mining process will be done by land use policy of the State & no land diversion has been proposed.	Chapter II & III
7	It should be clearly stated whether the proponent Company has a well laid down Environment Policy approved by its Board of Directors? If so, it may be spelt out in the EIA Report with description of the prescribed operating processes /procedures to bring into focus any infringement / deviation /	Yes, the proponent Company has a well laid down Environment Policy. The hierarchical system or administrative order of the company has been given in the EIA report.	Chapter VIII  Section 8.1  Corporate Environment Policy

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	violation of the environmental or forest norms / conditions?. The hierarchical system or administrative order of the company to deal with the environmental issues and for insuring compliances with the EC conditions may also be given. The system of reporting of non-compliances / violations of environmental norms to the Board of Directors of the Company and/or shareholders or stakeholders at large, may also be detailed in the EIA Report.		
8	Issues relating to Mine Safety, including subsidence study in case of underground mining and slope study in case of open cast mining, blasting study etc. should be detailed. The proposed safeguard measures in each case should also be provided.	Issue related to mine safety has been given in of chapter 7.	
9	The study area will comprise of 10 km zone around the mine lease from lease periphery and the data contained in the EIA.	<p>The 10 km zone from periphery of the lease has been considered as the study area. The Buffer map of the study area is attached with report.</p> <p>All the details in the EIA report are for the life of the mine period.</p>	<p>Chapter I</p> <p>Figure 1.1</p>

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		The details of mining & production have been given in the report.	
10	Land use of the study area delineating forest area, agricultural land, grazing land, wildlife sanctuary, national park, migratory routes of fauna, water bodies, human settlements and other ecological features should be indicated. Land use plan of the mine lease area should be prepared to encompass preoperational, operational and post operational phases and submitted. Impact, if any, of change of land use should be given.	Land use pattern of 10 km from the periphery of the lease area has been prepared and incorporated with the report. The study area lies on Son River. There is no wildlife sanctuary or national park within the study area.	Land-use of the study area Figure 3.1 , Table 3.1
11	Details of the land for any Over Burden Dumps outside the mine lease, such as extent of land area, distance from mine lease, its land use, R&R issues, if any, should be given.	There is no overburden outside the mine lease area.	
12	A Certificate from the Competent Authority in the State Forest Department should be provided, confirming the involvement of forest land, if any, in the project area. In the event of any contrary claim by the Project Proponent regarding the status of forests, the site may be inspected by the State Forest Department along with	There is no forest land within the lease area.	---



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	the Regional Office of the Ministry to ascertain the status of forests, based on which, the Certificate in this regard as mentioned above be issued. In all such cases, it would be desirable for representative of the State Forest Department to assist the Expert Appraisal Committees.		
13	Status of forestry clearance for the broken up area and virgin forestland involved in the Project including deposition of net present value (NPV) and Compensatory afforestation (CA) should be indicated. A copy of the forestry clearance should also be furnished.	No forest land is involved in the lease area, therefore, deposition of net present value (NPV) and compensated Afforestation is not indicated.	
14	Implementation status of reorganization of forest rights under the schedule tribes and other traditional forest Dwellers (Recognition of Forest Rights) Act, 2006 should be indicated"	There is no forest land involved in the leased out area. Hence, this act is not applicable for this project.	
15	The vegetation in the RF / PF areas in the study area, with necessary details, should be given.	No RF/PF is present within the 10 km radius of the lease area. However, the vegetation details of the study area are incorporated with the report.	Chapter III
16	A study shall be got done to ascertain the impact of the Mining Project on wildlife of the study area and details	The details Impacts & there mitigation measures are given in chapter IV of EIA/EMP	Chapter IV

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	furnished. Impact of the project on the wildlife in the surrounding and any other protected area and accordingly, detailed mitigative measures required, should be worked out with cost implications and submitted.	Report.	
17	Location of National Parks, Sanctuaries, Biosphere Reserves, Wildlife Corridors, Ramsar site Tiger / Elephant Reserves / (existing as well as proposed), if any, within 10 km of the mine lease should be clearly indicated, supported by a location map duly authenticated by Chief Wildlife Warden. Necessary clearance, as may be applicable to such projects due to proximity of the ecologically sensitive areas as mentioned above, should be obtained from the Standing Committee of National Board of Wildlife and copy furnished.	No National Parks, Sanctuaries, Biosphere Reserves, Wildlife Corridors, Ramsar site Tiger / Elephant Reserves / (existing as well as proposed) are found within 10 km of the study area.	
18	A detailed biological study of the study area [core zone and buffer zone (10 km radius of the periphery of the mine lease)] shall be carried out. Details of flora and fauna, endangered, endemic and RET Species duly authenticated, separately for core and buffer zone should be furnished based on such	Detailed biological study of core zone and buffer zone within 10 km radius of the periphery of the mine lease has been carried out for the project. The same has been incorporated in the report.	Chapter III

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	primary field survey, clearly indicating the Schedule of the fauna present. In case of any scheduled-I fauna found in the study area, the necessary plan along with budgetary provisions for their conservation should be prepared in consultation with State Forest and Wildlife Department and details furnished. Necessary allocation of funds for implementing the same should be made as part of the project cost.		
19	Proximity to Areas declared as ‘Critically Polluted’ or the Project areas attracting court restrictions for mining operations, should also be indicated and where so required, clearance certifications from the prescribed Authorities, such as the SPCB or State Mining Dept. Should be secured and furnished to the effect that the proposed mining activities could be considered.	Proposed project does not come under critically polluted area.	
20	Similarly, for coastal Projects, A CRZ map duly authenticated by one of the authorized agencies demarcating LTL, HTL, CRZ area, location of the mine lease w.r.t CRZ, coastal features such as mangroves, if any, should be	This project does not come under CRZ area.	-

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	furnished. (Note: The Mining Projects falling under CRZ would also need to obtain approval of the concerned Coastal Zone Management Authority).		
21	R&R Plan/compensation details for the Project Affected People (PAP) should be furnished. While preparing the R&R Plan, the relevant State/National Rehabilitation & Resettlement Policy should be kept in view. In respect of SCs /STs and other weaker sections of the society in the study area, a need based sample survey, family-wise, should be undertaken to assess their requirements, and action programmes prepared and submitted accordingly, integrating the sectoral programmes of line departments of the State Government. It may be clearly brought out whether the village(s) located in the mine lease area will be shifted or not. The issues relating to shifting of village(s) including their R&R and socio-economic aspects should be discussed in the Report.	There is no R & R involved in this project.	

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22	<p>One season (non-monsoon) [i.e. March-May (Summer Season); October-December (post monsoon season); December-February (winter season)] primary baseline data on ambient air quality as per CPCB Notification of 2009, water quality, noise level, soil and flora and fauna shall be collected and the AAQ and other data so compiled presented date-wise in the EIA and EMP Report" Site-specific meteorological data should also be collected. The location of the monitoring stations should be such as to represent whole of the study area and justified keeping in view the pre-dominant downwind direction and location of sensitive receptors. There should be at least one monitoring station within 500 m of the mine lease in the pre-dominant downwind direction. The mineralogical composition of PM10, particularly for free silica, should be given.</p>	<p>Base line study was carried out for season march to may 2023. Details are provided in EIA/EMP Report.</p> <p>The locations of the monitoring stations were decided on the basis of prevailing meteorological conditions (Wind direction &amp; wind speed) of the study area.</p> <p>The wind rose has been given in chapter III of EIA/EMP Report. One location has been selected in downwind direction within 500 m from the lease boundary.</p> <p>The location of the monitoring sites has been shown in map.</p>	Chapter III
23	<p>Air quality modeling should be carried out for prediction of impact of the project on the air quality of the area. It should also take into account the impact of movement of vehicles for</p>	<p>A detailed study on Air quality modeling will be incorporated at the time of FEIA.</p>	

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	transportation of mineral. The details of the model used and input parameters used for modeling should be provided. The air quality contours may be shown on a location map clearly indicating the location of the site, location of sensitive receptors, if any, and the habitation. The wind roses showing pre-dominant wind direction may also be indicated on the map.		
24	The water requirement for the Project, its availability and source should be furnished. A detailed water balance should also be provided. Fresh water requirement for the Project should be indicated.	The water requirement for the project is 10.59 ~ 10.60 KLD for drinking, dust suppression and green belt development.  A detailed water balance is being provided in the report.	Chapter –II
25	Necessary clearance from the Competent Authority for drawl of requisite quantity of water for the Project should be provided.	Water requirement will be fulfilled by private water tanker. So, no clearance is required.	Chapter II
26	Description of water conservation measures proposed to be adopted in the Project should be given.	The project do not consume any process water except for drinking, dust suppression & plantation. Plantation is proposed, which will increase the water holding capacity & help in recharging of ground water.	



**Project: Sand Mining Project (Bhoj Son 18 Sand Ghat) At Riverbed of Son River at Mauja-Khandol, Anchal- Sandesh, District- Bhojpur, Bihar.**

		No artificial rainwater harvesting is proposed for the present project in lease area, however if any such project proposed by State Government PP will help out for the above.	
27	Impact of the Project on the water quality, both surface and groundwater, should be assessed and necessary safeguard measures, if any required, should be provided"	Mining activity will be done on Dry Bed of River so there is no impact on surface water. Mining will be up to 3 m below ground level or above the ground water table whichever comes first. This will not intersect the ground water table.	Chapter II
28	Based on actual monitored data, it may clearly be shown whether working will intersect groundwater. Necessary data and documentation in this regard may be provided. In case the working will intersect groundwater table, a detailed Hydro Geological Study should be undertaken and Report furnished. The Report inter-alia, shall include details of the aquifers present and impact of mining activities on these aquifers. Necessary permission from Central Ground Water Authority for working below ground water and for pumping of ground water should also be	The mining will be done only upto 3.0 m depth.  The detailed impact and control measure w.r.t the quality of water in the surrounding area is discussed under Chapter 4.	

**Project: Sand Mining Project (Bhoj Son 18 Sand Ghat) At Riverbed of Son River at Mauja-Khandol, Anchal- Sandesh, District- Bhojpur, Bihar.**

	obtained and copy furnished.		
29	Details of any stream, seasonal or otherwise, passing through the lease area and modification / diversion proposed, if any, and the impact of the same on the hydrology should be brought out.	The project site lies on Son river. No diversion is proposed.	
30	Information on site elevation, working depth, groundwater table etc. Should be provided both in AMSL and bgl. A schematic diagram may also be provided for the same.	The Elevation of the applied area for the block is 64.5 ASML to 65.5 ASML in the stretch. Mining will be up to 3 m below ground level or above the ground water table whichever comes first.	
31	A time bound Progressive Greenbelt Development Plan shall be prepared in a tabular form (indicating the linear and Quantities coverage, plant species and time frame) and Submitted keeping in mind the same will have to be executed up front on commencement of the Project. Phase-wise plan of plantation and compensatory afforestation should be charted clearly indicating the area to be covered under plantation and the species to be planted. The details of plantation already done should be given. The plant species selected for green belt	<p>Plantation/afforestation will be done as per program i.e along the road sides and near civic amenities.</p> <p>Post plantation, the area will be regularly monitored in every season for evaluation of success rate.</p> <p>List of Plant species selected for green belt is detailed in the EIA report.</p> <p>The plant species selected for green belt have a greater ecological value and are of good utility value to the local</p>	Chapter IX

**Project: Sand Mining Project (Bhoj Son 18 Sand Ghat) At Riverbed of Son River at Mauja-Khandol, Anchal- Sandesh, District- Bhojpur, Bihar.**

	should have greater ecological value and should be of good utility value to the local population with emphasis on local and native species and the species which are tolerant to pollution.	population. The plant species are selected by giving emphasis on local and native species and the species which are tolerant to pollution	
32	Impact on local transport infrastructure due to the Project should be indicated. Projected increase in truck traffic as a result of the Project in the present road network (including those outside the Project area) should be worked out, indicating whether it is capable of handling the incremental load. Arrangement for improving the infrastructure, if contemplated (including action to be taken by other agencies such as State Government) should be covered. Project Proponent shall conduct Impact of Transportation study as per Indian Road Congress Guidelines.	The projection has been done based on the mineral transportation.  The details of traffic analysis are discussed in the report.	Chapter IV
33	Details of the onsite shelter and facilities to be provided to the mine workers should be included in the EIA Report.	A temporary rest shelter will be provided for the workers near to the site with provisions of water, first aid facility, protective equipments, etc. Details are given in the EIA/EMP Report.	Chapter II

**Project: Sand Mining Project (Bhoj Son 18 Sand Ghat) At Riverbed of Son River at Mauja-Khandol, Anchal- Sandesh, District- Bhojpur, Bihar.**

34	Conceptual post mining land use and Reclamation and Restoration of mined out areas (with plans and with adequate number of sections) should be given in the EIA report.	Conceptual plans and Sections are given in Chapter 2.	
35	Occupational Health impacts of the Project should be anticipated and the proposed preventive measures spelt out in detail. Details of pre-placement medical examination and periodical medical examination schedules should be incorporated in the EMP. The project specific occupational health mitigation measures with required facilities proposed in the mining area may be detailed.	<p>Occupational health impact mainly is expected due air pollution due to fugitive dust emission because of movement of vehicles. However appropriate mitigation measures for air pollution control have been given in the report, discussed in Chapter-4.</p> <p>Each labour will undergo pre-placement medical examination. Thereafter periodical health check up will be arranged as stated in the report. About 4.0 lakh has been earmarked for occupational health.</p>	<p>Chapter VII</p> <p>Chapter VIII</p>

**Project: Sand Mining Project (Bhoj Son 18 Sand Ghat) At Riverbed of Son River at Mauja-Khandol, Anchal- Sandesh, District- Bhojpur, Bihar.**

36	Public health implications of the Project and related activities for the population in the impact zone should be systematically evaluated and the proposed remedial measures should be detailed along with budgetary allocations.	The proposed project being a small scale semi-mechanized/OTFM Method mining project, there will be hardly any process related health implication on the population of the nearby villages except fugitive dust emissions due to transportation. Budgetary allocation is given in Chapter-VIII.	
37	Measures of socio economic significance and influence to the local community proposed to be provided by the Project Proponent should be indicated. As far as possible, quantitative dimensions may be given with time to time for implementation.	Socio-economic significance provided to the local community i.e. to the nearby villagers is given in the EIA/EMP Report.	
38	Detailed environmental management plan (EMP) to mitigate the environmental impacts which, should inter-alia include the impacts of change of land use, loss of agricultural and grazing land, if any, occupational health impacts besides other impacts specific to the proposed Project	The detailed environmental management plan to mitigate the environmental impacts has been mentioned in of the EIA/EMP Report.	Chapter IX

**Project: Sand Mining Project (Bhoj Son 18 Sand Ghat) At Riverbed of Son River at Mauja-Khandol, Anchal- Sandesh, District- Bhojpur, Bihar.**

39	Public Hearing points raised and commitment of the Project Proponent on the same along with time bound Action Plan with budgetary provisions to implement the same should be provided and also incorporated in the final EIA/EMP Report of the Project.	This is a draft EIA report. Public hearing is yet to be conducted.	--
40	Details of litigation pending against the project, if any, with direction /order passed by any Court of Law against the Project should be given.	No litigation is pending against the project.	
41	The cost of the Project (capital cost and recurring cost) as well as the cost towards implementation of EMP should be clearly spelt out.	The capital cost of <b>10.4</b> lakh & <b>5.5</b> lakh as recurring cost has been earmarked for EMP. Chapter IX table no. 9.2	Chapter IX
42	A Disaster management Plan shall be prepared and included in the EIA/EMP Report	A Disaster management Plan has been given in EIA report.	Chapter VI
43	Benefits of the Project if the Project is implemented should be spelt out. The benefits of the Project shall clearly indicate environmental, social, economic, employment potential, etc.	2% of the total cost of the project has been earmarked towards the Enterprise Social Commitment which will be used for the development of village.	
44	<b>Besides the above, the below mentioned general points are also to be followed:-</b>		
a	All the documents to be properly	All the documents are properly	



**Project: Sand Mining Project (Bhoj Son 18 Sand Ghat) At Riverbed of Son River at Mauja-Khandol, Anchal- Sandesh, District- Bhojpur, Bihar.**

	referenced with index and continuous page numbering.	referenced with index and continuous page numbering.	
b	Where data are presented in the report especially in tables, the period in which the data were collected and the sources should be indicated.	Compiled With EIA report.	
c	The project proponent shall enclose all the analysis/testing reports of water, air, soil, noise etc. using the MoEF&CC/NABL accredited laboratories. All the original analysis/testing reports should be available during appraisal of the project.	Compiled With EIA report.	
d	Where the documents provided are in language other than English, an English translation should be provided.	Compiled With EIA report.	
e	The Questionnaire for environment appraisal of mining projects as devised earlier by the ministry shall also be filled and submitted.	Compiled With EIA report.	
f	While preparing the EIA report, the instructions for the proponents and instructions for the consultants issued by MoEF&CC vide O.M. No-J-11013/41/2006-IA.II (I) dated 4th August, 2009.which are available on	Compiled With EIA report.	

**Project: Sand Mining Project (Bhoj Son 18 Sand Ghat) At Riverbed of Son River at Mauja-Khandol, Anchal- Sandesh, District- Bhojpur, Bihar.**

	the website of this Ministry, should be followed.		
g	Changes, if any made in the basic scope the project parameters (as submitted in Form-1 and the PFR for securing the TOR) should be brought to the attention of MoEF&CC with reasons for such changes and permission should be sought, as the TOR may also have to be altered. Post public Hearing changes in structure and content of the Draft EIA/EMP (other than modification arising out of the P.H. process) Will entail conducting the PH again with the revised documentation.	Agreed	
h	As per the circular no J-11011/618/2010-IA,II(I) dated 30.5.2012 certified report of the status compliance of the conditions stipulated in the environment clearance for the existing operations of the project should be obtained from the regional office of Ministry of Environment, Forest and Climate Change, as may be applicable.	This is new case for Mining. No certified compliance is required.	

**Project: Sand Mining Project (Bhoj Son 18 Sand Ghat) At Riverbed of Son River at Mauja-Khandol, Anchal- Sandesh, District- Bhojpur, Bihar.**

i	The EIA report should also include: (i) surface plan of the area indicating contours of main topographic features, drainage and mining area (ii) geological maps and sections and (iii) sections of the mine pit and external dumps, if any, clearly showing the land features of the adjoining area.	Compiled With EIA report.	
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**Project: Sand Mining Project (Bhoj Son 18 Sand Ghat) At Riverbed of Son River at Mauja–Khandol, Anchal- Sandesh, District- Bhojpur, Bihar.**

## 2.0 TYPE OF PROJECT

The project is proposed for the excavation of sand from the bed of river Son. The proposed project is Open cast Semi-mechanized/OTFM mining project.

## 2.1 NEED FOR THE PROJECT

The project site lies on Son River. The river get recharged by the rain water and carries sediment consisting of sand etc during monsoon season, generally.

Sand is used widely in the construction industry. It is usually mixed with cement and other ingredients to create mortar for building. It is also used in agriculture, as sandy soils are ideal for crops such as watermelons, peaches and peanuts. Sand is also used in Aquaria as it makes a low cost aquarium base material. This project will also provide employment to local people helping them earn livelihood.

## 2.2 LOCATION DETAILS

The project has been proposed by M/s Tirupati Petro Mart, Prop- Rita Devi. The proposed project is over an area of 79.0 Ha at Khata no. – 533 Khasra No.- 4670, 4671, 4672, 4673(P) & 4674 on Son River at mauja– Khandol, Anchal- Sandesh, Dist - Bhojpur (Bihar). The lease area falls in Survey of India Toposheet **72C/11 & 72C/15**. The lease co-ordinates and connectivity details are listed below:

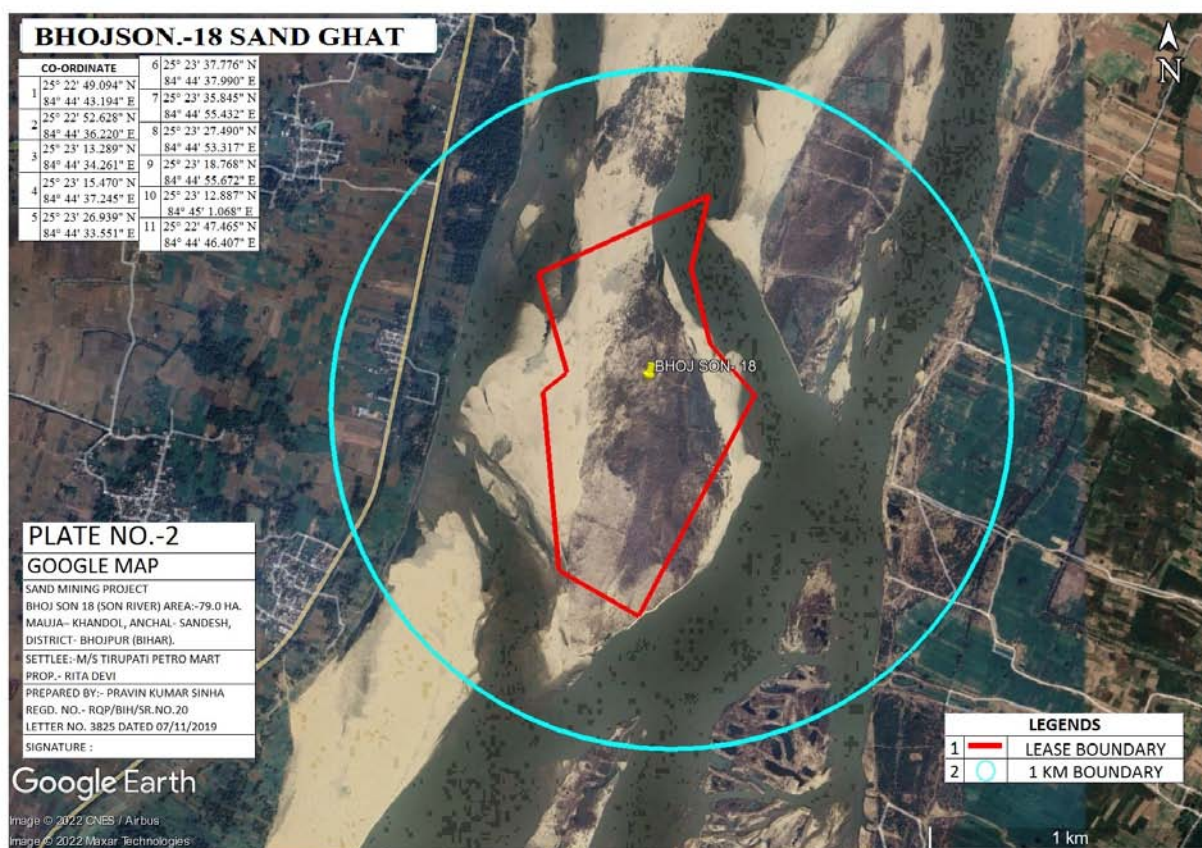
**Table 2.1, Mine Lease Co-ordinates**

Sl. No	Coordinate	River Name
1	25° 22' 49.094" N 84° 44' 43.194" E	Son
2	25° 22' 52.628" N 84° 44' 36.220" E	
3	25° 23' 13.289" N 84° 44' 34.261" E	
4	25° 23' 15.470" N 84° 44' 37.245" E	
5	25° 23' 26.939" N 84° 44' 33.551" E	
6	25° 23' 37.776" N 84° 44' 37.990" E	
7	25° 23' 35.845" N 84° 44' 55.432" E	
8	25° 23' 27.490" N 84° 44' 53.317" E	

**Project: Sand Mining Project (Bhoj Son 18 Sand Ghat) At Riverbed of Son River at Mauja-Khandol, Anchal- Sandesh, District- Bhojpur, Bihar.**

9	25° 23' 18.768" N 84° 44' 55.672" E	
10	25° 23' 12.887" N 84° 45' 1.068" E	
11	25° 22' 47.465" N 84° 44' 46.407" E	

The mine site is well connected to SH 81 via an approach road of approx. 1.0 km.  
NH 139: approx. 2.50 KM towards East direction. SH 81: approx. 0.50 km towards West direction. Garhani Railway Station, approx. 17.80 km in West direction. Jay Prakash Narayan International Airport Patna, approx. 42 km towards NE direction.



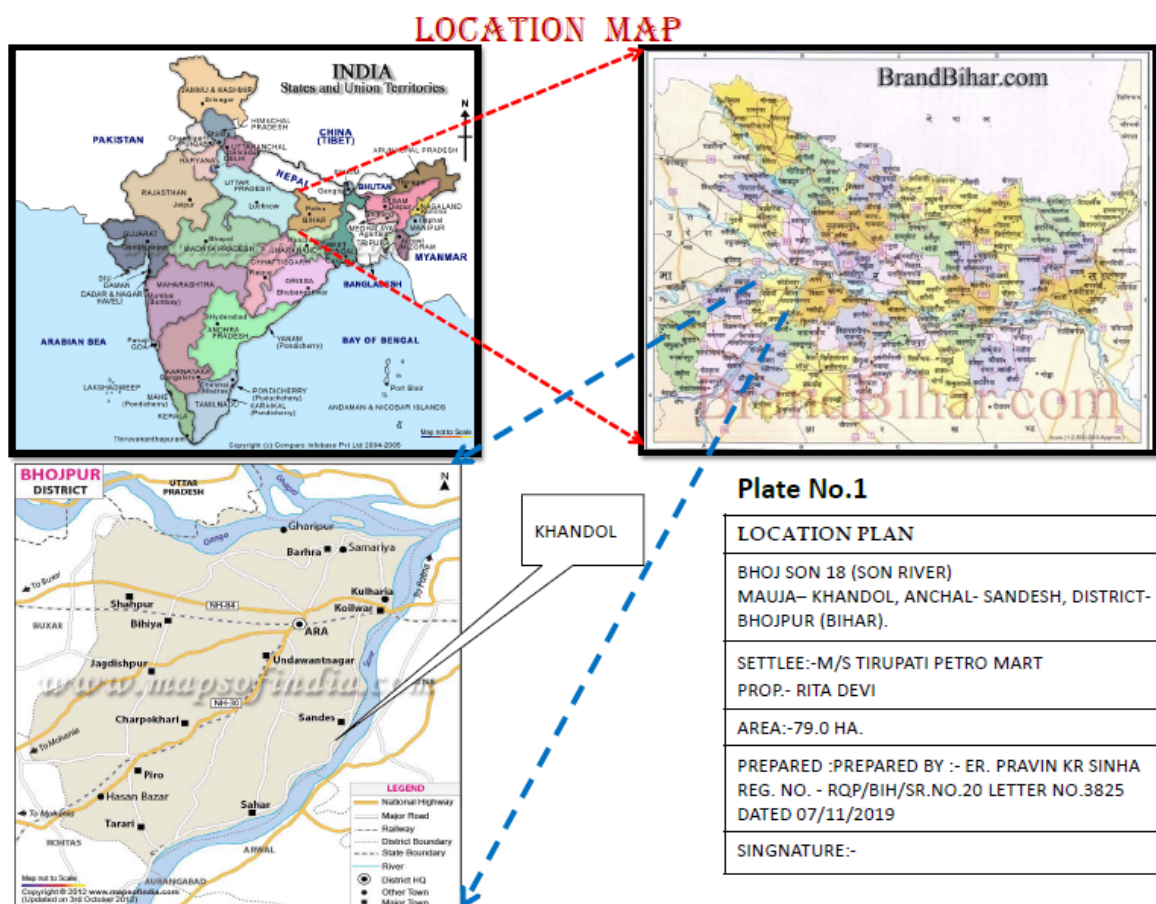
**FIGURE 2.1:- PILLAR COORDINATE MAP**

### 2.2.1 Lease / Block Area

The proposed project is Open Cast Semi-Mechanized Mining of Sand with a proposed production of 1422000 cum per annum or 2417400 Tonnes per annum.

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The project has been proposed by M/s Tirupati Petro Mart, Prop- Rita Devi. The proposed project is over an area of 79.0 Ha at Khata no. – 533 Khasra No.- 4670, 4671, 4672, 4673(P) & 4674 on Son River at mauja– Khandol, Anchal- Sandesh, Dist - Bhojpur (Bihar). As per MoEF, New Delhi Gazette dated 14<sup>th</sup> September 2006 and amended thereof, the proposed mining project is categorized as **Category ‘B-1’**. The estimated project cost for the proposed project is **Rs 24,65,80,000/-** (including auction cost)



**FIGURE 2.2:- LOCATION MAP OF THE PROJECT SITE**

## 2.3 TOPOGRAPHY & GEOLOGY

### 2.3.1 Topography

Bhojpur district is situated in the South Bihar alluvial plains. Bhojpur is an administrative district in the state of Bihar in India. The district headquarters are located at Arrah also known as Ara. The district occupies an area of 2,474 km<sup>2</sup> and has a population of 1,792,771



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(as of 2001). Bhojpur district occupies an area of 2,395 square kilometres (925 sq mi), It is located at a longitude of 83° 45' to 84° 45' East and the latitude is 25° 10' to 25° 40' North and is situated at a height of 193 meters above sea level. The sand deposits of Bhojpur district of Bihar broadly form part and parcel of the flood plains of Ganga River as whole formed since geological ages.

The State of Bihar is transecting by a no. of rivers. The individual river basins and their catchment areas is shown in Fig. no. 1 below. The various sand mining lease areas (also referred to as sand Ghats) lie in the river bed of river Son which is a major tributary of river Ganga. They are formed in the Quaternary period of central Bihar Plains- the OAG (Older Alluvium Group) forming the highest terrace, in the Son-Ganga alluvial tract, and NAG (Newer Alluvium Group) forming younger terraces, as Older Flood Plains, are exposed all along the Alluvial Upland.

### **2.3.2 Geomorphology**

Bhojpur district is mainly covered with alluvium (Plate IV) and hard rocks of Vindhyan Super group are situated at the southwestern side beyond the district boundary. The north and northeast parts of the district are covered with Newer Alluvium and younger flood plains (diaraformations) while the central and southern parts are covered with Older Alluvium and older flood plains. The entire area of the district has a general slope towards the north and northeast. The general elevation with respect to mean sea level is 50-90 m. The gradient is 0.6 m/km approximately from south to north.

The north and northeast area of the district is pitted with oxbow lakes, meander scars with point bars left over by old Ganga channels. The local small rivers follow little yazoo pattern before entering the meander belt of river Ganga and flow few kilometers parallel to the southern levee of river Ganga.

**Source:** [http://cgwb.gov.in/district\\_profile/bihar/bhojpur.pdf](http://cgwb.gov.in/district_profile/bihar/bhojpur.pdf)

### **2.3.3 REGIONAL GEOLOGY**

Regionally the area constitutes a part of the Ganga River Basin.

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The north-eastern part of Haryana is predominantly characterized by sedimentary lithology in the Sub-Himalayan zone comprising Subathus, Dagshais, Kasaulis and Siwaliks. A general Regional stratigraphic sequence in the area is given below :

Showing the Geological Succession and their geographic distribution

**Table 2.2 Showing the Geological Succession and their Occurrences distribution**

Age	Geology	Occurrences
Quaternary	Alluvial Deposits (Sand, Clay, Silt, Fragments)	North Bihar Plain & Central Bihar Plain
Tertiary	Sand Stones & Clay Stones	North Champaran Hills
Gondwana	Coal Measures, Forming a series of Small outlier basins	Banka District
Vindhya	Sandstones, Shales, Limestones, etc.	Parts of Bahbhua and Rohtas dist
Satpura	Schist, Phyllite, Quartzite	Part of Aurangabad, Gaya, Nawada, Nalanda, Sheikhpura and Munger District
Proterozoic	Mica Schist, amphibolites, quartzite, granite, dolerite and pegmatite	Nawada, Jamui and Banka
Archaean	Gneisses, Granites, Schists, Phyllites, quartzite, amphibolites & intrusive all metamorphosed sedimentary and igneous rocks	Part of Aurangabad, Gaya, Nawada, Jamui, Banka and Bhagalpur

*Source: Mining Plan*

### **2.3.4 LOCAL GEOLOGY OF THE AREA**

The sand exposed in the River bed of Son and surrounding areas is the product of the deposition of the sediments brought and deposited in the flood plains of River Ganga. These sediments are of recent geological formation. The litho-units exposed within the river and surrounding areas have formed as water borne sediments brought by flood water during rainy season every year and deposited in riverbed.

**Project: Sand Mining Project (Bhoj Son 18 Sand Ghat) At Riverbed of Son River at Mauja-Khandol, Anchal- Sandesh, District- Bhojpur, Bihar.**

The litho units encountered in the riverbed and surrounding areas belongs to the Shivalik super groups. The size of the sediments towards the source i.e. host rock is coarse and at the tale end of the river the grain size is reduced to smaller sizes resulted in the formation of clay beds. The following sequences have been observed in the area, i.e. Top soil/ Alluvium followed by sand deposition.

Sand and silt are deposited in the middle of the river whereas fine sand and soil are deposited at the fringe of the riverbanks.

Soil/ alluvium varying in thickness from 0.20m to 0.60m m constitute the top horizons in the area suitable for agriculture. River Ganga meanders through the area exposing the alluvium and soil at the banks. Sand is found in the river bed upto a depth of more than 3.0 m. The major part of bed remains dry as water flows in a single stream during the non-monsoon seasons. Only during rainy seasons the entire flood plain has water, when there will be no mining done.

Source: Mining Plan

### **2.3.5 CLIMATE**

Warm and humid climate prevails in the district. The temperature touches 39<sup>0</sup>C on an average during the months of April and May, and that of the minimum 6.3<sup>0</sup>C during the month of January.. The monsoon starts mostly from the mid of June and continues up to the end of the September. From seventy years (1901- 1970) annual rainfall data it has been observed that the normal rainfall of the district is at 1080 mm/yr. The annual rainfall of the district varies within 1025.2 to 1106.2 mm. About 85.46 % of the total annual rainfall is received during monsoon period and the rest (only 14.54 % approximately) comes in the months of November to May of non monsoon period.

Source: [https://cgwb.gov.in/District\\_Profile/Bihar/Bhojpur.pdf](https://cgwb.gov.in/District_Profile/Bihar/Bhojpur.pdf)

### **2.4 GEOLOGICAL RESERVE**

The geological reserves have been each stretches & for individual blocks. Geological reserves have been completed through cross sectional area method. The area of each section line is multiplied by strike influence to get the volume.

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Proved Mineral Reserves (111): All quantities of sand occurring up to depth of 3m from surface has been considered as proved reserves.

**Table-2.3:- Proved Mineral Reserves**

Classification	Code	Quantity of Sand
A) Mineral Reserves	----	Cum
1) Proved Mineral Reserves	111	2370000
<b>Total</b>		2370000

### ***Source Mining Plan***

#### **2.4.1 Mineable Reserves:**

Mineable reserves have been computed up to 3m depth from surface. Benches having height 1.5m & width 6.0m drawn from the ultimate pit limit. Area of each benches have been calculated multiplied by strike influence to get the volume. The volume multiplied by bulk density (1.7 g/cm<sup>3</sup>) to get the tonnage.

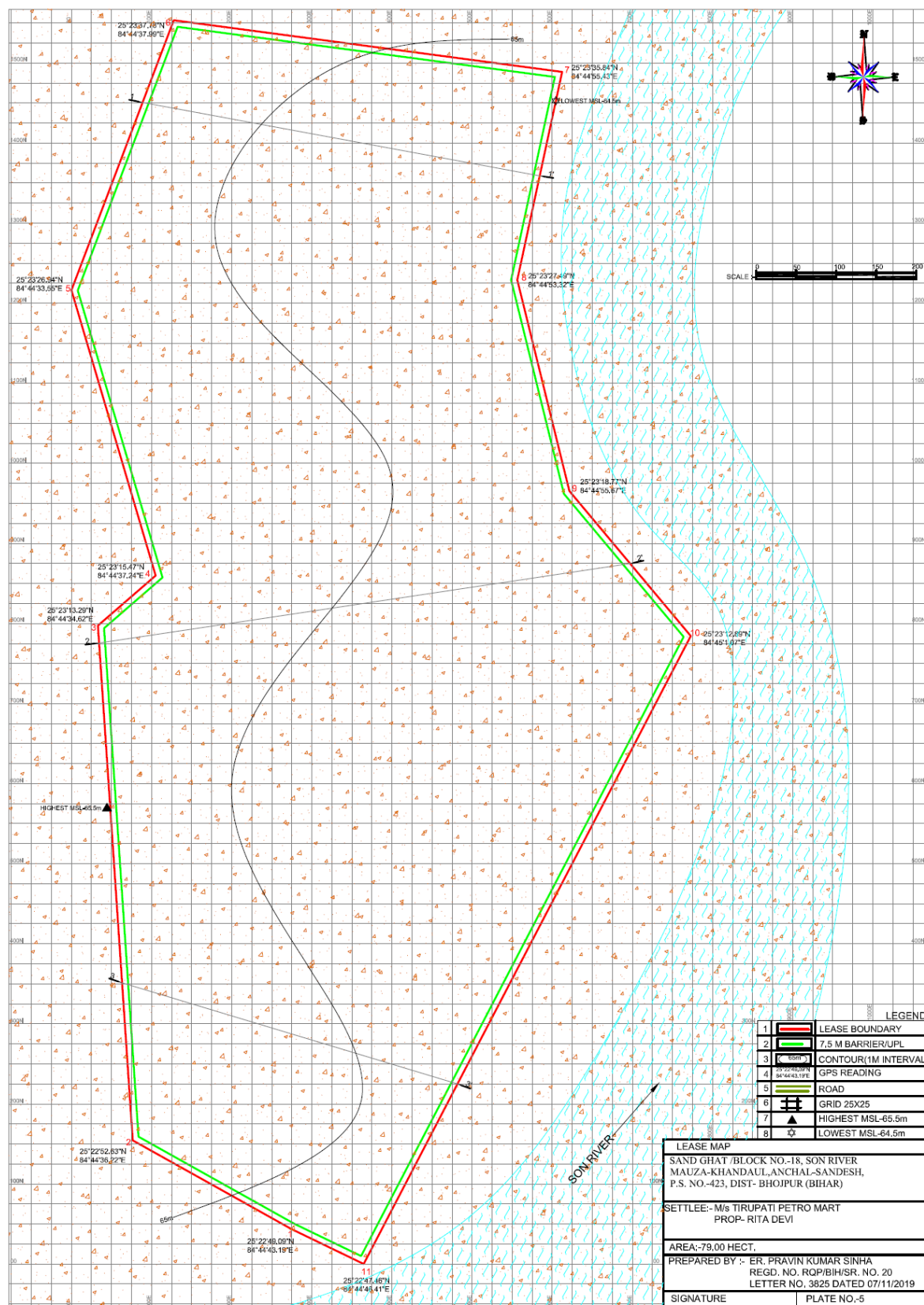
The minerals excavated from the river bed will be replenished gradually during the monsoon season every year. And the area pertaining to paleochannels of the river will be leveled & restored back.

**Table-2.4:- Minable Reserves**

Bench Level (mRL)	Length (m)	Width (m)	Depth (m)	Volume (cum)	Tonnes
65-63.5	1443	527	1.5	1140692	1939177
63.5-62	1433	517	1.5	1111292	1889197
<b>Total</b>				2251983	3828372

**Total Mineable Reserve = 2251983 CUM or 3828372 Tonnes**

**Project: Sand Mining Project (Bhoj Son 18 Sand Ghat) At Riverbed of Son River at Mauja-Khandol, Anchal- Sandesh, District- Bhojpur, Bihar.**



**FIGURE 2.3:- SURFACE CUM GEOLOGICAL PLAN OF PROJECT**

**Project: Sand Mining Project (Bhoj Son 18 Sand Ghat) At Riverbed of Son River at Mauja–Khandol, Anchal- Sandesh, District- Bhojpur, Bihar.**

### 2.4.2 Type of Mining

Mining will be done as per the guidelines of Bihar Mineral (Concession Prevention of illegal Mining Transportation & Storage) Rules, 2019.

This is an open-cast mining project. The operation will be semi-mechanized/OTFM with use of excavators/JCBs truck /tractors combination or Manually etc. The sand will be collected in its existing form.

Sand Mining will be carried out only upto a depth of 3 m bgl or above ground water level (whichever is less), for river bed block.

No drilling /blasting are required as the material is loose in nature.

Proper benching of 1.5 m height and 6m width will be maintained for mining blocks as per guideline M.M.R-2019, under rule 115(1).

Mining will be done only during the day time and completely stopped during the monsoon season.

### 2.4.3 Year Wise Production Schedule:

The bench wise annual exploitation of sand from Bhoj Son 18 is given below:-

**Table 2.5 Year wise Production Detail**

<b>YEAR</b>	<b>Over burden (cum) □</b>	<b>ROM Sand (cum)</b>	<b>Saleable Sand (cum)</b>
1 <sup>ST</sup>	-	<b>1422000</b>	<b>1422000</b>
2 <sup>ND</sup>	-	<b>1422000</b>	<b>1422000</b>
3 <sup>RD</sup>	-	<b>1422000</b>	<b>1422000</b>
4 <sup>TH</sup>	-	<b>1422000</b>	<b>1422000</b>
5 <sup>TH</sup>	-	<b>1422000</b>	<b>1422000</b>

The annual extractable RBM comes to **1422000 CUM or 2417400 Tonnes..** It will be replenished after rainy season every year.

**Project: Sand Mining Project (Bhoj Son 18 Sand Ghat) At Riverbed of Son River at Mauja–Khandol, Anchal- Sandesh, District- Bhojpur, Bihar.**

## **2.5 Conceptual Mining Plan**

Mine Applied Area will be worked for Bhoj Son 18 Sand Ghat. However, as the digging depth will be restricted to 3.0 m only. This will be further replenished during rainy season. Sand Ghat will be worked systematically as the width is limited while length is much more. As the lease period is only 5 (Five) years, some of the area will be left un-worked at the end of lease period.

(i) Final Slope Angle to Be Adopted: Height of the bench is limited to 1.5 m while width of individual bench shall be kept 6.0m. River bank side will be protected by working in dry part of the river and by leaving safety distance of the width of the river of 5 meter. Bank side natural slope will not be disturbed. This will prevent collapse of bank and erosion. However, the height of the bank with respect to river bed is varying from 3-4 meters.

(ii) During plan period workings will be carried out in the Sand Ghat at a time of the Applied Area simultaneously. Scattered workings will ensure safety, remove congestion of vehicles and will have better control and management.

(iii) Ultimate Capacity of Dumps: There will be no OB removal / during the plan period. Therefore no proposal has been envisaged for its separate dumping. No outside material will be filled up in the extracted zone.

## **2.6.0 Anticipated life of mine**

There is as such no specific life of the mine as the area under reference is inactive part of river bed of the river and its pale channels and whatever quantity of minor minerals are extracted from the Applied Area during five year; almost equal to extracted quantity of the same are replenished every year and the river bed area will be leveled & restored back. However, as lease has been granted for 5 years, mining will be done for the allotted time.

### **2.6.1 Waste –disposal arrangement**

No top soil is present in the mining area as it is riverbed. Small amount of domestic waste will be generated by the workers at the site, which will be disposed off through proper



**Project: Sand Mining Project (Bhoj Son 18 Sand Ghat) At Riverbed of Son River at Mauja–Khandol, Anchal- Sandesh, District- Bhojpur, Bihar.**

municipal way. No other waste generation is expected. No waste will be thrown into the streams or left on the banks. Separate bins will be kept within the lease area for domestic wastes.

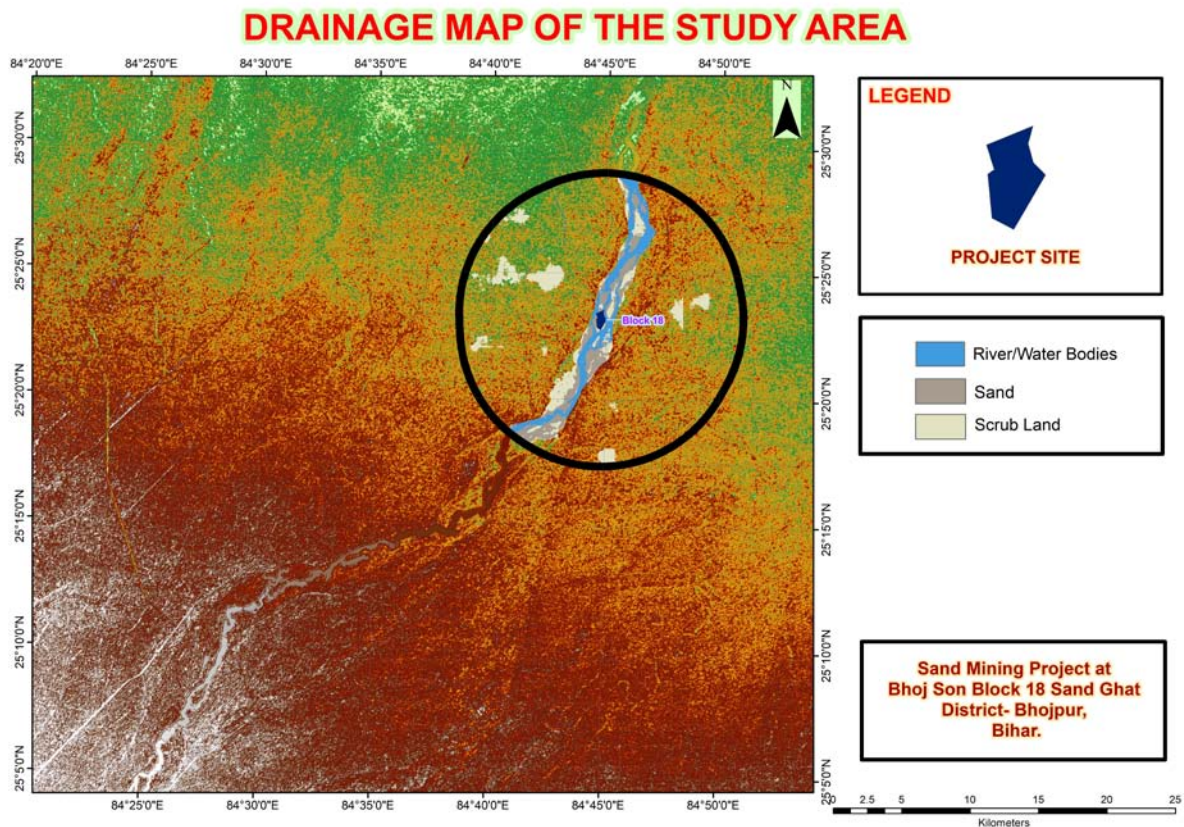
## 2.7 GENERAL FEATURES

### 2.7.1 Land-use pattern

The mine lease area is flat river bed and river banks. There is no forest land or agriculture land in the mine lease area. The entire mining lease lies within River.

### 2.7.2 Surface drainage pattern

The mine site lies on the dry bed of Son River so there will be no impact on surface water.



**FIG-2.4, DRAINAGE MAP**



**Project: Sand Mining Project (Bhoj Son 18 Sand Ghat) At Riverbed of Son River at Mauja-Khandol, Anchal- Sandesh, District- Bhojpur, Bihar.**

### 2.7.3 Man power requirement

The manpower requirement for the proposed project will be around 64 who will be utilized for excavation & loading of minerals into trucks or tractor-trolleys. Break-up of Man-power requirement is given in below **Table 2.6.**

**Table 2.6, Manpower Requirement**

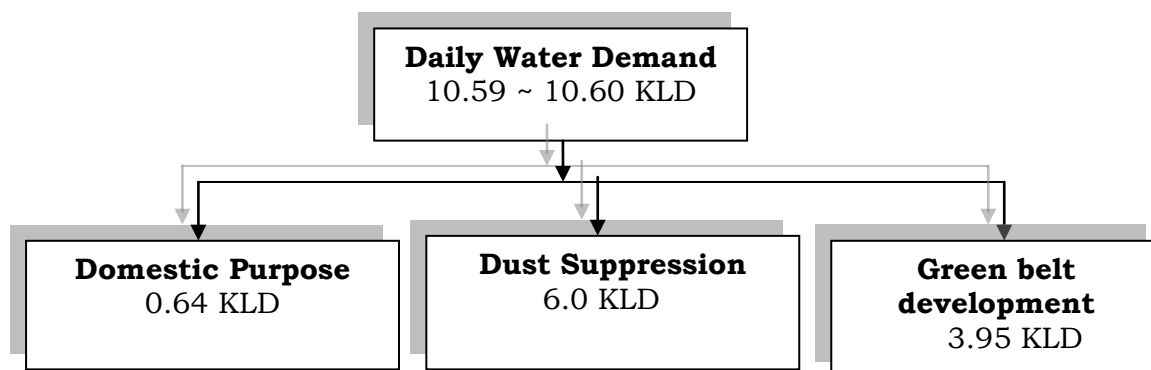
S. No.	Category	Numbers
1.	Administration	2
2.	Supervisor	4
3.	Skilled	18
4.	Un-skilled	40
<b>TOTAL</b>		<b>64</b>

### 2.7.4 Water supply

Water requirement for the proposed project will be provided for the workers for drinking & domestic purpose. Water will also be provided for dust suppression. Fresh water will be only used for drinking purpose. The break up for water requirement is given below:

Activity	Calculation	Round off Figure in KLD
Drinking	@ 10 lpcd per labor $10 \times 64 / 1000 = 0.64$ KLD	0.64
Dust Suppression	<b>Total approach road to be water sprinkled = 1000 m</b> $1000 \text{ m} \times 6 \text{ m} \times 0.5 \times 2 \text{ times} / 1000 = 6.0$ KLD	6.0
Plantation	790 plant (during plan period) @ 5 L/per plant = $790 \times 5 \text{ lts} = 3950 / 1000 = 3.95$ KLD	3.95
<b>Total</b>		<b>10.59 ~ 10.60</b>

**Project: Sand Mining Project (Bhoj Son 18 Sand Ghat) At Riverbed of Son River at Mauja-Khandol, Anchal- Sandesh, District- Bhojpur, Bihar.**



**FIGURE 2.5: WATER REQUIREMENT**

The water will be supplied from available sources from nearby village.

### 2.7.5 Site services

The following facilities/amenities will be extended by the mine management under site services:

- A temporary rest shelter will be provided for the workers near to the site for rest.
- Provisions will also be made for following in the rest shelter:
  - ❖ First aid box will be made available at the site. In emergency worker.
  - ❖ Sanitation facility i.e. septic tank or community toilet facility will be provided for the workers.
  - ❖ Mask and gloves distribution to the workers.

### 2.7.6 Extent of mechanization

The operation will be open cast semi- mechanized/OTFM with use of excavators/JCBs truck /tractors combination or Manually etc. The sand will be collected in its existing form.

**Table 2.7, List of Equipment to be used**

S.No	Name of Machinery	Capacity	Fuel Consumption	No of Machinery
1	JCB	1.00 m <sup>3</sup>	10 Ltr/hr	3

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2	Excavator	2.0 m <sup>3</sup>	16 Ltr/hr	11
3	Trucks	12 tonnes	4 Ltr/hr	750
4	Tractors	04 Tonnes	2 Ltr/hr	168
5	Water Tanker	4000 liter	4 Ltr/hr	2
6	Light vehicles	As per requirement	4 Ltr/hr	1

### 2.7.7 Statutory requirements

It is accepted that effective resource management cannot be done in isolation. The proponent therefore vigorously pursues approaches towards coordination and integration where possible, so as to lead to coordinated regulatory systems.

Various acts dealing with matters relating to the conservation and protection of the environment and which a holder of a mining authorization must also take cognizance of include inter alia, the following:

- Bihar Minor Mineral Concession Rule, 2014 amended till date.
- The Mines Act, 1952.
- The Mines and Mineral (Development and Regulation) Act, 1957.
- Mines Rules, 1955.
- Mineral Concession Rules, 1960.
- Mineral Conservation and Development Rules, 1988.
- The Water (Prevention and Control of Pollution) Act, 1974.
- The Air (Prevention and Control of Pollution) Act, 1981.
- The Environment (Protection) Act, 1986.
- The Forest (Conservation) Act, 1980.
- The Wildlife (Protection) Act, 1972.

\*\*\*\*\*

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### 3.0 General

The main objective of describing the environment which may be potentially affected, are i) to assess present environmental quality and the environmental impacts and ii) to identify environmentally significant factors that could preclude mine development. Mining activities affect the existing status of environment at site. In order to maintain the existing environmental status at mining site it is essential study existing environmental status and assess the impact of upcoming project on various environmental components. This chapter gives idea of description of environment status of the study area and this will be helpful for assessment of impact on the environment due to proposed mining activities. Baseline environmental status in and around proposed mining lease area describe the existing conditions of air, noise, water, soil, biological and socio-economic environment. The proposed project as a center, a radial distance of 10 km is considered as study area for baseline data collection and environmental monitoring. The data was collected for various environmental attributes so as to compute the impacts that are likely to arise due to proposed development activity.

#### 3.0.1 Study area & study period

The proposed project as a center, a radial distance of 10 km is considered as study area for baseline data collection and environmental monitoring. The baseline environment quality was carried out over a radial distance of 10 km around the mining lease area during the months of March 2023 to May 2023.

#### 3.0.2 Methodology

Base line attributes like ambient air, water, meteorology, noise, Soil, Ecology and Biodiversity & Socio Economy condition were collected as per approved term of reference. Secondary data was also collected from various government department as well as local people. Methodology adopted in this study is as follows.

- ✓ By setting up meteorological station near project site
- ✓ Collection of site specific meteorological data at the mine site.
- ✓ Installation of respiratory dust samplers (for PM<sub>10</sub>, PM<sub>2.5</sub>) at different location in the study area for the collection of primary air pollutant and analyze the existing air conditions.



**Project: Sand Mining Project (Bhoj Son 18 Sand Ghat) At Riverbed of Son River at Mauja–Khandol, Anchal- Sandesh, District- Bhojpur, Bihar.**

- ✓ Carrying out a detailed biological study for the Core and Buffer Zone
- ✓ Soil sample were collected from various location in the study area to analyze physical and chemical characteristics for assessment of impact on soil.
- ✓ Surface and Ground water samples were also collected from the various locations in the study area for analysing the existing water quality in the study area.
- ✓ Noise measurement has been done in core zone as well as buffer zone to analyze the existing situation in the study area.
- ✓ Literature review that includes identification of relevant data and articles from various publications, various government agencies and other sources for socio-economy, demography has been done with primary data collection in 10 km of the study area.
- ✓ Existing pollution load has been also identified in the buffer zone due to similar activities.
- ✓ Accordingly, field studies were carried out during the study period (March 2023, May 2023) to establish the existing baseline conditions.

### **3.1 Land Environment of the Study area**

#### **Land use**

Land use involves the management and modification of natural environment or wilderness in to built environment such as settlements and semi-natural habitats such as arable fields, pastures, and managed woods. It also has been defined as "the total of arrangements, activities and inputs that people undertake in a certain land cover type.

#### **Land cover**

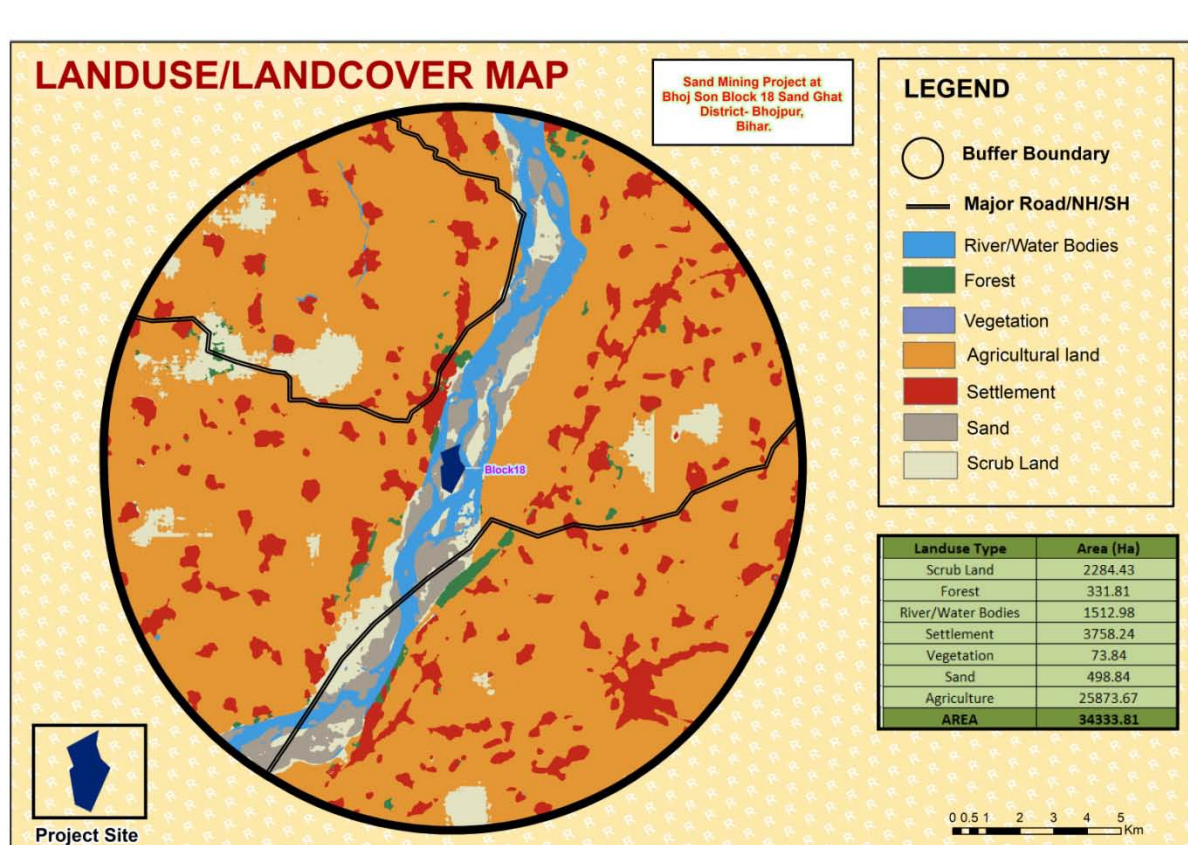
Land cover is the physical material at the surface of the earth. Land covers include grass, asphalt, trees, bare ground, water, etc. Land cover is the expression used by ecologist Frederick Edward Clements that has its closest modern equivalent being vegetation. The expression continues to be used by the Bureau of Land Management.

To assess the land use pattern surrounding the 10 km radius of the site, a detailed study was carried out. The land use pattern study reveals that the 10 km environs is predominantly agricultural land. The land use details are given in **Table- 3.1** and shown in **Figure-3.1**.

**Project: Sand Mining Project (Bhoj Son 18 Sand Ghat) At Riverbed of Son River at Mauja–Khandol, Anchal- Sandesh, District- Bhojpur, Bihar.**

**Table 3.1: Land Use Cover of the Project Study Area**

Landuse Type	Area (Ha)
Scrub Land	2284.43
Forest	331.81
River/Water Bodies	1512.98
Settlement	3758.24
Vegetation	73.84
Sand	498.84
Agriculture	25873.67
<b>AREA</b>	<b>34333.81</b>



**FIGURE 3.1: LAND USE COVER OF THE PROJECT STUDY AREA**

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### 3.2 Water Environment

Water quality assessment is one of the essential components of EIA study. Such assessment helps in evaluating the existing health of water body and suggesting appropriate mitigation measures to minimize the potential impact from development projects. Water quality of ground water has been studied in order to assess proposed water-uses in construction, drinking, cooling and horticulture purpose.

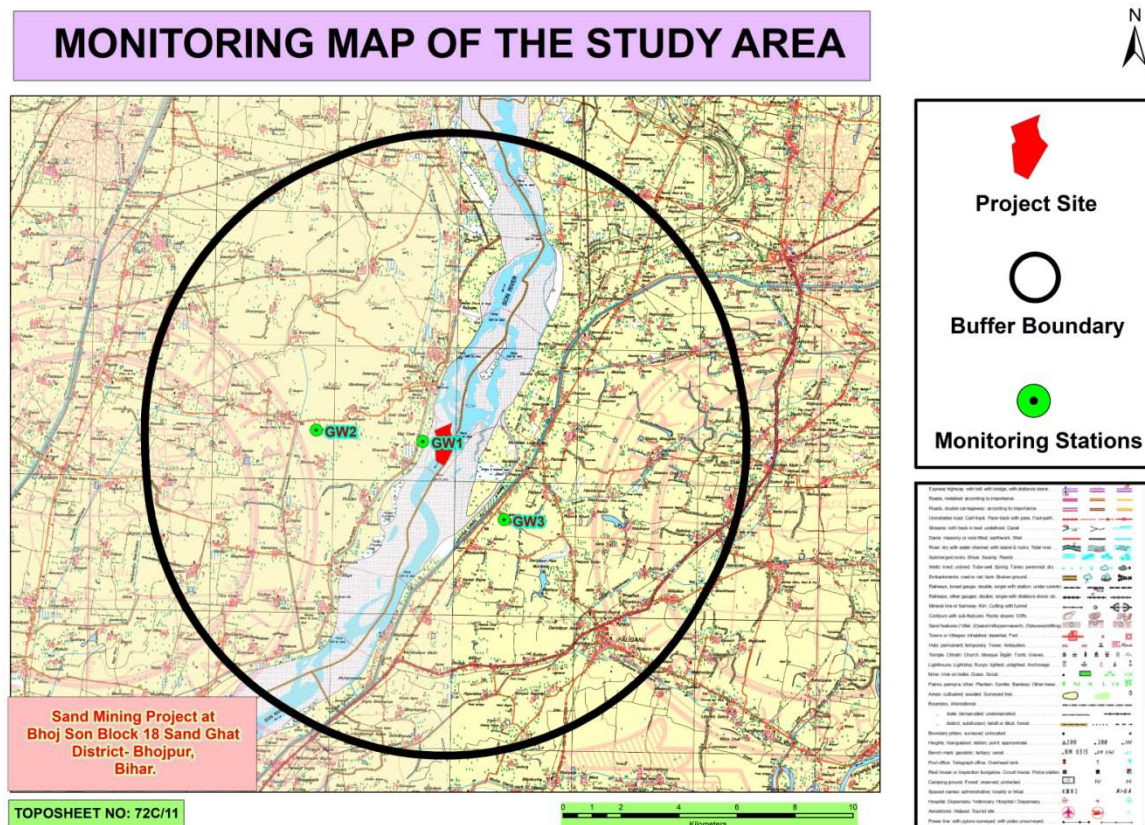
The water quality at the site and other locations within the 10 km impact zone was monitored during March 2023 to may 2023. The water sampling locations marked within the study are presented in **Table 3.2** and **Figure 3.2** and the result of the monitoring and analysis are presented in the **Table 3.3** showing Water Quality Monitoring Locations marked within the Study Area.

**Table 3.2: WaterSampling Locations**

<b>Water (Ground) Monitoring Locations</b>		
GW 1	Near village Kazi Chak	0.46 km, west
GW 2	Jaganpura	4.07 km, west
GW 3	Jalpura	3.05 Km, SE



**Project: Sand Mining Project (Bhoj Son 18 Sand Ghat) At Riverbed of Son River at Mauja-Khandol, Anchal- Sandesh, District- Bhojpur, Bihar.**



**Figure 3.2 Water Sampling Location Map**

**Table 3.3 Ground Water Quality Monitoring Result**

S. No.	Parameter	Unit	Limit (as per IS:10500)		GW1	GW2	GW3
			Desirable	Permissible			
1	Colour	Hazen	5	25	<2	<2	<2
2	Odour	-	Un	-	Un	Un	Un
3	Taste	-	Agreeable	-	Agreeable	Agreeable	Agreeable
4	Turbidity	NTU	5	10	<1	<1	<1
5	pH	-	6.5-8.5	No Relaxation	7.41	7.32	7.51
6	Total Hardness (as CaCO <sub>3</sub> )	mg/l	300	600	295	243	326
7	Iron (as Fe)	mg/l	0.3	1	0.1	0.08	0.06
8	Chlorides (as Cl)	mg/l	250	1000	76	102	89
9	Fluoride (as F)	mg/l	1	1.5	0.5	0.4	0.7



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	)						
10	TDS	mg/l	500	2000	415	443	471
11	Calcium(as Ca <sup>2+</sup> )	mg/l	75	200	71	58	78
12	Magnesium (as Mg <sup>2+</sup> )	mg/l	30	100	28	23	31
13	Copper (as Cu)	mg/l	0.05	1.5	<0.01	<0.01	<0.01
14	Manganese(as Mn)	mg/l	0.1	0.3	0.02	0.03	0.04
15	Sulphate (as SO <sub>4</sub> )	mg/l	200	400	23	34	29
16	Nitrate(as NO <sub>3</sub> )	mg/l	45	No Relaxation	5	4	6
17	Phenolic Compounds (as C <sub>6</sub> H <sub>5</sub> OH)	mg/l	0.001	0.002	<0.001	<0.001	<0.001
18	Mercury (as Hg)	mg/l	0.001	No Relaxation	<0.001	<0.001	<0.001
19	Cadmium (as Cd)	mg/l	0.01	No Relaxation	<0.01	<0.01	<0.01
20	Selenium ( as Se )	mg/l	0.01	No Relaxation	<0.01	<0.01	<0.01
21	Arsenic (as As)	mg/l	0.01	No Relaxation	<0.01	<0.01	<0.01
22	Cyanide (as CN )	mg/l	0.05	No Relaxation	<0.01	<0.01	<0.01
23	Lead (as Pb)	mg/l	0.05	No Relaxation	0.02	0.01	0.03
24	Zinc (as Zn)	mg/l	5	15	0.05	0.05	0.08
25	Anionic Detergent (as MBAS)	mg/l	0.2	1	<0.01	<0.01	<0.01
26	Chromium (as Cr <sup>6+</sup> )	mg/l	0.05	No Relaxation	<0.01	<0.01	<0.01
27	Mineral oil	mg/l	0.01	0.03	<0.01	<0.01	<0.01
28	Alkalinity as CaCO <sub>3</sub>	mg/l	200	600	177	169	226
29	Aluminium (as Al)	mg/l	0.03	0.2	0.04	0.03	0.03
30	Boron (as B)	mg/l	1	5	0.2	0.2	0.4
<b>Microbiological Parameter</b>							
31	Total Coliform	MPN /100ml	10 , Max	-	6s	<2	7
32	<i>E. coli</i>	E.coli /100ml	Absent	-	Absent	Absent	Absent

**Project: Sand Mining Project (Bhoj Son 18 Sand Ghat) At Riverbed of Son River at Mauja-Khandol, Anchal- Sandesh, District- Bhojpur, Bihar.**

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#### Observation:

Analysis of results of ground water reveals the following: -

- pH varies from **7.32 to 7.51**.
- Total hardness varies from **243 mg/l to 326 mg/l**.
- Total dissolved solids vary from **415 mg/l to 471 mg/l**.

The ground water from all sources remains suitable for drinking purposes as all the constituents are within the limits prescribed by drinking water standards promulgated by Indian Standards IS: 10500.

### 3.2 (b) SURFACE WATER

Three surface water samples were collected from the study area. The location of surface water samples is given in Table 3.4. The physio-chemical analysis of the these samples are given in the Table 3.5

**Table 3.4: Surface water sampling locations**

Surface Water Monitoring Locations		
SW1	Upstream (River Son)	500 Meters
SW 2	Project site	----
SW 3	Downstream (River Son)	500 Meters

**Table 3.5: Physio-chemical properties of surface water**

S. No.	Parameter	Unit	S.W. 1	S.W.2	S.W. 3
			upstream	Site	downstream
1	pH	-	8.18	8.25	8.3
2	Dissolved oxygen	mg/l	7.2	7.4	7.4
3	BOD (3 Days at 27°C)	mg/l	2	2	1
4	Free Ammonia (as N)	mg/l	<0.1	<0.1	<0.1
5	Sodium Adsorption Ratio	-	0.71	0.58	0.61
6	Boron	mg/l	0.2	0.2	0.3
7	Conductivity	µmhos/cm	570	581	594

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8	Turbidity	NTU	2	3	3
9	Magnesium Hardness ( as $\text{CaCO}_3$ )	mg/l	92	96	101
10	Total Alkalinity (as $\text{CaCO}_3$ )	mg/l	159	173	184
11	Chloride (as Cl)	mg/l	75	66	70
12	Sulphate (as $\text{SO}_4$ )	mg/l	13	16	14
13	Nitrate (as $\text{NO}_3$ )	mg/l	1.7	2.3	2.7
14	Fluoride (as F)	mg/l	0.4	0.5	0.4
15	Sodium (as Na)	mg/l	24	19	22
16	Potassium (as K)	mg/l	4.6	5.3	4.9
17	TKN (as N)	mg/l	1.8	2.3	2.7
18	Total Phosphorous (as $\text{PO}_4$ )	mg/l	0.23	0.27	0.16
19	COD	mg/l	10	14	8
20	Phenolic compounds (as $\text{C}_6\text{H}_5\text{OH}$ )	mg/l	<0.001	<0.001	<0.001
21	Iron (as Fe)	mg/l	0.12	0.18	0.14
22	Zinc (as Zn)	mg/l	0.03	0.05	0.03
23	Arsenic (as As)	mg/l	<0.01	<0.01	<0.01
24	Mercury (as Hg)	mg/l	<0.001	<0.001	<0.001
25	TDS	mg/l	326	354	376
26	Total Coliform	MPN/100ml	1210	1260	1290
27	Faecal Coliform	MPN/100ml	190	1110	1 130

### 3.2.1 Sampling frequency

Parameters for analysis of water quality were selected based on the utility of the particular source of water as per CPCB guidance. Surface water quality was monitored for parameters as per Methods of Monitoring & Analysis published by CPCB and it was rated according to the CPCB Water Quality Criteria against A, B, C, D & E class of water. Water samples were collected as Grab water sample from sampling location for complete physico-chemical and bacteriological tests respectively. The samples were analyzed as per standard procedure / method given in IS: 10500.

**Project: Sand Mining Project (Bhoj Son 18 Sand Ghat) At Riverbed of Son River at Mauja–Khandol, Anchal- Sandesh, District- Bhojpur, Bihar.**

The surface water quality is compared with CPCB water quality criteria mentioned in **Table 3.6** below:

**Table 3.6, Water quality criteria as per Central Pollution Control Board**

Designated-Best-Use	Class of water	Criteria
Drinking Water Source without conventional treatment but after disinfection	A	Total Coliforms Organism MPN/100ml shall be 50 or less pH between 6.5 and 8.5 Dissolved Oxygen 6mg/l or more Biochemical Oxygen Demand 5 days 20°C 2mg/l or less
Outdoor bathing (Organized)	B	Total Coliforms Organism MPN/100ml shall be 500 or less; pH between 6.5 and 8.5; Dissolved Oxygen 5mg/l or more Biochemical Oxygen Demand 5 days 20°C 3mg/l or less
Drinking water source after conventional treatment and disinfection	C	Total Coliforms Organism MPN/100ml shall be 5000 or less; pH between 6 to 9; Dissolved Oxygen 4mg/l or more Biochemical Oxygen Demand 5 days 20°C 3mg/l or less
Propagation of Wild life and Fisheries	D	pH between 6.5 to 8.5 Dissolved Oxygen 4mg/l or more Free Ammonia (as N) 1.2 mg/l or less
Irrigation, Industrial Cooling, Controlled Waste disposal	E	pH between 6.0 to 8.5 Electrical Conductivity at 25°C micro mhos/cm Max.2250 Sodium absorption Ratio Max. 26 Boron Max. 2mg/l
	Below-E	Not Meeting A, B, C, D & E Criteria

As per the standard practice, one sample from each station was taken in January. Sampling was done by standard sampling technique as per the Standard Methods. Necessary precautions were taken for preservation of samples.

### 3.2.2 Result & Conclusion:



**Project: Sand Mining Project (Bhoj Son 18 Sand Ghat) At Riverbed of Son River at Mauja–Khandol, Anchal- Sandesh, District- Bhojpur, Bihar.**

#### Surface water Observation:

- The analysis results indicate that the pH ranges between **8.18 and 8.3**.
- Dissolved Oxygen (DO) was observed in the range of **7.2 to 7.4 mg/l** against the minimum requirement of 4 mg/l.
- BOD values were observed to be in the range of **1.0to 2.0mg/l**.
- Total Coliform examination of surface water samples revealed the presence of total coliform in range of 1210 MPN/100 ml to 1290 MPN/100 ml .

**Based on the results it is evident that most of the parameters of the samples comply with ‘Category ‘C’ standards of CPCB (Table 3.5) are indicating their suitability for only Drinking water source after conventional treatment and disinfections.**

### 3.3 Air Environment

Meteorology is the key to understand the air quality. The essential relationship between meteorology and atmospheric dispersion involves the wind in the broadest sense. Wind fluctuations over a very wide range of time, accomplish dispersion and strongly influence other processes associated with them.

A meteorological station was set up at the proposed mine premises. Meteorological data was generated during the pre monsoon season and shown in **Table-3.7**

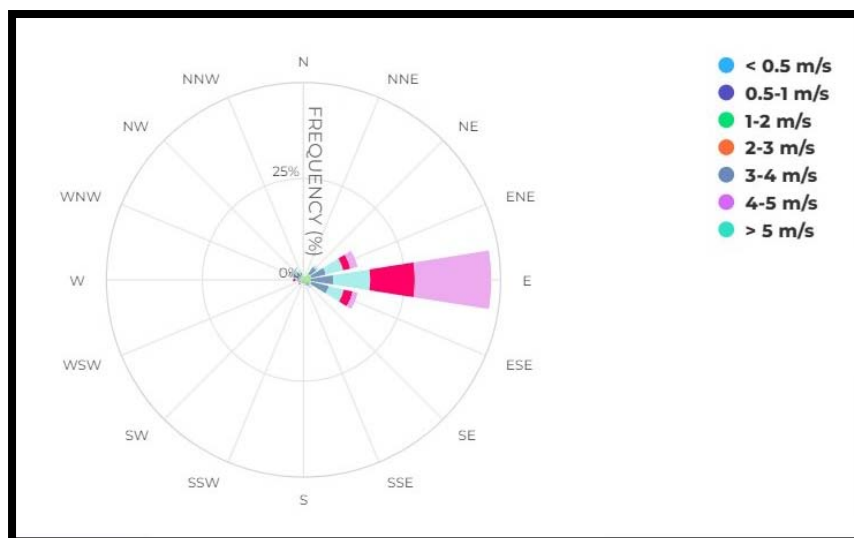
The following parameters were recorded at hourly intervals continuously during monitoring period, except rainfall which was recorded on daily basis.

- Wind speed
- Wind Direction
- Air Temperature

**Table-3.7, Summarized project site meteorological data for pre monsoon Season**

Month	Temperature °C		Wind Speed (Km/Hr)	
	Min	Max	Avg.	Max
March 2023	14	29	9.7	16.8
April 2023	17	33	10.7	17.8
May 2023	18	32	9.4	15.6

**Project: Sand Mining Project (Bhoj Son 18 Sand Ghat) At Riverbed of Son River at Mauja–Khandol, Anchal- Sandesh, District- Bhojpur, Bihar.**



**Figure 3.3: Wind Rose Diagram (at site)**

### 3.3.1 Secondary Data Collected from IMD

Secondary data from IMD- Patna been collected for temperature, relative humidity, rainfall, wind speed and direction. The data at IMD is usually measured twice a day viz., at 0830 and 1730 hr.

The meteorological data is collected from the IMD- Patna about 45 km from project site, which is the nearest operating IMD station to the project site. The data collected from IMD includes wind speed, wind direction, temperature, relative humidity and rainfall for the year 1981-2010. The monthly maximum, minimum and average values are collected for all the parameters except wind speed and direction. The collected data is tabulated in **Table-3.7**

When the data generated at project site is compared with the data recorded at IMD, it is observed that the data generated at the site is broadly in comparison with regional meteorology, except for minor variations as described above.

### 3.3.2 Comparison of primary and secondary data

The India Meteorological Department (IMD) records the data twice a day viz. 0830 hr and 1730 hr while the site-specific data has been recorded at an hourly interval. On comparison of

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site specific data generated for study period vis-à-vis the IMD data, slight variations were observed. The following observations are brought out:

When the data generated at project site is compared with the data recorded at IMD, it is observed that the data generated at the site is broadly in comparison with regional meteorology, except for minor variations as described above such as predominant wind direction is NW at IMD while at project site predominant wind direction is West.

### 3.3.3 Ambient Air Quality

The ambient air quality was monitored in the impact area as per MoEF& CC guidelines. The study area represents entirely rural environment. The prime objective of the baseline air quality study was to assess the ambient air quality of the mining lease area.

### METHOD OF MONITORING

The Central Pollution Control Board (CPCB) has published comprehensive document on emission testing regulations (“Emission Regulations Part-3, 1985”). Those procedures relevant to the particulate monitoring are summarized in Table

**Methods adopted for PM<sub>2.5</sub>, PM<sub>10</sub>, SO<sub>2</sub> and NO<sub>x</sub> (as NO<sub>2</sub>)**

Parameters	Technique	Technical Protocol	Minimum Detectable Limit
PM <sub>2.5</sub>	Gravimetric method	US EPA Method	5 (µg/m <sup>3</sup> )
PM <sub>10</sub>	Gravimetric method	IS 5182 (Part-XXIII)	5 (µg/m <sup>3</sup> )
Sulphur Dioxide	West and Gaeke	IS-5182 (Part-II)	3 (µg/m <sup>3</sup> )
Nitrogen Oxide	Jacob & Hochheiser	IS-5182 (Part-VI)	7 (µg/m <sup>3</sup> )

#### i. Particulate Matter (PM):-

The CPCB method and IS 5182 (Part-XXIII) adopt a very similar approach to particulate sampling. There are some differences in the expressions used, but they are generally of no practical significance. It is recommended that CPCB method is adapted.

#### ii. Equipment calibration:

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For accurate testing of emission sources, the components of the sampling train is calibrated by outsource and supplier (Master Calibrator) standards and solutions are used, calibrated under certified reference material.

### 3.3.4 Selection criteria for monitoring location

The baseline status of the ambient air quality has been assessed through a scientifically designed ambient air quality network. The design of monitoring network in the air quality surveillance programme has been based on the following consideration.

- Meteorological parameters including wind direction
- Topography of the study area
- Representative of regional background air quality for obtaining baseline status
- Representative of likely impact areas.

Ambient Air Quality Monitoring (AAQM) stations were set up at 08 locations with due consideration to the above mentioned points. AAQM locations were selected in downwind, upwind as well as crosswind direction of the proposed mining lease area covering core and buffer zones. The details of the monitoring stations are given in **Figure 3.4** and shown in **Table-3.8**

Ambient air quality monitoring was carried out twice a week with a frequency of 24 hours for three months during the study period. The common air pollutant namely Particulate Matter-10 ( $PM_{10}$ ) &  $PM_{2.5}$ , Sulphur-dioxide ( $SO_2$ ) and Oxides of Nitrogen ( $NO_2$ ) has been measured through a planned field monitoring.

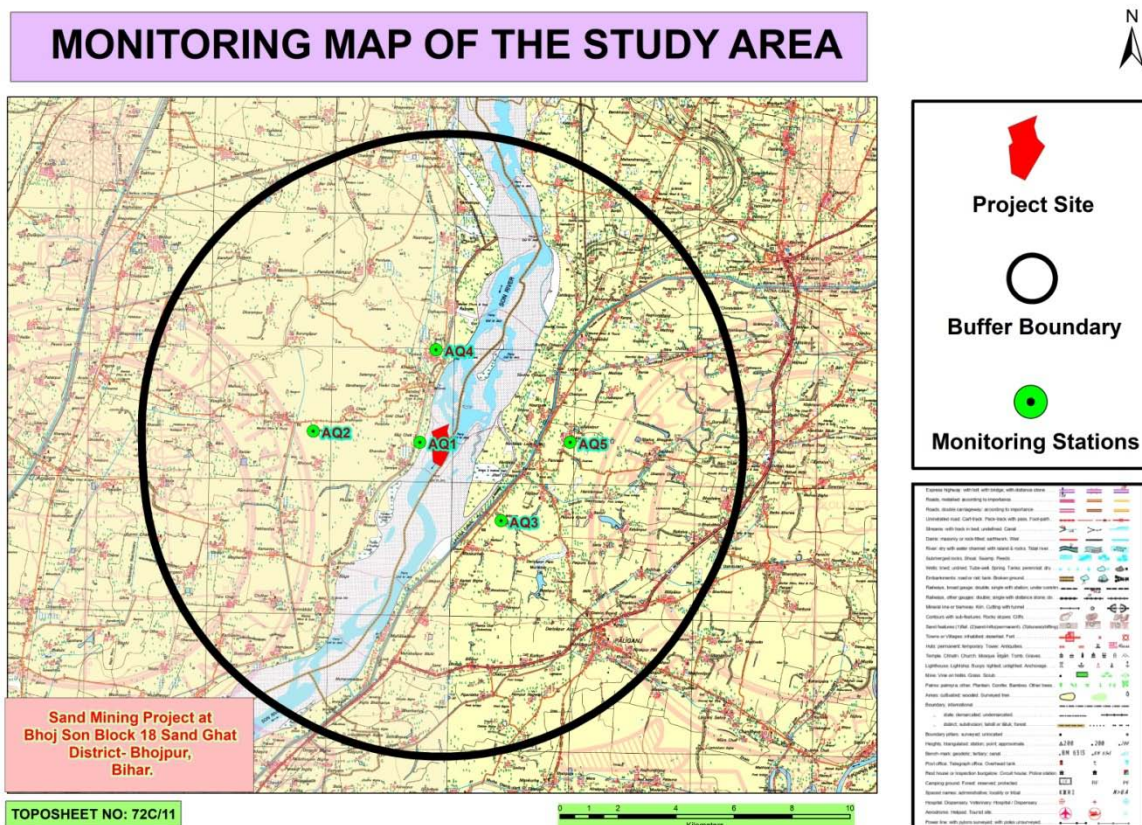
The baseline values of the air pollutants of concern are presented in Tables below statistical parameters like minimum, maximum, average and 98<sup>th</sup> percentiles have been computed from the observed field data for all sampling stations and are given **Table-3.9, Table-3.10, Table-3.11& Table 3.12**. These are compared with the standards prescribed by Central PollutionControl Board (CPCB) for industrial, residential and rural zone.



**Project: Sand Mining Project (Bhoj Son 18 Sand Ghat) At Riverbed of Son River at Mauja-Khandol, Anchal- Sandesh, District- Bhojpur, Bihar.**

**Table 3.8: Ambient Air Quality Monitoring Stations**

Air Monitoring Locations		
Location ID	Location name	Distance (Km) and Direction
AAQ 1	Near village Kazi Chak	0.46 km, west
AAQ 2	Jaganpura	4.07 km, west
AAQ 3	Jalpura	3.05 Km, SE
AAQ 4	Turkaul	2.58 Km, NW
AAQ 5	Kab	4.15 Km, E



**Figure 3.4 Ambient Air Quality Monitoring Stations**

**Project: Sand Mining Project (Bhoj Son 18 Sand Ghat) At Riverbed of Son River at Mauja–Khandol, Anchal- Sandesh, District- Bhojpur, Bihar.**

**Table-3.9: Ambient Air Quality in the Study Area PM2.5**

Location Code	PM2.5 ( $\mu\text{g}/\text{m}^3$ )				
	Name of the station	Min	Max	Average	98 <sup>th</sup> Percentile
AAQ1	Near village Kazi Chak	<b>36.8</b>	43.6	38.8	42.3
AAQ2	Jaganpura	37.6	42.0	39.6	41.8
AAQ3	Jalpura	37.1	42.3	39.0	41.7
AAQ4	Turkaul	37.7	<b>44.9</b>	40.0	43.7
AAQ5	Kab	37.4	44.6	39.5	43.3

**Table-3.10: Ambient Air Quality in the Study Area PM10**

Location Code	PM10 ( $\mu\text{g}/\text{m}^3$ )				
	Name of the station	Min	Max	Average	98 <sup>th</sup> Percentile
AAQ1	Near village Kazi Chak	<b>71.6</b>	85.6	78.3	84.5
AAQ2	Jaganpura	73.1	87.3	79.9	86.3
AAQ3	Jalpura	72.2	86.2	78.9	85.2
AAQ4	Turkaul	73.7	85.0	79.6	84.7
AAQ5	Kab	72.8	<b>87.5</b>	79.5	86.2

**Table-3.11: Ambient Air Quality in the Study Area SO2**

Location Code	SO2 ( $\mu\text{g}/\text{m}^3$ )				
	Name of the station	Min	Max	Average	98 <sup>th</sup> Percentile
AAQ1	Near village Kazi	<b>4.1</b>	7.7	5.6	7.4

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	Chak				
AAQ2	Jaganpura	4.9	<b>8.7</b>	6.6	8.4
AAQ3	Jalpura	4.4	8.0	5.9	7.7
AAQ4	Turkaul	4.2	8.0	6.5	7.9
AAQ5	Kab	4.5	8.3	6.2	8.0

**Table-3.12: Ambient Air Quality in the Study Area NO2**

Location Code	NO2 ( $\mu\text{g}/\text{m}^3$ )				
	Name of the station	Min	Max	Average	98 <sup>th</sup> Percentile
AAQ1	Near village Kazi Chak	<b>7.2</b>	13.0	9.9	12.8
AAQ2	Jaganpura	8.6	14.7	11.5	11.6
AAQ3	Jalpura	7.7	13.5	10.4	13.4
AAQ4	Turkaul	7.9	<b>16.0</b>	11.9	15.5
AAQ5	Kab	7.9	14.1	10.8	13.9

### 3.3.4.1 Baseline Scenario

#### Particulate Matter (PM<sub>2.5</sub>)

Fine particles include all types of combustion, including motor vehicles, power plants, residential wood burning, forest fires, agricultural burning, and some industrial processes. In general some of the important sources of particulate matter are mines. The following sources of particulate matter in the study area are identified:

- Emission due to vehicular movement
- Dust generation from ground or other mining operations

PM<sub>2.5</sub> recorded within the study area was in the range of **36.8 $\mu\text{g}/\text{m}^3$  to 44.9  $\mu\text{g}/\text{m}^3$** . Table 3.9 were compared with the National Ambient Air Quality Standards (NAAQS) and found that all sampling stations recorded in the study area are within the applicable limits i.e., 60 $\mu\text{g}/\text{m}^3$  for PM<sub>2.5</sub> for industrial, residential, rural and other areas.

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### **Suspended Particulate Matter (PM10)**

Suspended particulate matter in general terms is the particulate matter in suspension in ambient air. It includes dust, smoke etc. In general some of the important sources of suspended particulate matter are mines. The following sources of suspended particulate matter in the study area are identified:

- Emission due to vehicular movement
- Dust generation from ground or other mining operations

The minimum and maximum level of PM10 recorded within the study area was in the range of **71.6  $\mu\text{g}/\text{m}^3$  to 87.5  $\mu\text{g}/\text{m}^3$** . The 24 hourly average values of PM10 were compared with the National Ambient Air Quality Standards (NAAQS) and found that all sampling stations recorded in the study area are within the applicable limits i.e., 100  $\mu\text{g}/\text{m}^3$  for PM10 in industrial, residential, rural and other areas.

### **Sulphur Dioxide (SO<sub>2</sub>)**

Sulphur dioxide gas is an inorganic gaseous pollutant. Sulphur dioxide emissions are expected to be emitted wherever combustion of any fuel containing Sulphur takes place. The Sulphur in the fuel will combine with oxygen to form Sulphur dioxide. The following sources of Sulphur dioxide in the study area are identified:

- Emissions from domestic/consumption of fuel (coal, diesel, etc)

Sulphur dioxide in atmosphere is significant because of its toxicity; Sulphur dioxide is capable of causing illness and lung injury. Further it can combine with water in the air to form toxic acid aerosols that can corrode metal surfaces, fabrics and the leaves of plants. Sulphur dioxide is an irritant to the eyes and respiratory system. Excessive exposure to Sulphur dioxide causes breathing related diseases as it affects the lungs.

The minimum and maximum concentration of SO<sub>2</sub> recorded within the study area was **4.1  $\mu\text{g}/\text{m}^3$  to 8.7  $\mu\text{g}/\text{m}^3$** .

The 24 hourly average values of SO<sub>2</sub> were compared with the National Ambient Air Quality Standards (NAAQS) and it was found that all sampling stations recorded values are below the applicable limits 80  $\mu\text{g}/\text{m}^3$  for Residential, Rural and other areas.

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### Oxides of Nitrogen (NO<sub>2</sub>)

The important sources of oxides of Nitrogen are from utilities and auto exhaust due to vehicular movement in mine lease area. The following sources of oxides of nitrogen in the study area are identified.

- Emissions from vehicular movements in the study area.

Oxides of Nitrogen in the presence of sunlight will undergo reactions with a number of organic compounds to produce all the effects associated with photochemical smog. NO<sub>2</sub> has inherent ability to produce deleterious effects by themselves like toxicity. It causes asphyxiation when its concentration is great enough to reduce the normal oxygen supply from the air. The minimum and maximum level of NO<sub>2</sub> recorded within the study area was in the range of was **7.2 µg/m<sup>3</sup> to 16.0 µg/m<sup>3</sup>**.

The 24 hourly average values of NO<sub>2</sub> were compared with the National Ambient Air Quality Standards (NAAQS) and it was found that all sampling stations recorded values are below the applicable limits 80 µg/m<sup>3</sup> for Residential, Rural and other areas.

### Ambient Air Quality in the Study Area, Free Silica

Location Code	Free silica (µg/m <sup>3</sup> )		
	Name of the station	Min	Max
AAQ1	Near village Kazi Chak	1.39	1.66
AAQ2	Jaganpura	1.37	1.57
AAQ3	Jalpura	1.35	1.68
AAQ4	Turkaul	1.50	1.72
AAQ5	Kab	1.71	1.89

### 3.4 SOIL ENVIRONMENT

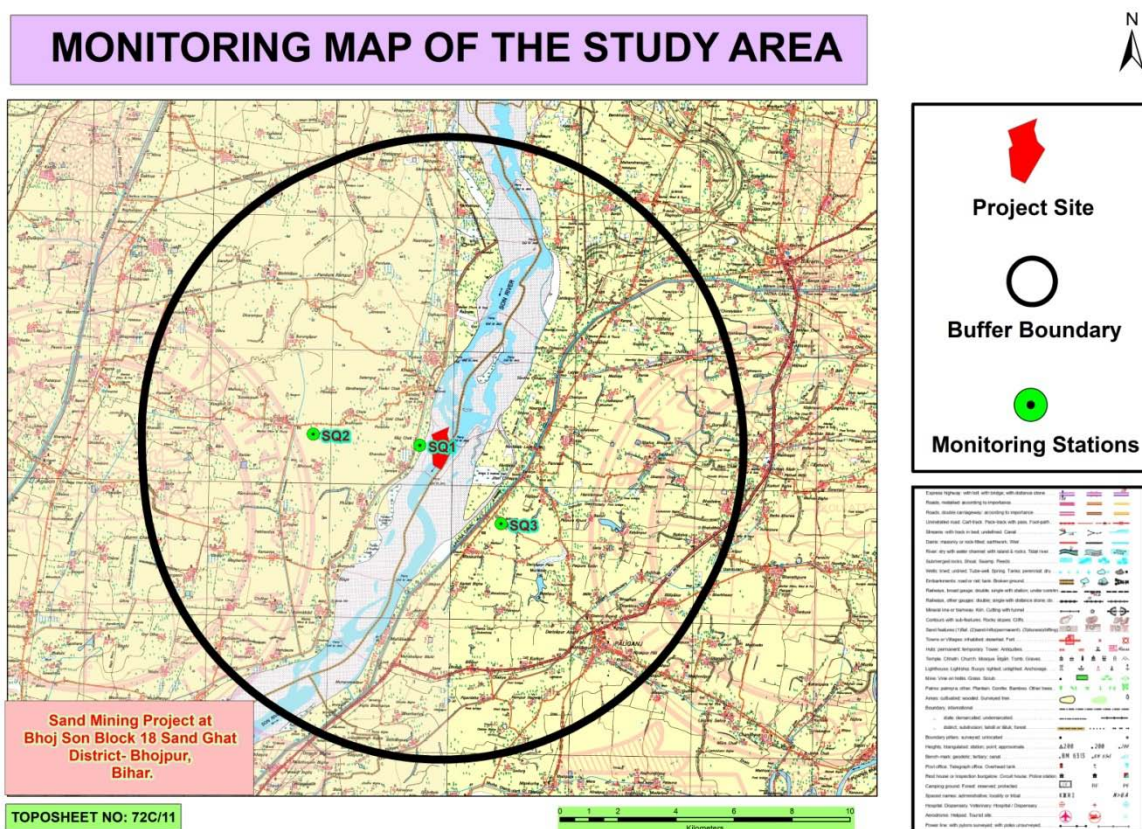
Soil may be defined as a thin layer of earth's crust, a medium for the growth of plants. The soil characteristics include both physical and chemical properties. The soil survey and soil sample were carried out / collected to assess the soil characteristics of the study area. Soil samples were collected from 10 locations and analyzed as per CPCB norms. The soil sampling locations are marked in **Figure 3.5** and shown in **Table 3.13**. The physico-chemical characteristic of these soil samples is given in **Table 3.14**.



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**Table 3.13: Description of soil sampling locations**

Soil monitoring locations		
SQ 1	Near village Kazi Chak	0.46 km, west
SQ 2	Jaganpura	4.07 km, west
SQ 3	Jalpura	3.05 Km, SE



**Figure 3.5, Soil Sampling Locations**

**Table 3.14: Physico-chemical properties of soil**

S.No	Parameter	Unit	SQ-1	SQ-2	SQ-3
1	Silt	%	8.6	18.1	25.0
2	Clay	%	6.4	35.8	44.4
3	Sand	%	84.5	46.3	29.6
4	pH	-	7.30	7.83	8.3
5	Electrical	$\mu\text{mhos/c}$	150	250	255

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	Conductivity	m			
6	Cation exchange capacity	meq/100 gm	10.4	17.2	16.3
7	Exchangeable Potassium	mg/kg	104	115	133
8	Exchangeable Sodium	mg/kg	157	138	201
9	Exchangeable Calcium	mg/kg	1549	2100	2201
10	Exchangeable Magnesium	mg/kg	264	357	342
11	Sodium Absorption Ratio	-	0.25	0.32	0.42
12	Nitrogen	% by mass	0.0280	0.0322	0.0130
13	Phosphorus(P <sub>2</sub> O <sub>5</sub> )	mg/kg	5.35	7.20	5.94
14	Zinc (Zn)	mg/kg	12.42	15.20	12.57
15	Water Holding Capacity	%	24.4	41.0	38.2
16	Porosity	%	47.0	29.1	32.3

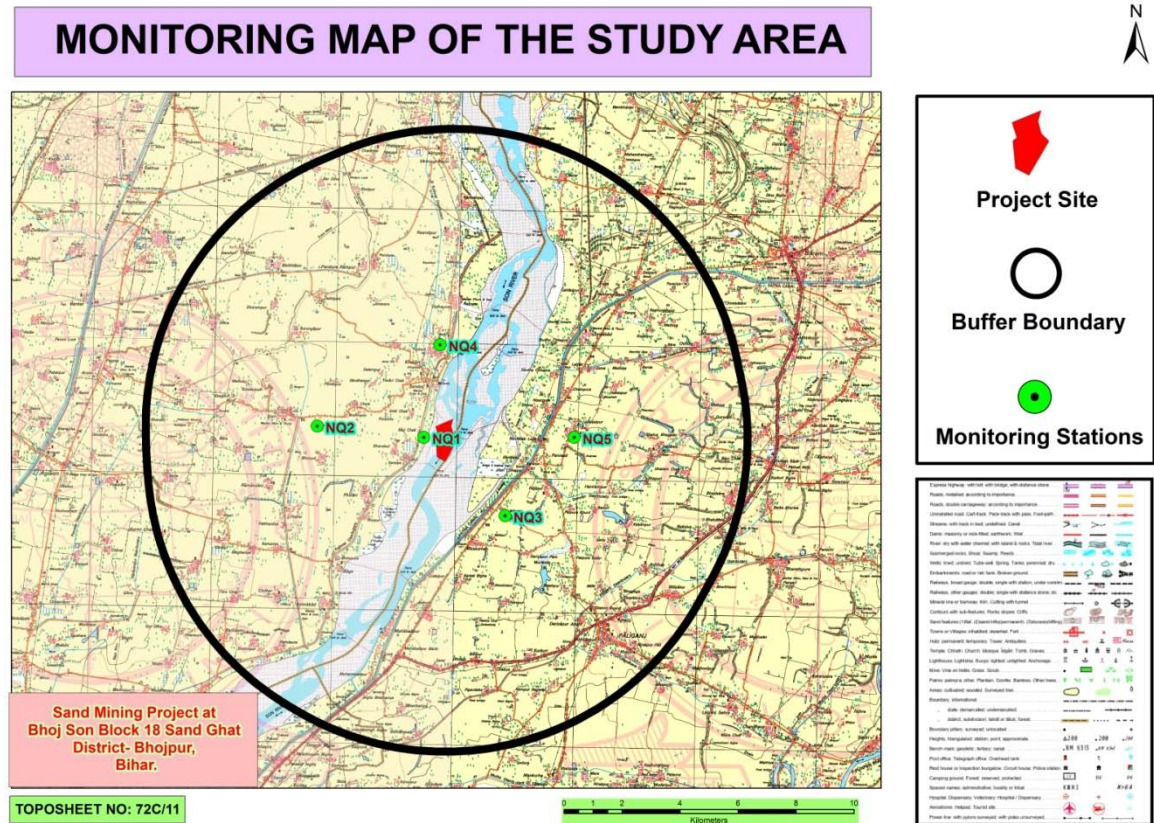
#### Observations:

Samples collected from identified locations indicate the soil is sandy type and the pH value ranging from **7.30 to 8.3**, which shows that the soil is alkaline in nature.

### 3.5 NOISE ENVIRONNENT

The noise levels within the study area were recorded using Sound Level Meter and noise monitoring results were compared with the Ambient Noise Quality Standard notified under Environment Protection Act, 1986. The levels recorded are as stated in **Table 3.16**. The noise level monitoring locations are marked in **Figure 3.6** and shown in **Table 3.15**.

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**Figure 3.6 Noise Monitoring Stations**

**Table 3.15: Noise Quality Monitoring Stations**

Noise Monitoring Locations		
NQ 1	Near village Kazi Chak	0.46 km, west
NQ 2	Jaganpura	4.07 km, west
NQ 3	Jalpura	3.05 Km, SE
NQ 4	Turkaul	2.58 Km, NW
NQ 5	Kab	4.15 Km, E



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**Table 3.16: Noise Monitoring Results**

S. No.	Locations		Equivalent Noise Level, dB (A)			
			Limit (as per CPCB Guidelines), Leq, dB(A)		Observed value Leq, dB(A)	
			DAY*	NIGHT*	DAY*	NIGHT*
1	Near village Kazi Chak	Residential Zone	55	45	<b>41.2</b>	<b>32.1</b>
2	Jaganpura	Residential Zone	55	45	44.1	<b>40.30</b>
3	Jalpura	Residential Zone	55	45	<b>50.1</b>	37.2
4	Turkaul	Residential Zone	55	45	42.13	35.42
5	Kab	Residential Zone	55	45	41.54	33.50

### Results

Noise monitoring reveals that the minimum & maximum noise levels at day time were recorded as **41.2 dB(A) to 50.1 dB(A)** respectively. The minimum&maximum noise levels at night time were found to be **32.1dB (A) & 40.30 dB(A)** respectively.

There are several sources in the 10 km radius of study area, which contributes to the local noise level of the area. On the commencement of the project, the sound from traffic activities will add to the ambient noise level of the area. This will be kept under check by taking proper suggestive measures.

## 3.6 BIOLOGICAL ENVIRONMENT

### 3.6.1.1 Introduction

The ecological study reflects the potential of a regional ecosystem and its biological components. In India, the biological diversity of plants and animals varies from region to region on account of their diversity and density. Producers (plants), consumers (animals), and decomposers (microbes) govern the whole cycle of ecology. Plant and animals both are interdependent on each other.

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The biological study is essential to understand the impact of any developmental project on the existing flora and fauna present in the study area. Hence, studies on various aspects of the ecosystem play an important role in identifying sensitive issues for undertaking appropriate action to mitigate the impact if required.

The Environment baseline data generation report in respect of flora-fauna has been prepared to assess the current ecology & biodiversity scenario of the area; and to carry out Environmental Management Plan based on the proposed project activities. The plan will identify and address the environmental and ecological conservation implications of the area. Conservation of biodiversity is essential for sustainable development.

The main objective of the ecological survey is aimed to find out the baseline status of flora and fauna (terrestrial and aquatic ecosystem) of the study area before the start of Sand Mining Project, On Son River At Bhoj Son 18 Sand Ghat.

### **3.6.2 Description of the study area**

The Proposed Sand Mining Project was located on Son River at Mauja Khandol, Anchal-Sandesh, District- Bhojpur, Bihar.

#### **3.6.2.1 Description of Eco-sensitive zones in the Study Area (Wildlife Sanctuary/ National Parks/Animal or Elephant Corridors/ Protected Wetlands etc.)**

There are no National parks, Biosphere Reserves, Wildlife corridors, Tiger/Elephant reserves (existing as well as proposed), within 5 km from the present project.

Also, areas protected under international conventions, national or local legislation for their ecological, landscape, cultural or other related value are doesn't exist in the core and buffer zone of the present project. On the other hand, the proposed alignment will cross over some riverine channel in the core zone. Adequate structure for cross drainage shall be constructed in order to maintain the natural hydrology and protection of all forms of biota found there in all the water bodies of the area. Apart from the above, the proposed project the area will promote tourism activities due to the existing Beraila Wildlife Sanctuaries (Bird Sanctuary).

### **3.6.3 Drainage /Water Bodies of the Study Area**

Apart from these, some seasonal (monsoon-fed) riverine streams and Nallas are also present in the study area. Few ponds are also recorded nearby the different villages mainly used for fish farming, Cattle feeding, Irrigation purpose by the villagers, etc.

### **Scope and Objectives of the Study**



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The above study aims in identifying potential impacts on flora and fauna and to suggest relevant compensatory and mitigatory measures to protect/conservate biodiversity in the likely impacted area due to the project activity. Following points to be covered under the scope of work:

- Survey of terrestrial & aquatic flora & fauna for core & buffer zone separately.
- Details of endemic species found in the study area and their IUCN status, Schedule status (as per WPA, 1972).
- Survey of the study area in terms of features like breeding & spawning grounds, habitats, flight paths, and the migratory path of the animals.
- Survey of flora covering types e.g. agriculture crop, commercial crop, plantation, natural vegetation/forest type, grass land. The endangered & endemic species of flora & fauna beside any other flora, if present are also to be identified.
- The survey has been covering a total listing of the faunal population. The survey has also covered endangered, endemic, migratory & detail of aquatic fauna.
- The assessment of potential damage to terrestrial & aquatic flora and fauna. The impact should be categorized as primary & secondary, temporary and long term, unavoidable & risk transboundary impacts, possible irreversible change.

### 3.6.4 Methodology/ Data Collection

A primary field survey was carried out within a 10 km radius of the proposed project in pre monsoon period (march – may 2023). Both terrestrial and aquatic ecosystems have been studied to understand the biological environment. Secondary data were collected from authentic sources like the Forests Department, Fisheries Department, Agriculture Department of Son, and available published literature.

### 3.6.5 Flora (Aquatic and Terrestrial)

For the collection of data for aquatic flora, the methodology prescribed in the standard book of Adoni (1985), NEERI (1998), and APHA (2015) has been adopted. A total of 05 sampling sites were selected for the collection of samples to analyze the aquatic flora.

On the other hand, for the terrestrial data, community analysis was carried out during the summer season. For the collection of terrestrial data, a total of 05 sampling points were selected. At every sampling site, quadrates of 10m X 10m (100 sq.m.) size were randomly laid to study tree species. The circumference of all the adult individuals [(circumference at breast height (CBH)] was measured with Freeman's tape. The study of

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communities was carried out by using qualitative characteristics, and quantitative characteristics. Qualitative characteristic mainly involved presence/absence of the species, genera, and family. This showed the community structures, composition and other characteristic can be readily described by visual observation without actual measurements. The quantitative analysis involved the structure and composition of vegetation across vegetation types and compared in terms of frequency, density, abundance, and basal area of tree species.

### **3.6.6 Fauna (Aquatic and Terrestrial)**

For the collection of data for aquatic fauna, the methodology prescribed in the standard book of Adoni (1985), NEERI (1998), and APHA (2015) has been adopted. A total of 05 sampling points were selected for the collection of samples to identify the the aquatic fauna.

On the other hand, for the terrestrial data, the assessment of fauna was done by an extensive field survey in the area at 05 locations. During the survey, the Line Transect method was used for the study of mammals and Transact & Patch sampling were used for Amphibians, visual encountered methods was used for reptiles and butterflies. The presence of wildlife was also confirmed from the animal calls, footmarks, excreta, and from the local inhabitants depending on the animal sightings and the frequency of their visits in the project area which was later confirmed from the different government offices like the forest department or wildlife department, etc.

Observations of birds were made during a walk-through in the chosen transect for sighting birds. The number of birds observed in each sampling location was listed. Birds were noted and identified with the help of binocular and standard field identification guides.

### **3.6.7 Sampling Sites**

A total of 05 samplingsitewere selected for the terrestrial vegetation, avian fauna, and other terrestrial animals like reptiles, mammals, etc. For the collection of samples and data of aquatic flora and fauna, 05 separate sampling sites were also selected at different locations in the study area.

### **3.6.8 Flora of the Study Area**

The core zone of the proposed project area doesn't have any major natural forest land.

A major part of the core and buffer zone of the project is agricultural land having some major vegetation in the form of agro forestry. Vegetation patterns in villages and surrounding areas are slightly different from the rest of the areas in the Bhojpur District. The common species

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grown near the villages are mostly edible, fruits bearing or useful plants. Purposely planted tree patches (mostly fruit-bearing) are available nearby several villages in the study area. The most dominant tree species in the study area are *Aegle marmelos* (Bel), *Azadirachta indica* (Neem), *Embllica officinalis* (Amla), *Dalbergia sissoo* (Sisam), *Ficus bengalensis* (Bargad), *Musa paradisiacal* (Kela), *Syzygiumcumini* (Jamun), *Cassia siamea* (Kasod/Siris), *Litchi chinensis* (Litchi), *Mangifera indica* (Aam) and in case of shrubs *Antigonum leptopus*, *Ricinus communis*, *Lantana camara*, *Jatropha gossipifolia* and *Cassia auriculata* etc. The most dominant species in the study area of both the district was *Mangifera indica* (Aam) and its different varieties.

### 3.6.9 Flora of Core zone

#### 3.6.9.1 Terrestrial Flora of Core zone (Natural vegetation etc.).

There is no flora found in the core zone

#### 3.6.9.2 Agricultural Crops/ Commercial Crops of the Core zone and Buffer Zone

Details of the agricultural vegetation and commercial crops were collected from the 09 selected sites of the core (Bhojpur district) and the details are given in table . These crops are similar to the crops of buffer zone also. So, the same information is applicable for the core and buffer zone.

**Table 3.17: List of Crops seasonally planted by respective farmers in the Core and Buffer Zone**

S.No.	Botanical Name	Local/Trade Name	Family Name
1	<i>Zey mays</i>	Makkha/Maize	Poaceae
2	<i>Triticum aestivum</i>	Wheat	
3	<i>Oryza sativa</i>	Paddy	
4	<i>Cicer arietinum</i>	Channa	Fabacea
5	<i>Coriander sativum</i>	Dhaniya	Apiaceae
6	<i>Abelmoschus esculentus</i>	Bhendi	Amaranthacea
7	<i>Mamordica charanta</i>	Karela	Cucurbiataceae
8	<i>Capsicum annum</i>	Mirchi	Solanaceae
9	<i>Lycopersicon lycopersicum</i>	Tomato	
10	<i>Solanum melongena</i>	Brinjal	

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11	<i>Capsicum annuum</i>	Mirchi	Amaryllidaceae
12	<i>Solanum tuberosum</i>	Potato	
13	<i>Allium cepa</i>	Onian	
14	<i>Cajanus cajan</i>	Pigeon pea	Fabaceae
15	<i>Carica papaya</i>	Papaya	Caricaceae
16	<i>Okra</i>	Ladyfinger/ Bhindi	Malvaceae
17	<i>Lagenaria siceraria</i>	Bottle gourd/ Lauki	Cucurbitaceae
<b>Source:</b> Present Survey Data Supported by District Agriculture Department, Bhojpur			

### 3.6.9.3 Aquatic Flora of Core zone (Phytoplankton/ Macrophytes).

Aquatic floral details of the core zone were collected from 08 selected sites of the study area. Some sites were located buffer zone adjacent to the present alignment, however some were located in the core & buffer zone. Details of phytoplankton and macrophytic vegetation of the core and the buffer zone are given in tables 3.18, 3.19 & 3.20.

**Phytoplankton:** Most of the phytoplankton species recorded from the core zone was similar to the buffer zone also. So, the same information is applicable for the core and buffer zone. Phytoplankton species were collected and identified from 08 selected sampling sites of the study area. A total of 69 phytoplankton species were recorded from the different water bodies of the study area, out of which 27 species were of class Chlorophyceae, 17 species of Cyanophyceae, 19 species of Bacillariophyceae, and 6 species of Euglenophyceae. Details of Phytoplankton species are given in table 3.18.

**Table 3.18: List of Phytoplankton species present in different water bodies in study area (Core and Buffer Zone).**

S.N.	Taxonomic Details	S-1	S-2	S-3	S-4	S-5	S-6	S-7	S-8	Schedule Status in WPA (1972)	IUCN Status
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	<b>Chlorophyceae</b>									NA	NA
1	<i>Arthrodesmus</i> sp.	+		+	+		+		+	NA	NA
2	<i>Ankistrodesmus falcatus</i>		+	+			+	+	+	NA	NA
3	<i>Chlorococcum</i> sp.	+	+	+			+		+	NA	NA
4	<i>Closteriopsis</i> sp.	+	+		+	+		+		NA	NA
5	<i>Cosmarium formii</i>	+	+	+	+	+	+		+	NA	NA
6	<i>Cosmarium margaritatum</i>	+		+	+		+	+		NA	NA
7	<i>Crucigenia</i> sp.	+	+	+	+		+			NA	NA
8	<i>Chlorella vulgaris</i>	+		+	+	+			+	NA	NA
9	<i>Oocystis crassa</i>	+	+			+	+	+	+	NA	NA
10	<i>Pediastrum simplex</i>			+	+	+				NA	NA
11	<i>Scenedesmus armatus</i>	+	+	+		+	+	+	+	NA	NA
12	<i>Scenedesmus bijugatus</i>	+		+	+	+	+		+	NA	NA
13	<i>Spirogyra</i> sp.	+	+	+		+	+	+		NA	NA
14	<i>Tetraedron trigonum</i>				+		+		+	NA	NA
15	<i>Tetrastrum</i> sp.	+	+	+		+	+		+	NA	NA
16	<i>Ulothrix</i> sp.	+	+	+	+	+	+	+		NA	NA
17	<i>Ulothrix zonata</i>	+		+		+	+		+	NA	NA
18	<i>Volvox</i> sp.	+	+	+		+	+			NA	NA
	<b>Total</b>	19	15	23	16	17	24	12	17		
	<b>Cyanophyceae</b>									NA	NA
1	<i>Anabaena</i> sp.		+	+	+	+	+		+	NA	NA
2	<i>Anabaena circinalis</i>	+	+	+	+	+	+	+		NA	NA
3	<i>Aphanocapsa</i> sp.	+		+	+	+	+	+	+	NA	NA
4	<i>Aphanothece</i> sp.	+	+		+	+			+	NA	NA
5	<i>Chroococcus</i> sp.	+		+	+	+	+	+		NA	NA
6	<i>Gloeocapsa</i> sp.	+	+	+			+		+	NA	NA
7	<i>Lyngbya</i> sp.	+	+		+	+	+	+	+	NA	NA
8	<i>Merismopedia</i> sp.	+	+	+		+	+	+	+	NA	NA
9	<i>Merismopedia tenuissima</i>	+		+	+	+	+			NA	NA
10	<i>Microcystis</i> sp.		+		+			+	+	NA	NA
11	<i>Microcystis aeruginosa</i>	+		+			+			NA	NA



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12	<i>Nostoc</i> sp.		+		+	+	+	+	+	NA	NA
	<b>Total</b>	<b>12</b>	<b>11</b>	<b>11</b>	<b>12</b>	<b>13</b>	<b>15</b>	<b>9</b>	<b>12</b>		
	<b>Bacillariophyceae</b>									NA	NA
1	<i>Amphora ovalis</i>	+				+	+		+	NA	NA
2	<i>Amphora</i> sp.	+	+	+	+	+		+		NA	NA
3	<i>Cyclotella</i> sp.			+		+	+	+	+	NA	NA
4	<i>Cymbella affinis</i>	+		+	+		+		+	NA	NA
5	<i>Eunotia major</i>	+	+		+	+		+		NA	NA
6	<i>Fragillaria pinnata</i>		+	+		+	+		+	NA	NA
7	<i>Gomphonema</i> sp.	+			+		+	+	+	NA	NA
8	<i>Gomphonema lanceolatum</i>	+	+	+	+	+			+	NA	NA
9	<i>Melosira</i> sp.	+	+	+	+	+	+			NA	NA
10	<i>Navicula similis</i>	+	+	+	+		+	+	+	NA	NA
11	<i>Navicula subrhyncocephala</i>	+	+		+		+		+	NA	NA
12	<i>Nitzschia palea</i>	+	+		+	+	+			NA	NA
13	<i>Pinnularia</i> sp.	+	+	+				+	+	NA	NA
14	<i>Synedra acus</i>	+				+	+		+	NA	NA
15	<i>Synedra ulna</i>		+		+	+	+	+	+	NA	NA
	<b>Total</b>	<b>16</b>	<b>12</b>	<b>9</b>	<b>13</b>	<b>11</b>	<b>15</b>	<b>10</b>	<b>13</b>		
	<b>Euglenophyceae</b>									NA	NA
1	<i>Euglena acus</i>	+	+	+	+	+	+	+	+	NA	NA
2	<i>Euglena</i> sp.	+			+	+	+		+	NA	NA
3	<i>Euglepha</i> sp.	+	+	+	+	+	+	+	+	NA	NA
4	<i>Phacus</i> sp.		+				+			NA	NA
5	<i>Phacus caudatus</i>	+			+	+	+	+	+	NA	NA
6	<i>Trachelomonas</i> sp.	+	+	+	+	+	+	+		NA	NA
	<b>Total</b>	<b>5</b>	<b>4</b>	<b>3</b>	<b>5</b>	<b>5</b>	<b>6</b>	<b>4</b>	<b>4</b>		
<b>Source:</b> Primary Survey Data of P&M Solution Pvt. Ltd., Noida											

**Table 3.19: Site wise Qualitative list of Phytoplankton species recorded from the Core and Buffer Zone**

Class	S-1	S-2	S-3	S-4	S-5	S-6	S-7	S-8
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Chlorophyceae	19	15	23	16	17	24	12	17
Bacillariophyceae	16	12	9	13	11	15	10	13
Euglenophyceae	5	4	3	5	5	6	4	4
<b>Total No. of Species</b>	<b>52</b>	<b>42</b>	<b>46</b>	<b>46</b>	<b>46</b>	<b>60</b>	<b>35</b>	<b>46</b>

**Macrophytes:** The aquatic vegetation recorded from the core zone was similar to the aquatic vegetation of the buffer zone also. So, the same information is applicable for the core and buffer zone. The maximum number of aquatic vegetation was recorded at sites 06 and 08 due to the perennial nature of the water bodies. On the other hand, other water bodies support less vegetation due to a lack of water (monsoon-fed streams), and moisture. The details of Macrophytes species are given in table 3.20.

**Table 3.20: List of Aquatic Macrophytic vegetation of Core and Buffer Zone**

S.No.	Name of the Taxa	Family Name	IUCN Status	S-1	S-2	S-3	S-4	S-5	S-6	S-7	S-8
1	<i>Azolla pinnata</i>	Salviniaceae	LC	+	+	+	+	+	+	+	+
2	<i>Cyperus alopecuroides</i>	Cyperaceae	LC	+	+			+	+	+	+
3	<i>Cyperus difformis</i>	Cyperaceae	LC	+		+	+		+	+	+
4	<i>Eichhornia crassipes</i>	Pontederiaceae	LC	+	+	+		+	+		+
5	<i>Hydrilla verticillata</i>	Hydrocharitaceae	LC				+			+	+
6	<i>Ipomea aquatica</i>	Convolvulaceae	LC		+	+	+	+	+		+
7	<i>Ipomea carnea</i>	Convolvulaceae	LC	+	+	+	+		+	+	+
8	<i>Lemna minor</i>	Araceae	LC	+	+			+	+	+	+
9	<i>Ludwigia parviflora</i>	Onagraceae	LC	+	+	+	+		+	+	+
10	<i>Nelumbo sp.</i>	Nelumbonaceae	LC		+			+			
11	<i>Nymphoides aquatica</i>	Menyanthaceae	LC	+		+		+	+	+	+
12	<i>Phragmites karka</i>	Poaceae	LC						+		
13	<i>Pistia stratiotes</i>	Araceae	LC		+		+			+	+
14	<i>Polygonum glabrum</i>	Polygonaceae	LC	+	+	+		+	+	+	+
15	<i>Typha latifolia</i>	Typhaceae	LC						+		+

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16	<i>Typha orientalis</i>	Typhaceae	LC		+		+	+	+	+	
<b>Total No. of Species</b>				<b>9</b>	<b>8</b>	<b>8</b>	<b>8</b>	<b>9</b>	<b>13</b>	<b>11</b>	<b>13</b>

### 3.6.10 Flora of Buffer zone

#### 3.6.10.1 Terrestrial Flora of Buffer zone (Natural vegetation/Commercial vegetation).

During the present survey, a total of 77 species of plant species were observed from the study area. Out of 77 plant species, 42 species of tree, 18 species of shrubs/herbs, 6 species of climbers, and 10 species of Grass species were recorded from the buffer zone of the present study area. The below-mentioned vegetation details have been collected from the Core as well as Buffer zone of the present study area. All the details have been furnished based on the field survey at different locations and data supported by the Department of Forest, Bhojpur of Bihar. The details of vegetation of the buffer zone is given in Table 3.21.

**Table 3.21: List of Trees, Shrubs, Herbs and Grasses observed in Buffer Zone**

S.No.	Botanical Name	Common/ Hindi Name	Name of family
	<b>Trees</b>		
1	<i>Acacia nilotica</i>	Babool	Mimosaceae
2	<i>Acacia nilotica</i>	Desi babool	Fabaceae
3	<i>Acacia leucophloea</i>	Safed babul	Mimosaceae
4	<i>Aegle marmelos</i>	Bel	Rutaceae
5	<i>Ailanthus excels</i>	Adusa	Simaroubaceae
6.	<i>Albizia amara</i>	Siris	Mimosoideae
7	<i>Albizia lebbeck</i>	Sirish	Mimosaceae
8	<i>Alstonia scholaris</i>	Saptaparni	Apocynaceae
9	<i>Anogeissus latifolia</i>	Dhaura,	Combretaceae
10	<i>Anthocephalus cadamba</i>	Kadamb	Rubiaceae
11	<i>Artocarpus heterophyllus</i>	Jack fruit	Moraceae
12	<i>Azadirachta indica</i>	Neem	Meliaceae
13	<i>Bauhinia racemosa</i>	Apta	Leguminosae
14	<i>Bauhinia variegata L.</i>	Kachnar	Leguminosae
15	<i>Bombax ceiba</i>	Semal	Malvaceae

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16	<i>Bombax malabaricum</i>	Semal tree	Malvaceae
17	<i>Borassus flabellifer</i>	Nariyal	Palmae
18	<i>Butea monosperma</i>	Palas	Leguminosae
19	<i>Dalbergia latifolia</i>	Shisam	Leguminosae
20	<i>Dalbergia sissoo</i>	Shisam	Leguminosae
21	<i>Delonix regia</i>	Gulmohar	Fabaceae
22	<i>Dendrocalamus strictus</i>	Bamboo	Poaceae
23	<i>Diospyros melanoxylon</i>	Tendu	Ebenaceae
24	<i>Ficus benghalensis</i>	Bargad	Moraceae
25	<i>Ficus religiosa</i>	Pipal	Moraceae
26	<i>Madhuca longifolia</i>	Mohua tree	Sapotaceae
27	<i>Magnifera indica</i>	Aam	Anacardiaceae
28	<i>Melia azedarach</i>	Bukkam Neem	Meliaceae
29	<i>Moringa olerifera</i>	Munga	Moringanaceae
30	<i>Nerium oleander</i>	Kaner	Apocynaceae
31	<i>Phoenix sylvestris</i>	Date palm	Arecaceae
32	<i>Phyllanthus emblica</i>	Awla	Euphorbiaceae
33	<i>Pisidium guava</i>	Guava	Myrtaceae
34	<i>Pongamia pinnata</i>	Karanj	Leguminosae
35	<i>Prosopis juliflora</i>	Vilayati babool	Fabaceae
36	<i>Sarracca indica</i>	Ashok	Annonaceae
37	<i>Shorea robusta</i>	Sal	Depterocarpaceae
38	<i>Syzygium cumini</i>	Jamun	Myrtaceae
39	<i>Tectona grandis</i>	Sagwan	Verbenaceae
40	<i>Terminalia arjuna</i>	Arjun	Combretaceae
41	<i>Terminalia chebula</i>	Harhar	Combretaceae
42	<i>Zizyphus jujube</i>	Ber	Rhamnaceae
<b>Shrub &amp; Herbs</b>			
43	<i>Acanthospermum hispidum</i>	Kanti	Asteraceae
44	<i>Acheranthus aspera</i>	Aghada	Amaranthaceae
45	<i>Argemone mexicana</i>	Pila dhtura	Papaveraceae
46	<i>Baugainvillia glabra</i>	Paper flower	Nyctaginaceae

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47	<i>Calotropis procera</i>	Aakra	Asclepiadaceae
48	<i>Cassia auriculata</i>	Tarwar	Fabaceae
49	<i>Cassia tora</i>	Tarota /Takla	Caesalpinaceae
50	<i>Chenopodium album</i>	manure weed	Amaranthaceae
51	<i>Dalura metel</i>	Dhotra	Solanaceae
52	<i>Ipomoea carnea</i>	Besharam	Convolvulaceae
53	<i>Jatropha gossipifolia</i>	cotton-leaf	Euphorbiaceae
54	<i>Lantana camara</i>	Ghaneri	Verbenaceae
55	<i>Mimosa pudica</i>	Chui Mui	Mimosaceae
56	<i>Ocimum sanctum</i>	Tulsi	Labiatae
57	<i>Parthenium hysterophorus</i>	Gajar grass	Asteraceae
58	<i>Ricinus communis</i>	Arand	Euphorbiaceae
59	<i>Ricinus communis</i>	castor oil plant	Euphorbiaceae
60	<i>Tridax procumbens</i>	Kambarmodi	Asteraceae
<b>Grasses</b>			
61	<i>Apluda mutica</i>	Mauntian grass	Poaceae
62	<i>Commelina benghalensis</i>	Bokna	Commelinaceae
63	<i>Cynodon dactylon</i>	Doob	Poaceae
64	<i>Cyperus rotundus</i>	Motha	cyperaceae
65	<i>DactylSeptemnerenum aegyptium</i>	Crow foot grass	Poaceae
66	<i>Pennisetum purpureum</i>	Elephant grass	Poaceae
<b>Climbers</b>			
67	<i>Antigonon leptopus</i>	Anantalata	Polygonaceae
68	<i>Bougainvillea glabra</i>	Booganbel	Nyctaginaceae
69	<i>Celastrus paniculata</i>	Kujari	Celastraceae
70	<i>Cissampelos pareira</i>	Khariya lata	Menispermaceae
71	<i>Clitoria ternatea</i>	Blue pea	Fabaceae
72	<i>Coccinia grandis</i>	Jungli Kundru	Cucurbitaceae
73	<i>Combretum indicum</i>	Madhu Malati	Combretaceae
74	<i>Cuscuta reflexa</i>	Amarbel	Convolvulaceae
75	<i>Cuscuta reflexa</i>	Amar bel	Convolvulaceae
76	<i>Ipomoea cairica</i>	Neeli Bel	Convolvulaceae

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77	<i>Tilospora cordifolia</i>	Giloy	Menispermaceae
<b>Source:</b> Primary data of P&M Solution, Noida and data supported by the Department of Forest, Bhojpur district of Bihar.			

### 3.6.10.2 Agricultural vegetation/ Commercial vegetation of the Buffer zone.

The variety of Crops and cropping patterns in the core and the buffer zone was the same in the study area. Vegetation details of the buffer zone were collected from 05 selected sites (TS-1 to TS-05) and the details are given in Table 3.17.

### 3.6.10.3 Aquatic Flora of Buffer zone (Phytoplankton/ Macrophytes/ Aquatic Weeds)

**Phytoplankton:** The diversity of Phytoplankton species was similar in the core and buffer zone. The details of macrophytic vegetation of the buffer zone are given in Table 3.18 & 3.19.

**Macrophytes:** The diversity of aquatic macrophytes was similar in both core and buffer zone. The details of macrophytic vegetation of the buffer zone are given in Table 3.20.

### 3.6.11 Fauna of the Study Area

Proposed alignment passing through the rural and purely in the agricultural field. At some places, it will cross from adjacent to some villages in the study area. The study area is devoid of any natural forest, so, major wildlife animals are rarely found in the area. Only some moving animals were observed. Domesticated animals mainly constitute the faunal population within the project area.

The assessment of fauna was done on the bases of secondary data collected from different government offices like the forest department, wildlife department, etc. The presence of wildlife was also confirmed by the local inhabitants depending on the animal sightings and the frequency of their visits in the project area.

During the present study period, a large number of local birds are noticed in the buffer zone of the study area. But, there are no bird habitats like nesting, breeding, and foraging patterns are noticed in the core zone.

### 3.6.12 Fauna of the Core Zone

**3.6.12.1 Terrestrial fauna of core zone (Mammals/Reptiles/amphibians/birds/insects etc.).**

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The domesticated animals like; Buffalo (*Bubalus bubalis*); Ass (*Equus hemionus*), Cow (*Bos primigenius*); Goat (*Capra aegagrus*) Horse (*Equus caballus*); and Dog (*Canis lupus familiaris*) were observed moving in different parts of the study area (including core and buffer zone), especially nearby town and villages. Other mammals and reptiles found in the study area are listed in Table 3.22.

**Table 3.22: List of Mammals/Reptiles/Amphibians/Birds recorded from the Core Zone**

S. No.	Common Name	Scientific Name	Family	Schedule status (as per WPA-1972)	IUCN status
<b>Mammals</b>					
1.	Jungle cat	<i>Felis chaus</i>	Felidae	II	LC
2.	Five striped palm squirrel	<i>Funambulus pennanti</i>	Sciuridae	IV	LC
3.	Indian Fulvous Fruit-Bat	<i>Rousettus leschenaultia</i>	Pteropodidae	V	LC
4.	Indian Field Mouse	<i>Mus booduga</i>	Muridae	V	LC
5.	Common House Rat	<i>Rattus rattus</i>	Muridae	V	LC
6.	Bandicoot Rat	<i>Bandicotabengalensis</i>	Muridae	V	LC
7.	Indian Grey Mongoose	<i>Herpestes edwardsi</i>	Herpestidae	II	LC
<b>Reptiles &amp; Amphibians</b>					
8.	Garden lizard	<i>Calotes versicolor</i>	Agamidae	IV	NE
9	King cobra	<i>Ophiophagus hannah</i>	Elapidae	II	LC
10	Cobra	<i>Naja naja</i>	Elapidae	II	LC
11.	Pit viper	<i>Crotalus</i> sp	Viperidae	II	LC
12	Garden lizard	<i>Calotes versicolor</i>	Agamidae	IV	NE
<b>Bird Species</b>					
1	<i>Acridotheres tristis</i>	Myna	Sturnidae	IV	LC
2	<i>Acridotheres tristis</i>	Common myna	Sturnidae	IV	LC



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3	Amandava amandava	Red munia	Estrildidae	IV	LC
4	<i>Ardea cinerea</i>	Grey heron	Ardeidae	IV	LC
6	Bubulcus ibis	Cattle egret	Ardeidae	IV	LC
7	<i>Columba livia</i>	Pigeon	Columbidae	IV	LC
5	<i>Corvus macrorhynchos</i>	Jungle crow	Corvidae	IV	LC
6	<i>Corvus splendens</i>	Crow	Corvidae	V	LC
7	<i>Gallinule chloropus</i>	Common moorhen	Rallidae	IV	LC
8	<i>Milvus migrans</i>	Black Kite	Accipitridae	IV	LC
9	<i>Passer domesticus</i>	House sparrow	Passeridae	IV	LC
10	<i>Pycnonotus cafer</i>	Red-vented bulbul	Pycnonotidae	IV	LC
11	Saxicoloides fulicatus	Indian robin	Psittaculidae	IV	LC
12	<i>Turdoides caudate</i>	Common babbler	Leiothrichidae	IV	LC

**IUCN Status =LC:** Least Concern, **NE:** Not Evaluated.

**Source:**Primary Survey data of P&M Solution, Noida and the data supported by Department of Forest, Bhojpur district of Bihar

**Table 3.23: Butterflies observed in the Core zone**

S. No.	Common Name	Scientific Name	Family	IUCN Status
1.	Plain Tiger	<i>Danaus chrysippus</i>	Nymphalidae	LC
2.	Common emigrant	Catopsilia pomona	Pieridae	LC
3.	Common crow	<i>Euploea core</i>	Nymphalidae	LC
4.	Small grass yellow	Eurema brigitta	Pieridae	LC

**Source:**Primary Survey data of P&M Solution, Noida and the data supported by Department of Forest, Bhojpur district of Bihar

### 3.6.12.3 Aquatic Fauna of Core zone (Zooplankton/ Macro-invertebrates/ Fishes/ Amphibians/ Turtles etc.)

All the aquatic fauna recorded from the core zone were also recorded from the buffer zone and most of the sampling sites are the same for the core and buffer zone as given in table

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3.17. So, the list of aquatic fauna of the core zone is merged with the details of the buffer zone and is given in Table 3.25 to 3.27.

#### **3.6.12.4 Fauna of Buffer zon**

To prepare a detailed report on the status of faunal biodiversity of the present study area (1 km buffer) of Bhojpur district of Bihar and to assess the impacts due to digging/ leveling of alignment route/ construction of bridge/ operational activity which evolves suitable mitigation measures to protect & conserve biodiversity following components were studied: terrestrial biodiversity, wildlife survey (diversity), habitat study (feeding, breeding, roosting areas), distribution of birds, rare & endangered species of the study area.

The fauna of the study area (Core and Buffer zone) vary upon the local topography and different types of habitats. The fauna of the study area has been categorized into two categories based on their habitat, i.e.

- (i) Aquatic fauna and
- (ii) Terrestrial fauna.

During the present survey, there are some seasonal, perennial and private water body was observed along with the proposed alignment, which will be affected due to the present project activities. The alignment of the project will cross a few seasonal and perennial streams.

#### **3.6.12.6 Terrestrial Fauna of Buffer zone (Mammals/Reptiles/Amphibians/Birds/ Insects etc.)**

The major part of the study area lies under agricultural fields and barren land which restricts the wildlife habitat significantly. There is neither any wildlife sensitive area nor any corridor for the movement of wildlife in the study area. A list of the animals of the study area has been prepared on the basis of the survey and also inquire from the local people. The animals, thus recorded were cross-checked with Wildlife (Protection) Act, 1972 for their schedule status. Faunal details of the study area are given in Tables 3.24 to 3.26.

##### **i. Mammals and Reptiles/ Amphibians**

The domesticated animals like Goat (*Capra aegagrus*); Buffalo (*BuSands bubalis*); Cow (*Bos primigenius*); Horse (*Equus caballus*); Ass (*Equus hemionus*) and Dog (*Canis lupus*

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*familiaris*) were observed moving in different parts of the study area, especially nearby town and villages. Other mammals and reptiles found in the study area are listed in Table 3.24.

**Table 3.24: List Mammals, Reptiles and Amphibians recorded from the Buffer Zone**

S. No.	Common Name	Scientific Name	Family	Status as per WPA-1972	IUCN status
<b>Mammals</b>					
1	<i>Bandicota bengalensis</i>	Bandicoot Rat	Sciuridae	IV	LC
2	<i>Canis auris</i>	Jackal	Pteropodidae	V	LC
3	<i>Felis chaus</i>	Jungle cat	Soricidae	IV	LC
4	<i>Funambulus palmarum</i>	Three-striped Squirrel	Suidae	III	LC
5	<i>Funambulus pennanti</i>	Five striped palm squirrel	Hyaenidae	III	LC
6	<i>Herpestes edwardsi</i>	Indian Grey Mongoose	Canidae	II	LC
7	<i>Hyaena hyaena</i>	Stripped hyena	Leporidae	V	LC
8	<i>Lepus nigricollis</i>	Indian Hare	Canidae	II	LC
9	<i>Mus booduga</i>	Indian Field Mouse	Sciuridae	IV	LC
10	<i>Presbytis entellus</i>	Common langur	Cercopithecidae	II	LC
11	<i>Pteropus giganteus</i>	Indian Flying Fox	Pteropodidae	V	LC
12	<i>Rattus rattus</i>	Common House Rat	Muridae	V	LC
13	<i>Rousettus leschenaultia</i>	Indian Fulvous Fruit- Bat	Muridae	V	LC
14	<i>Suncus murinus</i>	Grey musk Shrew	Muridae	V	LC
15	<i>Sus scrofa</i>	Wild Boar	Canidae	III	LC
16	<i>Vulpes bengalensis</i>	Indian fox	Felidae	II	LC
<b>Reptiles and Amphibians</b>					
1	<i>Bufo melanostictus</i>	Common toad	Bufonidae	IV	LC
2	<i>Bungarus caeruleus</i>	Krait	Elapidae	IV	NE

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3	<i>Calotes versicolor</i>	Garden lizard	Agamidae	IV	NE
4	<i>Crotolus</i> sp.	Pit viper	Viperidae	II	LC
5	<i>Enhydris enhydris</i>	Smooth water snake	Homalopsidae	IV	LC
6	<i>Euphlyctis hexadactyla</i>	Common frog	Dicroglossidae	IV	LC
7	<i>Hemidactylus flaviviridis</i>	House Gecko	Gekkonidae	--	NE
8	<i>Naja naja</i>	Cobra	Elapidae	II	LC
9	<i>Ophiophagus hannah</i>	King cobra	Elapidae	II	LC
10	<i>Ptyas mucosa</i>	Rat Snake	Colubridae	II	NE
11	<i>Rana temporaria</i>	Common frog	Ranidae	IV	LC
12	<i>Varanus</i> sp.	Monitor lizard	Varanidae	II	LC

**IUCN Status =LC:** Least Concern, **VU:** Vulnerable. **NT:** Near Threatened, **NE:** Not Evaluated,

**Source:** Primary Survey data of P&M solution, Noida and the data supported by Department of Forest, Bhojpur District.

## ii. Avian Fauna

**Table 3.25: Avian Fauna observed from the study area (01 KM Buffer area)**

S.No	Scientific Name	Common Name	Family	Schedule Status (WPA-1972)	IUCN Status
1	<i>Acridotheres tristis</i>	Myna	Sturnidae	IV	LC
2	<i>Acridotheres tristis</i>	Common myna	Sturnidae	IV	LC
3	<i>Alcedo atthis</i>	Small blue kingfisher	Alcedinidae	IV	LC
4	<i>Amandava amandava</i>	Red munia	Estrildidae	IV	LC
5	<i>Ardea cinerea</i>	Grey heron	Ardeidae	IV	LC
6	<i>Ardeola grayii</i>	Indian pond heron	Ardeidae	IV	LC
7	<i>Athene brama</i>	Spotted Owlet	Strigidae	IV	LC
8	<i>Bubulcus ibis</i>	Cattle egret	Ardeidae	IV	LC
9	<i>Centropus sinensis</i>	Crow pheasant	Cuculidae	IV	LC

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10	<i>Ceryle rudis</i>	Pied kingfisher	Alcedinidae	IV	LC
11	<i>Charadrius dubius</i>	Little ringed plover	Charadriidae	IV	LC
12	<i>Ciconia episcopus</i>	White-necked stork	Ciconidae	IV	NT
13	<i>Cinnyris asiaticus</i>	Purple Sunbird	Psittaculidae	IV	LC
14	<i>Columba livia</i>	Pigeon	Columbidae	IV	LC
15	<i>Corvus macrorhynchos</i>	Jungle crow	Corvidae	IV	LC
16	<i>Corvus splendens</i>	Crow	Corvidae	V	LC
17	<i>Dicrurus adsimilis</i>	Black drongo	Dicruridae	IV	LC
18	<i>Egretta alba</i>	Larger egret	Ardeidae	IV	LC
19	<i>Egretta garzetta</i>	Little egret	Ardeidae	IV	LC
20	<i>Francolinus pondicerianus</i>	Titar	Phasianidae	IV	LC
21	<i>Gallinule chloropus</i>	Common moorhen	Rallidae	IV	LC
22	<i>Gallus gallus</i>	Jungle hen	Phasianidae	IV	LC
23	<i>Halcyon smymensis</i>	White-throated kingfisher	Alcedinidae	IV	LC
24	<i>Milvus migrans</i>	Black Kite	Accipitridae	IV	LC
25	<i>Passer domesticus</i>	House sparrow	Passeridae	IV	LC
26	<i>Phalacrocorax carbo</i>	Great cormorant	Phalacrocoracidae	IV	LC
27	<i>Phalacrocorax niger</i>	Little cormorant	Phalacrocoracidae	IV	LC
28	<i>Pluvialis fulva</i>	Pacific golden plover	Charadriidae	IV	LC
29	<i>Pseudibis papillosa</i>	Red-naped ibis	Threskiornithidae	IV	LC
30	<i>Psittacula krameri</i>	Rose ringed Parakeet	Psittacidae	IV	LC
31	<i>Pycnonotus cafer</i>	Red-vented bulbul	Pycnonotidae	IV	LC
32	<i>Saxicoloides fulicatus</i>	Indian robin	Psittaculidae	IV	LC

**IUCN Status =LC:** Least Concern, **VU:** Vulnerable.

**Source:** Primary Survey data of P&M Solution and the data supported by Department of Forest, Son, Bihar.

### iii. Butter Flies

**Table 3.26: Butterflies observed from the Buffer zone of the study area**



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S.No.	Scientific Name	Common Name	Family	IUCN Status
1	<i>Catopsilia pomona</i>	Common emigrant	Pieridae	LC
2	<i>Chlosyne lacinia</i>	Sunflower/Bordered Patch	Nymphalidae	LC
3	<i>Danaus chrysippus</i>	Plain Tiger	Nymphalidae	LC
4	<i>Danaus genutia</i>	Stripped Tiger	Nymphalidae	LC
5	<i>Euploea core</i>	Common crow	Nymphalidae	LC
<b>Source:</b> Primary Survey data of P&M Solution and the data supported by Department of Forest, Son, Bihar.				

### 3.6.12.7 Aquatic Fauna of Buffer zone (Zooplankton/Macro-invertebrates/Fishes/Amphibians /Turtles etc.)

Aquatic fauna is referred to as any form of an animal that has adapted to living in the aquatic environments such as rivers, lakes, ponds, dams, streams, etc.). Son River and its adjoining streams are formed the drainage in the study area. Few other seasonal water bodies like village ponds, streams, and nallas are also present in the study area. In general, faunal account of any water bodies can be divided into following categories, *i.e.*,

- (i) zooplankton,
- (ii) Macro-invertebrates/Insects/Benthos
- (iii) Fishes
- (iv) Amphibians/ Reptiles/ etc.

Details of Zooplankton; Macro-invertebrates/insects/benthos; Amphibians/Reptiles and Fishes recorded from the different water bodies of the study area (Bhojpur district) are given in Tables 3.27 to 3.30.

#### i. Zooplankton

Zooplankton is commonly found in all types of aquatic habitats. These are recognized as secondary producers and considered as one of the best tools for the environmental monitoring program. During the present study period, a total of 49 zooplankton species was recorded and identified comprising of class Protozoa (8 species), Rotifera (20 species), Cladocera (10 species), Copepoda (8 species), and Ostracoda (3 species). The details of the zooplankton diversity of different habitats are given in Table 3.28 and Fig 3.12.

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**Table 3.27: Zooplankton species found in the different water bodies situated in the buffer zone**

S.No.	Name of the Taxa	S-1	S-2	S-3	S-4	S-5	S-6	S-7	S-8	Schedule Status in WPA (1972)	IUCN Status
	<b>Protozoa</b>										
1	<i>Arcella</i> sp.	+	+	+		+	+		+	NA	NA
2	<i>Arcella discoides</i>	+	+	+	+	+	+	+	+	NA	NA
3	<i>Arcella vulgaris</i>	+	+	+	+	+	+	+	+	NA	NA
4	<i>Centropyxis</i> sp.	+	+	+	+	+	+	+		NA	NA
5	<i>Centropyxis ecornis</i>		+			+	+		+	NA	NA
6	<i>Euglypha</i> sp.	+		+	+	+	+	+	+	NA	NA
7	<i>Metopus</i> sp.		+	+	+		+			NA	NA
8	<i>Opercularia</i> sp.	+	+	+		+			+	NA	NA
	<b>Total</b>	<b>8</b>	<b>9</b>	<b>8</b>	<b>7</b>	<b>8</b>	<b>9</b>	<b>5</b>	<b>8</b>		
	<b>Rotifera</b>										
1	<i>Anuraeopsis</i> sp.	+		+	+	+	+	+	+	NA	NA
2	<i>Anuraeopsis fissa</i>				+	+	+	+	+	NA	NA
3	<i>Asplanchna</i> sp.	+	+	+		+	+	+	+	NA	NA
4	<i>Asplanchna brightwelli</i>		+		+	+	+	+	+	NA	NA
5	<i>Brachionus</i> sp.	+		+	+	+	+	+		NA	NA
6	<i>Brachionus angularis</i>		+						+	NA	NA
7	<i>Brachionus calyciflorus</i>	+	+	+	+		+	+	+	NA	NA
8	<i>Brachionus quadridentata</i>		+	+	+		+	+		NA	NA
9	<i>Brachionus falcatus</i>	+			+	+	+	+		NA	NA
10	<i>Brachionus forficula</i>	+		+		+	+		+	NA	NA
11	<i>Cephalodella gibba</i>	+	+		+	+	+	+		NA	NA
12	<i>Filinia</i> sp.	+					+	+	+	NA	NA
13	<i>Filinia longiseta</i>		+	+		+		+	+	NA	NA
14	<i>Keratella</i> sp.	+		+		+			+	NA	NA
15	<i>Keratella Cochlearis</i>	+	+	+	+	+	+	+	+	NA	NA



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16	<i>Monostyla quadridentatus</i>		+	+						NA	NA
17	<i>Mytilina</i> sp.	+			+	+	+	+	+	NA	NA
18	<i>Polyarthra vulgaris</i>	+		+		+			+	NA	NA
19	<i>Testudinella patina</i>		+		+		+	+		NA	NA
20	<i>Trichocerca</i> sp.	+		+		+	+		+	NA	NA
	<b>Total</b>	<b>15</b>	<b>11</b>	<b>13</b>	<b>13</b>	<b>15</b>	<b>18</b>	<b>16</b>	<b>16</b>		
	<b>Cladocera</b>										
1	<i>Alona</i> sp.	+	+	+	+	+	+	+	+	NA	NA
2	<i>Alona intermediate</i>		+		+		+	+		NA	NA
3	<i>Bosmina</i> sp.	+		+	+	+	+	+	+	NA	NA
4	<i>Bosmina longirostris</i>	+		+			+	+		NA	NA
5	<i>Ceriodaphnia</i> sp.		+	+		+	+		+	NA	NA
6	<i>Chydorus sphaericus</i>	+	+		+		+	+		NA	NA
7	<i>Daphnia</i> sp.	+		+	+		+	+		NA	NA
8	<i>Leydgia</i> sp.		+	+		+	+		+	NA	NA
9	<i>Moina daphnia</i>	+			+		+	+	+	NA	NA
10	<i>Simocephalus</i> sp.	+	+	+		+			+	NA	NA
	<b>Total</b>	<b>9</b>	<b>7</b>	<b>8</b>	<b>7</b>	<b>6</b>	<b>11</b>	<b>8</b>	<b>7</b>		
	<b>Copepoda</b>										
1	<i>Cyclops</i> sp.	+	+	+	+	+	+	+	+	NA	NA
2	<i>Diaptomus</i> sp.	+	+	+	+	+	+		+	NA	NA
3	<i>Eucyclops</i> sp.	+	+	+			+	+	+	NA	NA
4	<i>Heleodiptomus viduus</i>	+	+			+	+			NA	NA
5	<i>Mesocyclops</i> sp.	+	+		+		+	+	+	NA	NA
6	<i>Nauplius larvae</i>	+	+	+	+	+	+	+	+	NA	NA
7	<i>Neodiptomus</i> sp.		+		+		+		+	NA	NA
8	<i>Nitzii amphibia</i>	+	+	+	+	+	+	+		NA	NA
	<b>Total</b>	<b>10</b>	<b>10</b>	<b>8</b>	<b>9</b>	<b>7</b>	<b>11</b>	<b>7</b>	<b>9</b>		
	<b>Ostracoda</b>										
1	<i>Cyprinotus</i> sp.	+		+	+	+	+	+	+	NA	NA
2	<i>Cypris</i> sp.	+	+	+	+		+	+	+	NA	NA
3	<i>Stenocypris malcolmsoni</i>	+	+	+	+	+	+		+	NA	NA

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	<b>Total</b>	<b>4</b>	<b>3</b>	<b>4</b>	<b>4</b>	<b>3</b>	<b>4</b>	<b>3</b>	<b>4</b>		
<b>Source:</b> Primary Survey data of P&M Solution, Noida.											

## ii. Macro-invertebrates (Insects/Benthos)

Macro-invertebrates are commonly found in all types of aquatic habitats such as streams, rivers, wetlands, lakes, and ponds. The term macro-invertebrate is used for those animals that have no backbone and can be seen with the naked eye. These animals generally include insects, crustaceans, mollusks, and annelids. They are significant within the food chain as larger animals such as fish and birds rely on them as a food source. None of the macro-invertebrate species have been observed under the of Rare, Endangered, and threatened category. Various macro-invertebrate species were collected and identified from the present study area and listed in Table 3.28.

**Table 3.28: Macro-invertebrates recorded from the Core and Buffer zone**

	<b>Insecta</b>										
1	<i>Baetis nymph</i>		+	+	+	+	+	+	+	NA	NE
2	<i>Caenid mayfly</i>	+			+		+			NA	NE
3	<i>Chironomus plumosus</i>	+	+	+	+	+	+	+	+	NA	NE
4	<i>Chironomus sp.</i>	+	+	+	+	+	+	+	+	NA	NE
5	<i>Damsel flies nymphs</i>	+			+		+			NA	NE
6	<i>Hirudinaria sp.</i>	+	+	+			+	+	+	NA	NE
7	<i>Limnodrilus hoffmeisteri</i>	+					+			NA	NE
8	<i>Mayflies nymphs</i>		+		+		+	+	+	NA	NE
9	<i>Mosquitos larvae</i>	+	+	+	+	+	+	+	+	NA	NE
10	<i>Ranatra elongata</i>	+	+			+	+	+	+	NA	NE
	<b>Total</b>	<b>12</b>	<b>10</b>	<b>10</b>	<b>11</b>	<b>9</b>	<b>16</b>	<b>11</b>	<b>11</b>		
	<b>Mollusca</b>										
1	<i>Bellamya bengalensis</i>	+		+	+	+	+	+	+	NA	NE
2	<i>Corbicula fluminalis</i>		+	+	+	+	+	+	+	NA	NE
3	<i>Corbicula sp.</i>	+	+	+	+	+	+			NA	NE
4	<i>Gyraulus convexus</i>	+		+			+	+	+	NA	NE
5	<i>Gyraulus sp.</i>	+	+		+	+	+		+	NA	NE
6	<i>Lymnaea acuminata</i>	+		+		+		+	+	NA	NE

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7	<i>Lymnaea sp.</i>	+	+	+	+	+	+	+	+	NA	NE
8	<i>Melanoides lineatus</i>		+	+			+		+	NA	NE
9	<i>Pila globosa</i> (apple snail)		+		+		+		+	NA	NE
10	<i>Unio tigridis</i>			+	+		+	+	+	NA	NE
	<b>Total</b>	<b>9</b>	<b>8</b>	<b>12</b>	<b>10</b>	<b>8</b>	<b>13</b>	<b>9</b>	<b>11</b>		
	<b>Source:</b> Primary Survey data of P&M Solution, Noida.										

### iii. Amphibians

Amphibians and reptiles are commonly found at places along the margin of aquatic and terrestrial systems. The presence of water bodies like rivers, streams, etc. in the study area are providing shelter to many amphibian species. Some of the commonly reported amphibian species in the present study areas are given in Table 3.29. None of the Amphibians and Reptiles have been observed under the Rare, Endangered, and threatened category. Also, none of them are under the Schedule-I category as per Wildlife Protection Act, 1972.

**Table 3.29: Amphibians and Reptiles recorded from the Core and Buffer zone**

S. No	English Name	Scientific Name	S-1	S-2	S-3	S-4	S-5	S-6	S-7	S-8	Schedule Status (WPA,1972)	IUCN Status
1	<i>Bufo melanostictus</i>	Common toad	+	+	+	+	+	+	+	+	IV	LC
2	<i>Bungarus caeruleus</i>	Common Krait	+	+	+	+	+	+	+	+	IV	LC
3	<i>Bungarus fasciatus</i>	Banded Krait	+	+	+	+	+	+	+	+	IV	LC
4	<i>Euphlyctis cyanophlyctis</i>	Indian skipper frog	+	+	+	+	+	+	+	+	IV	LC
5	<i>Hoplobatrachus tigerinus</i>	(Indian bullfrog).	+	+	+	+	+	+	+	+	IV	LC
6	<i>Chamelion calcarata</i>	Chameleon	+	+	+	+	+	+	+	+	II	LC
7	<i>Naja naja</i>	Indian Cobra	+	+	+	+	+	+	+	+	II	LC

**Note:** DD=Data Deficient, LC=Least Concern, NE=Not Evaluated.

**Source:** Primary Survey data of P&M Solution, Noida and Data supported by data of Department of Forest, Bhojpur District, Bihar.

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### (iii) Fishes

The study area of the present Project development project has several lentic and lotic water bodies in which few are perennial and most of the water bodies are seasonal or monsoon fed. Jammuaririver is a major lotic system in the study area. Some private ponds are also present in the study area which are mainly used for the culture of fishes. All these water bodies support fish species. Fishes found in the study area are listed in Table 3.30 and their site wise species variation is shown.

**Table 3.30: Fish Fauna found in different seasonal and perennial water bodies in the study area**

S.No.	Name of the Taxa	Family Name	S-1	S-2	S-3	S-4	S-5	S-6	S-7	S-8	IUCN Status	Schedule Status in WPA (1972)
1	<i>Catla catla</i>	Cyprinidae	+	+	+	+		+		+	VU	NA
2	<i>Channa stiatatus</i>	Chandadae					+	+	+		LC	NA
3	<i>Channa punctatus</i>	Chandadae			+	+	+		+	+	LC	NA
4	<i>Labeo bata</i>	Cyprinidae		+		+				+	LC	NA
5	<i>Labeo rohita</i>	Cyprinidae	+		+	+		+			LC	NA
6	<i>Macrobrachium malcomsoni</i>	Palaemonidae	+		+	+	+	+	+	+	LC	NA
7	<i>Mystus bleekeri</i>	Bagridae		+			+	+			LC	NA
8	<i>Mystus tengara</i>	Bagridae	+	+	+	+	+	+	+	+	LC	NA
9	<i>Puntius sarana</i>	Cyprinidae			+			+	+	+	LC	NA
10	<i>Puntius sophore</i>	Cyprinidae	+	+	+		+			+	LC	NA
11	<i>Puntius stigma</i>	Cyprinidae			+	+		+			LC	NA
12	<i>Puntius ticto</i>	Cyprinidae		+	+	+			+	+	LC	NA
	<b>Total</b>		7	7	10	9	7	10	6	9		

**Note:** VU= Vulnerable, LC= Least Concern and NA= Not Application.

**Source:** Primary Survey data of P&M Solution, Noida and data supported by Department of Fisheries, Bhojpur District, Bihar.

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### **3.6.13 Observations of Present Study (Flora & Fauna)**

#### **3.6.13.1 Flora**

Most of the parts of the present study area (Bhojpur district) are agricultural fields, villageland. The forest of the district comprises tropical deciduous vegetation due to high temperature and humidity. No any rare, endangered and threatened floral species have been observed from the core and buffer zone of the present study.

#### **3.6.13.2 Fauna**

There are no National parks, Sanctuaries, Biosphere Reserves, Wildlife corridors, Tiger/Elephant reserves (existing as well as proposed), within 1 km buffer area as well as 5 km of the project area. No any endangered and threatened faunal species were observed from the core and buffer zone of the present study area. On the other hand, there is no any Schedule-I fauna was recorded as per the Wildlife (Protection) Act, 1972. However, care will be taken during the developmental activities if found any.

### **3.7 Socio-Economic Environment**

#### **Demography & Socio-Economic Features**

##### **Introduction**

The proposed sand mine project is situated at mauja– Khandol, Anchal- Sandesh, Dist - Bhojpur (Bihar) over an area of 79.0 hectares. The state government has given consent for Sand mining to M/s Tirupati Petro Mart, Prop- Rita Devi, Add.- Mahthu Jamhor, Aurangabad, Dist. - Aurangabad, Bihar, Pin - 82412. This project falls under Category-“B1” as per EIA Notification 2006 (amended till date) of the Ministry of Environment and Forests & Climate Change, New Delhi.

##### **Demography**

Demography is one of the important indicators of environmental health of an area. It includes population, sex ratio, number of households, literacy, population density, etc. In order to assess the Demographic & Socio-economic features of the area, Census data 2011, for 2 main districts i.e. Bhojpur and Patna in Bihar state was compiled and placed in the form of tabulation and graphical representation.

##### **Demography of the Bhojpur District**

As per the census records 2011, Bhojpur district has a population of 27, 28,407 persons followed by 14, 30,380 males and 12, 98,027 females respectively.

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The decadal variation of the district has been seen at 21.6% during the decade 2001-11. The Urban area of the district has attained a higher decadal variation of 24.8% as compared to that of rural area at 21.1%. The district has a population density of 1,136 inhabitants per square kilometre (2,940/sq. mi). Its population growth rate over the decade 2001-11 was 21.27%.

As per 2011 census sex ratio of the district is 907 females per 1,000 males. The same for rural and urban areas of the district stands at 910 and 892 respectively. The sex ratio of population in the age group 0-6, which works out to 918, is much higher than the sex ratio of the total population (910) in the district of Bhojpur. While the sex ratio of (0-6) population in the rural areas of the district is 920, the sex ratio of (0-6) population for the urban areas is only 904.

### **Mother Tongue**

The population of the Bhojpur district during 2001 was 22, 43,144 persons. As per distribution of different mother tongues (languages mentioned under 8th Schedule of Constitution of India) as returned during the 2001 Census for Bhojpur district, Hindi, the main mother tongue of the district was returned by 96.1% (21,55,948 persons) of the population. The corresponding percentage for the Urdu, the second most prominent language spoken in Bhojpur district, was 3.7% (84,074 persons). Speakers of other Scheduled languages were very thin in number than the two described above.

### **Religion**

The population of the Bhojpur district during 2011 was 2,728,407. Hindus constitute 92.30 percent (2,518,216 persons) of the population in the district followed by Muslims 7.25% (197,819 persons). All other four major religious communities have almost negligible percentages.

### **Methodology**

In order to assess the Demographic & Socio-economic features along with the 10km distance based on field surveys and public consultations undertaken during the baseline field study period and Census records 2011, for the 2main districts named Bhojpur and Patnain Bihar state respectively was compiled and placed in the form of tabulation and graphical representation. Entire study area is observed predominantly rural, no town found in the study area.

### **Purpose of the Study**

**Project: Sand Mining Project (Bhoj Son 18 Sand Ghat) At Riverbed of Son River at Mauja–Khandol, Anchal- Sandesh, District- Bhojpur, Bihar.**

Socio-economic study was conducted to establish the baseline demographic features and impacts due to this ‘SandGhatMining Project’, as operation phase of any project invariably leads to Socio-economic changes. The construction phase of any kind of project could lead to unplanned and haphazard development of slums of various size and description with little or rudimentary.

### **Description of Social Environment**

As per the Census Records 2011, the study area has a total of 141 villages lying mainly under 2 districts namely Bhojpur and Patna in Bihar state. Overall study area villages are falling mainly under 7 tehsils namely Bihta (21 villages), Bikram (35 villages), Dulhin Bazar (16 villages), Paliganj (09 villages) of Patna district and Barhara (01 village), Koilwar (11 villages) and Sandesh (48 villages) of Bhojpur district respectively in Bihar State. No town found in the study area. There are seven (07) villages found as uninhabited villages in the study area.

### **Population Distribution (10 km)**

As per the Census Records 2011, the total population of 10 km radial study zone was recorded as 325661 persons of 141 villages of 2 major districts named Bhojpur and Patna in Bihar state. Male-female wise total population was recorded as 170053 males (52.2%) and 155608 (47.8%) females respectively.

Total number of ‘Households’ was observed as 51469 in the 10 km radius study zone. Scheduled Caste (‘SC’) population was observed as 54689 persons consisting of 28368 males (52.0%) and 26321 females (48.0%) in the 10 km study zone. Scheduled Tribes (‘ST’) population was also observed as 259 persons (0.08%) consisting 121 males (46.7%) and 138 females (53.3%) in the 10 km study zone. The child population (0-6 Age) of the study area is recorded as 55824 (17.1%) and comprising of 28937 (51.8%) males & 26887 (48.2%) females respectively. Village wise details of population distribution are given as follows in **Table 3.31 & 3.32**.

**Table 3.31, Village wise details of population distribution are given as follows in Table**

Name of Village/Town	No of Households	Total Population			Child Population (0-6 Years)		
		Persons	Male	Female	Persons	Male	Female
1. District Patna, Bihar							
Nathupur	197	1247	662	585	217	120	97
Doghra	450	3199	1704	1495	531	263	268
Etwa	228	1381	733	648	250	130	120



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Bindaul	487	3668	1993	1675	587	318	269
Taregna	147	1017	532	485	195	97	98
Mahuar	265	1587	849	738	318	160	158
Pande Chak	98	695	364	331	145	67	78
Kelhanpur	349	2260	1183	1077	473	252	221
Machhalpurlai	650	4167	2163	2004	673	333	340
Rampur Hasan lai	279	1702	906	796	289	151	138
Nagabihta	116	658	337	321	89	46	43
Ramtari	332	2057	1071	986	353	190	163
Mathura Pur	47	372	187	185	63	30	33
Mithapur	113	596	301	295	61	38	23
Akhtiarpur	263	1511	732	779	262	132	130
Babhan lai	562	3627	1870	1757	558	290	268
Ghoratap	272	1920	1009	911	332	183	149
Dihri	252	1567	797	770	270	140	130
Dalelganj	130	732	396	336	157	86	71
Sikaria	292	1798	957	841	300	159	141
Tara Nagar	225	1311	701	610	250	143	107
Pakrandha	385	2040	1093	947	311	162	149
Patut	1415	9111	4787	4324	1558	783	775
Barah	1104	7364	3917	3447	1188	601	587
Katari	327	2032	1046	986	355	170	185
Birdhaur	575	3702	1978	1724	510	272	238
Berar	541	3052	1562	1490	455	231	224
Janpara	302	1765	946	819	306	153	153
Lahladpur	284	2047	1086	961	322	172	150
Dullahpur	112	836	423	413	83	46	37
Donrapur	205	1251	643	608	182	89	93
Wazirpur	1131	6929	3640	3289	1203	640	563
Raghunathpur	474	3026	1593	1433	482	256	226
Kanpa	480	3194	1713	1481	560	297	263
Saidabad	556	3730	1933	1797	564	288	276
Anharipur	77	568	302	266	97	52	45
Gona	516	3500	1816	1684	545	292	253
Habaspur	509	2893	1493	1400	531	269	262
Chandni	51	345	188	157	64	35	29
Barda	203	1517	769	748	284	146	138
Gopalpur	192	1008	540	468	166	95	71
Bara	347	1776	922	854	302	157	145
Beni Bigha	461	2330	1256	1074	363	212	151
Chihunta	393	2146	1120	1026	378	191	187
Shahjahanpur	232	1216	620	596	207	105	102
Baigawan	158	891	451	440	150	78	72
Hathsar	59	461	244	217	30	16	14
Painapur	282	1927	999	928	334	165	169
Chichourha	206	1005	528	477	182	87	95
Jamalpur	373	1983	1012	971	296	170	126
Akhtiarpur	618	3346	1731	1615	594	323	271
Nagahra	616	3926	1995	1931	601	307	294
Faridpur	195	1130	565	565	270	127	143
Baghakol	288	1804	954	850	288	152	136

**Project: Sand Mining Project (Bhoj Son 18 Sand Ghat) At Riverbed of Son River at Mauja–Khandol, Anchal- Sandesh, District- Bhojpur, Bihar.**

Moriawan	415	2835	1473	1362	456	220	236
Shivgarh	328	1819	949	870	275	144	131
Baijalpur	100	778	420	358	138	78	60
Nisarpura	543	3458	1791	1667	629	334	295
Kab	1658	10141	5277	4864	1656	831	825
Dorwan	363	2521	1300	1221	369	190	179
Belhauri	599	3873	1963	1910	638	330	308
Silhouri	640	4051	2091	1960	664	333	331
Khapuri	180	1099	578	521	174	88	86
Ganipur	Uninhabited Village						
Gulal Chak	82	528	285	243	100	59	41
Bhalua	232	1331	696	635	213	116	97
Sadawe	823	4762	2501	2261	798	458	340
Andehri	183	1125	527	598	212	96	116
Baduri	158	895	447	448	146	76	70
Paipura Khurd	183	1088	553	535	205	115	90
Rajipur	765	4509	2315	2194	859	418	441
Saraiya	452	2670	1392	1278	581	310	271
Kalyanpur	517	3450	1866	1584	583	321	262
Jalpura	216	1570	828	742	245	140	105
Masaurha	442	2413	1203	1210	397	207	190
Udaipur	367	2130	1073	1057	391	191	200
Mohabbatpur	110	634	336	298	117	54	63
Hasanpur	62	269	128	141	40	20	20
Dariapur Pem	302	1697	880	817	290	142	148
Paipura Kalan	304	1783	877	906	295	137	158
Ijarta	186	1117	536	581	182	78	104
2. District Bhojpur, Bihar							
Bishambharpur	182	1292	687	605	205	116	89
Khangaon	1784	10711	5617	5094	2097	1083	1014
Guri	130	865	441	424	137	61	76
Manpur	120	822	423	399	136	71	65
Kusihan	155	913	481	432	143	75	68
Lodipur 1	264	1753	889	864	289	146	143
Jalpura	1615	12168	6432	5736	2069	1047	1022
Bhagwatpur	272	1792	947	845	312	166	146
Bishunpur	389	2128	1134	994	348	175	173
Sundra	221	1314	674	640	265	127	138
Jahanpur	308	1934	1013	921	364	187	177
Jogta	899	6378	3273	3105	1247	635	612
Sarimpur Bachri	554	3433	1782	1651	589	309	280
Lodipur 2	29	182	77	105	29	13	16
Narainpur	416	2711	1441	1270	415	215	200
Nansagar	54	328	163	165	58	29	29
Nasratpur	548	3279	1734	1545	511	271	240
Chilhauns	782	5054	2596	2458	1018	520	498
Turkaul	591	3817	2066	1751	663	352	311
Jansara	100	1018	542	476	168	83	85
Ahpura	531	3321	1752	1569	563	300	263
Salempur	139	543	291	252	85	50	35
Sandesh	1037	6874	3573	3301	1219	616	603

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Panpura	54	483	255	228	82	35	47
Kanharpur	209	1319	729	590	182	110	72
Chela	377	2139	1115	1024	365	188	177
Panrepur	97	594	335	259	66	36	30
Basauri	69	484	254	230	74	38	36
Gaighat	Uninhabited Village						
Bhanpura	Uninhabited Village						
Dihra	489	3371	1786	1585	608	317	291
Maniach	419	2578	1347	1231	466	247	219
Bichhiaon	476	2994	1519	1475	540	273	267
Dharampur	318	1942	1015	927	343	168	175
Surungapur	252	1756	900	856	282	140	142
Chauria	Uninhabited Village						
Dalelganj	225	1802	939	863	360	192	168
Parura Rampur	417	2522	1336	1186	537	306	231
Kusra	343	2462	1332	1130	503	263	240
Parura	535	3739	1955	1784	621	332	289
Deoar	255	1809	946	863	402	211	191
Akhgaon	443	3094	1626	1468	515	289	226
Partappur	287	1552	769	783	233	120	113
Kholpur	320	2429	1314	1115	414	207	207
Dehri	280	2183	1118	1065	421	225	196
Bardiha	190	1283	698	585	226	121	105
Jamuaon	694	4261	2297	1964	803	446	357
Udaibhanpur	23	156	86	70	19	11	8
Bara	171	997	514	483	166	92	74
Bartiar	305	1788	942	846	330	184	146
Kosdihra	116	766	394	372	149	74	75
Kori	1067	6821	3434	3387	1208	589	619
Baranhpur	18	84	45	39	12	7	5
Khandaul	846	5179	2686	2493	791	429	362
Phulari	762	5036	2682	2354	762	387	375
Bhatauli	431	2482	1324	1158	345	169	176
Chanchar	Uninhabited Village						
Mahadeopur	Uninhabited Village						
Ahiman Chak	230	1457	736	721	282	131	151
Balra	Uninhabited Village						
<b>TOTAL (10km)</b>	<b>51469</b>	<b>325661</b>	<b>170053</b>	<b>155608</b>	<b>55824</b>	<b>28937</b>	<b>26887</b>
<i>Source-Census of India, 2011</i>							

**Table 3.32: Village-wise SC & ST Population Distribution (10km)**

Name of Village/Town	Total Population	Scheduled Castes			Scheduled Tribes		
		Persons	Males	Females	Persons	Males	Females
1. District Patna, Bihar							
Nathupur	1247	133	63	70	0	0	0
Doghra	3199	336	178	158	0	0	0
Etwa	1381	337	172	165	0	0	0
Bindaul	3668	420	233	187	1	1	0
Taregna	1017	0	0	0	0	0	0

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Mahuar	1587	380	204	176	0	0	0
Pande Chak	695	333	173	160	0	0	0
Kelhanpur	2260	0	0	0	0	0	0
Machhalpurlai	4167	435	216	219	1	0	1
Rampur Hasan lai	1702	283	148	135	0	0	0
Nagabihta	658	82	42	40	0	0	0
Ramtari	2057	878	442	436	1	1	0
Mathura Pur	372	0	0	0	0	0	0
Mithapur	596	0	0	0	0	0	0
Akhtiarapur	1511	350	175	175	0	0	0
Babhan lai	3627	702	378	324	1	1	0
Ghoratap	1920	210	93	117	1	0	1
Dihri	1567	181	94	87	0	0	0
Dalelganj	732	5	3	2	0	0	0
Sikaria	1798	593	324	269	0	0	0
Tara Nagar	1311	444	228	216	0	0	0
Pakrandha	2040	14	7	7	0	0	0
Patut	9111	1563	822	741	1	0	1
Barah	7364	1667	872	795	2	1	1
Katari	2032	371	185	186	0	0	0
Birdhaur	3702	296	161	135	0	0	0
Berar	3052	135	67	68	24	12	12
Janpara	1765	63	34	29	0	0	0
Lahladpur	2047	261	152	109	0	0	0
Dullahpur	836	0	0	0	0	0	0
Donrapur	1251	517	274	243	10	6	4
Wazirpur	6929	2106	1085	1021	3	2	1
Raghunathpur	3026	130	71	59	0	0	0
Kanpa	3194	838	434	404	1	0	1
Saidabad	3730	649	325	324	25	13	12
Anharipur	568	0	0	0	0	0	0
Gona	3500	918	460	458	0	0	0
Habaspur	2893	749	390	359	0	0	0
Chandni	345	0	0	0	0	0	0
Barda	1517	577	283	294	0	0	0
Gopalpur	1008	314	163	151	0	0	0
Bara	1776	319	156	163	1	0	1
Beni Bigha	2330	253	141	112	0	0	0
Chihunta	2146	532	269	263	0	0	0
Shahjahanpur	1216	187	93	94	0	0	0
Baigawan	891	400	209	191	1	0	1
Hathsar	461	0	0	0	0	0	0
Painapur	1927	27	18	9	0	0	0
Chichourha	1005	485	246	239	0	0	0
Jamalpur	1983	442	243	199	0	0	0
Akhtiarapur	3346	1336	699	637	25	10	15
Nagahra	3926	375	210	165	2	0	2
Faridpur	1130	674	336	338	0	0	0
Baghakol	1804	191	101	90	0	0	0
Moriawan	2835	814	412	402	9	5	4
Shivgarh	1819	258	141	117	0	0	0

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Bajjalpur	778	0	0	0	0	0	0
Nisarpura	3458	775	394	381	1	0	1
Kab	10141	2234	1139	1095	2	1	1
Dorwan	2521	166	94	72	0	0	0
Belhauri	3873	175	86	89	0	0	0
Silhour	4051	1073	551	522	4	1	3
Khapuri	1099	302	152	150	0	0	0
Ganipur	Uninhabited Village						
Gulal Chak	528	0	0	0	0	0	0
Bhalua	1331	262	136	126	0	0	0
Sadawe	4762	664	350	314	0	0	0
Andehri	1125	238	103	135	0	0	0
Baduri	895	96	48	48	0	0	0
Paipura Khurd	1088	253	129	124	0	0	0
Rajipur	4509	1281	654	627	0	0	0
Saraiya	2670	984	525	459	0	0	0
Kalyanpur	3450	329	177	152	0	0	0
Jalpura	1570	91	45	46	0	0	0
Masaurha	2413	600	310	290	0	0	0
Udaipur	2130	75	44	31	0	0	0
Mohabbatpur	634	0	0	0	0	0	0
Hasanpur	269	54	23	31	0	0	0
Dariapur Pem	1697	853	438	415	1	0	1
Paipura Kalan	1783	307	151	156	0	0	0
Ijarta	1117	374	160	214	0	0	0
2. District Bhojpur, Bihar							
Bishambharpur	1292	0	0	0	0	0	0
Khangaon	10711	1624	843	781	100	49	51
Guri	865	67	35	32	0	0	0
Manpur	822	45	21	24	0	0	0
Kusihan	913	569	297	272	0	0	0
Lodipur 1	1753	12	10	2	0	0	0
Jalpura	12168	1216	637	579	0	0	0
Bhagwatpur	1792	247	118	129	0	0	0
Bishunpur	2128	435	245	190	0	0	0
Sundra	1314	211	110	101	0	0	0
Jahanpur	1934	0	0	0	0	0	0
Jogta	6378	514	263	251	0	0	0
Sarimpur Bachri	3433	665	347	318	0	0	0
Lodipur 2	182	54	25	29	4	1	3
Narainpur	2711	173	88	85	25	12	13
Nansagar	328	37	18	19	0	0	0
Nasratpur	3279	335	176	159	0	0	0
Chilhauns	5054	946	473	473	0	0	0
Turkaul	3817	335	193	142	0	0	0
Jansara	1018	0	0	0	0	0	0
Ahpura	3321	695	364	331	0	0	0
Salempur	543	293	153	140	0	0	0
Sandesh	6874	1826	929	897	1	0	1
Panpura	483	0	0	0	0	0	0
Kanharpur	1319	96	51	45	0	0	0

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Chela	2139	723	399	324	0	0	0
Panrepur	594	0	0	0	0	0	0
Basauri	484	0	0	0	0	0	0
Gaighat	Uninhabited Village						
Bhanpura	Uninhabited Village						
Dihra	3371	793	431	362	0	0	0
Maniach	2578	686	374	312	0	0	0
Bichhiaon	2994	527	272	255	0	0	0
Dharampur	1942	329	171	158	0	0	0
Surungapur	1756	0	0	0	0	0	0
Chauria	Uninhabited Village						
Dalelganj	1802	180	89	91	0	0	0
Parura Rampur	2522	740	382	358	0	0	0
Kusra	2462	377	205	172	0	0	0
Parura	3739	413	218	195	9	3	6
Deoar	1809	44	24	20	0	0	0
Akhgaon	3094	439	236	203	3	2	1
Partappur	1552	32	17	15	0	0	0
Kholpur	2429	278	157	121	0	0	0
Dehri	2183	91	42	49	0	0	0
Bardiha	1283	78	45	33	0	0	0
Jamuaon	4261	881	477	404	0	0	0
Udaibhanpur	156	0	0	0	0	0	0
Bara	997	0	0	0	0	0	0
Bartiar	1788	402	214	188	0	0	0
Kosdihra	766	0	0	0	0	0	0
Kori	6821	1098	554	544	0	0	0
Baranhpur	84	0	0	0	0	0	0
Khandaul	5179	231	115	116	0	0	0
Phulari	5036	586	297	289	0	0	0
Bhatauli	2482	540	275	265	0	0	0
Chanchar	Uninhabited Village						
Mahadeopur	Uninhabited Village						
Ahiman Chak	1457	77	44	33	0	0	0
Balra	Uninhabited Village						
<b>TOTAL (10km)</b>	<b>325661</b>	<b>54689</b>	<b>28368</b>	<b>26321</b>	<b>259</b>	<b>121</b>	<b>138</b>
<i>Source-Census of India, 2011</i>							

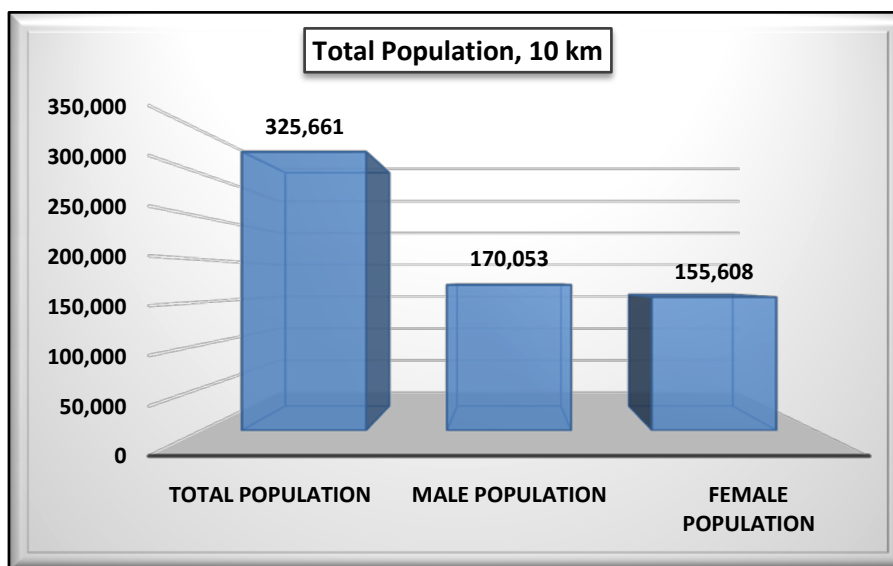
### Sex Ratio

The 'Sex Ratio' of the study area is a numeric relationship between females and males of an area and bears paramount importance in the present day scenario where the un-ethnic pre-determination of sex and killing of female foetus during pregnancy is practiced by unscrupulous medical practitioners against the rule of the law of the country. It is evident that by contrast the practice of female foeticide is not prevalent in the study area.

**Project: Sand Mining Project (Bhoj Son 18 Sand Ghat) At Riverbed of Son River at Mauja–Khandol, Anchal- Sandesh, District- Bhojpur, Bihar.**

The ‘Sex Ratio’ was observed as 907 females per 1000 males in the District. The same was recorded as 915 females for every 1000 males in the study area. The child (0-6 yr age) sex ratio of the study area was observed as 929 female children per 1000 male children.

The village wise male-female population distribution for the study area is depicted and shown by graphical representation in **Table 3.31 & Figure 3.7**



**Figure 3.7 :Male-Female Wise Population Distribution**

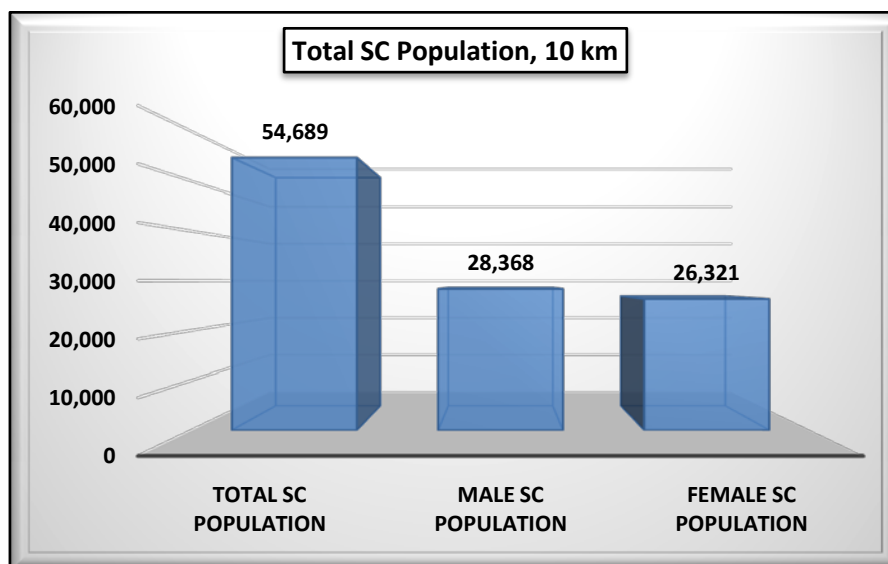
### **Scheduled Caste & Scheduled Tribe Population**

On the basis of the village wise SC & ST population distribution of the study area during 2011, the ‘Scheduled Castes’ population was observed as 54689 persons consisting of 28368 males and 26321 females respectively in the study area which accounts as 16.8% to the total population (325661 persons) of the study area. Scheduled Tribes (‘ST’) population was observed as 259 persons, accounts as 0.08% to the total population of the study zone consisting of 121 males and 138 females in the 10 km radius study zone. It implies that the rest 83.1% of the total population belongs to the general category.

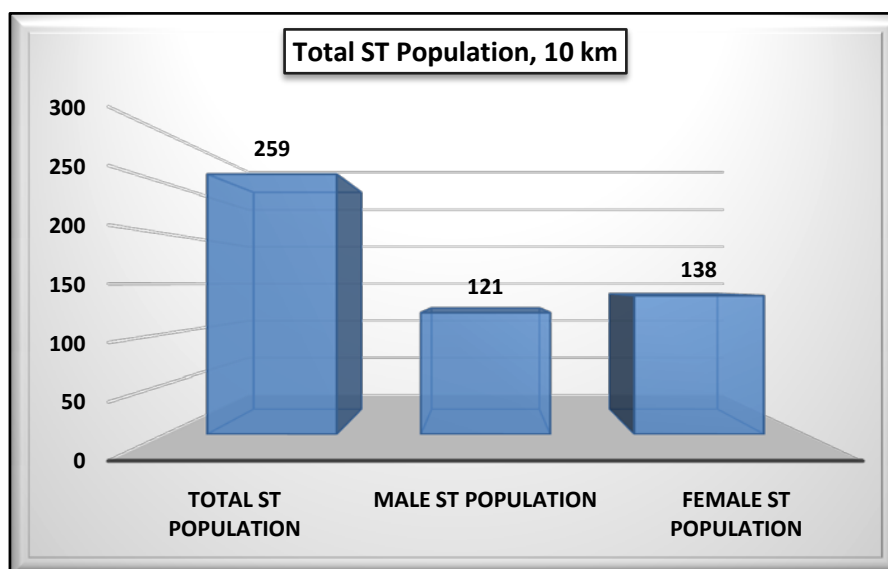
Male-female wise distribution of ‘SC’ & ‘ST’ population in the study area is graphically shown in **Figure 3.8 & 3.9** as follows.



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**Figure 3.8 :Scheduled Caste Population in the Study Area**



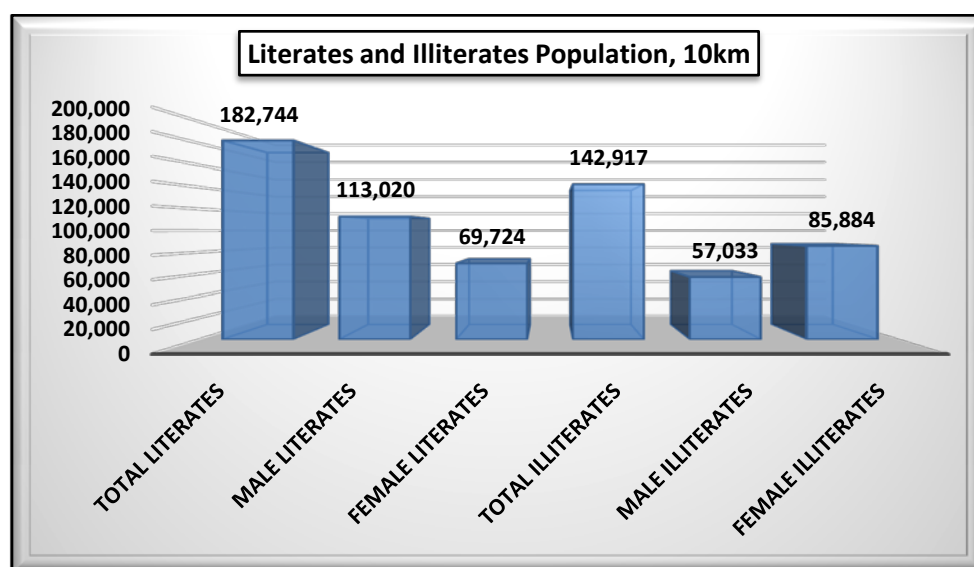
**Figure 3.9: Scheduled Tribes Population in the Study Area**

### Literacy Rate

Literacy level is quantifiable indicator to assess the development status of an area or region. Male-Female wise literates and illiterate's population is represented in **Table 3.33**. Total literate's population was recorded as 182,744 persons (56.0%) in the study area. **Table 3.33** reveals that Male-Female wise literates are observed as 113,020 & 69,724 persons respectively, implies that the 'Literacy Rate' is recorded as 56.0% with male-female wise percentages being 34.7% & 21.4% respectively.

The Male-Female wise graphical representation of literates & illiterate's population in study area villages/town is shown in **Figure 3.10**

**Project: Sand Mining Project (Bhoj Son 18 Sand Ghat) At Riverbed of Son River at Mauja-Khandol, Anchal- Sandesh, District- Bhojpur, Bihar.**



**Figure 3.10 :Male-Female Wise Distribution of Literates & Illiterates**

**Table 3.33 :Male-Female Wise Literates and Illiterates(10km)**

Name of Village/Town	Total Population	Literates			Illiterates		
		Persons	Males	Females	Persons	Males	Females
1. District Patna, Bihar							
Nathupur	1247	803	492	311	444	170	274
Doghra	3199	1631	1078	553	1568	626	942
Etwa	1381	822	506	316	559	227	332
Bindaul	3668	2111	1340	771	1557	653	904
Taregna	1017	413	292	121	604	240	364
Mahuar	1587	800	518	282	787	331	456
Pande Chak	695	320	213	107	375	151	224
Kelhanpur	2260	987	671	316	1273	512	761
Machhalpurlai	4167	2613	1518	1095	1554	645	909
Rampur Hasan lai	1702	961	584	377	741	322	419
Nagabihta	658	437	257	180	221	80	141
Ramtari	2057	1247	750	497	810	321	489
Mathura Pur	372	194	114	80	178	73	105
Mithapur	596	460	251	209	136	50	86
Akhtiarpur	1511	771	447	324	740	285	455
Babhan lai	3627	2005	1212	793	1622	658	964
Ghoratap	1920	1126	693	433	794	316	478
Dihri	1567	967	556	411	600	241	359
Dalelganj	732	376	242	134	356	154	202
Sikaria	1798	973	578	395	825	379	446
Tara Nagar	1311	709	432	277	602	269	333
Pakrandha	2040	1338	813	525	702	280	422
Patut	9111	5178	3134	2044	3933	1653	2280
Barah	7364	4586	2764	1822	2778	1153	1625
Katari	2032	1067	678	389	965	368	597
Birdhaur	3702	2329	1430	899	1373	548	825
Berar	3052	1650	977	673	1402	585	817
Janpara	1765	1004	648	356	761	298	463

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Lahladpur	2047	1241	783	458	806	303	503
Dullahpur	836	657	351	306	179	72	107
Donrapur	1251	721	414	307	530	229	301
Wazirpur	6929	3842	2391	1451	3087	1249	1838
Raghunathpur	3026	1861	1176	685	1165	417	748
Kanpa	3194	1843	1148	695	1351	565	786
Saidabad	3730	2454	1461	993	1276	472	804
Anharipur	568	301	201	100	267	101	166
Gona	3500	2101	1275	826	1399	541	858
Habaspur	2893	1510	950	560	1383	543	840
Chandni	345	177	119	58	168	69	99
Barda	1517	724	437	287	793	332	461
Gopalpur	1008	530	313	217	478	227	251
Bara	1776	982	598	384	794	324	470
Beni Bigha	2330	1482	909	573	848	347	501
Chihunta	2146	1291	773	518	855	347	508
Shahjahanpur	1216	708	427	281	508	193	315
Baigawan	891	524	328	196	367	123	244
Hathsar	461	354	201	153	107	43	64
Painapur	1927	1254	761	493	673	238	435
Chichourha	1005	442	269	173	563	259	304
Jamalpur	1983	1130	685	445	853	327	526
Akhtiarpur	3346	1754	1063	691	1592	668	924
Nagahra	3926	2150	1271	879	1776	724	1052
Faridpur	1130	619	369	250	511	196	315
Baghakol	1804	1119	651	468	685	303	382
Moriawan	2835	1667	1000	667	1168	473	695
Shivgarh	1819	1071	668	403	748	281	467
Baijalpur	778	428	288	140	350	132	218
Nisarpura	3458	1688	1058	630	1770	733	1037
Kab	10141	6091	3611	2480	4050	1666	2384
Dorwan	2521	1417	855	562	1104	445	659
Belhauri	3873	2319	1282	1037	1554	681	873
Silhour	4051	2480	1471	1009	1571	620	951
Khapuri	1099	651	385	266	448	193	255
Ganipur	Uninhabited Village						
Gulal Chak	528	305	205	100	223	80	143
Bhalua	1331	810	476	334	521	220	301
Sadawe	4762	2834	1684	1150	1928	817	1111
Andehri	1125	598	367	231	527	160	367
Baduri	895	500	303	197	395	144	251
Paipura Khurd	1088	637	366	271	451	187	264
Rajipur	4509	2403	1489	914	2106	826	1280
Saraiya	2670	1099	697	402	1571	695	876
Kalyanpur	3450	1731	1136	595	1719	730	989
Jalpura	1570	1085	622	463	485	206	279
Masaurha	2413	1425	831	594	988	372	616
Udaipur	2130	1066	693	373	1064	380	684
Mohabbatpur	634	342	243	99	292	93	199
Hasanpur	269	133	83	50	136	45	91
Dariapur Pem	1697	720	481	239	977	399	578

**Project: Sand Mining Project (Bhoj Son 18 Sand Ghat) At Riverbed of Son River at Mauja–Khandol, Anchal- Sandesh, District- Bhojpur, Bihar.**

Paipura Kalan	1783	1031	620	411	752	257	495
Ijarta	1117	557	320	237	560	216	344
2. District Bhojpur, Bihar							
Bishambharpur	1292	786	451	335	506	236	270
Khangaon	10711	6057	3690	2367	4654	1927	2727
Guri	865	450	297	153	415	144	271
Manpur	822	502	290	212	320	133	187
Kusihan	913	408	243	165	505	238	267
Lodipur 1	1753	1138	651	487	615	238	377
Jalpura	12168	6504	4305	2199	5664	2127	3537
Bhagwatpur	1792	1207	681	526	585	266	319
Bishunpur	2128	1208	749	459	920	385	535
Sundra	1314	712	440	272	602	234	368
Jahanpur	1934	995	640	355	939	373	566
Jogta	6378	3254	2154	1100	3124	1119	2005
Sarimpur Bachri	3433	1924	1157	767	1509	625	884
Lodipur 2	182	110	56	54	72	21	51
Narainpur	2711	1804	1078	726	907	363	544
Nansagar	328	200	121	79	128	42	86
Nasratpur	3279	1719	1072	647	1560	662	898
Chilhauns	5054	2585	1763	822	2469	833	1636
Turkaul	3817	2201	1396	805	1616	670	946
Jansara	1018	511	385	126	507	157	350
Ahpura	3321	2040	1247	793	1281	505	776
Salempur	543	253	154	99	290	137	153
Sandesh	6874	4021	2453	1568	2853	1120	1733
Panpura	483	304	196	108	179	59	120
Kanharpur	1319	866	520	346	453	209	244
Chela	2139	1037	672	365	1102	443	659
Panrepur	594	176	132	44	418	203	215
Basauri	484	316	201	115	168	53	115
Gaighat	Uninhabited Village						
Bhanpura	Uninhabited Village						
Dihra	3371	1951	1253	698	1420	533	887
Maniach	2578	1457	874	583	1121	473	648
Bichhiaon	2994	1562	993	569	1432	526	906
Dharampur	1942	1016	611	405	926	404	522
Surungapur	1756	977	636	341	779	264	515
Chauria	Uninhabited Village						
Dalelganj	1802	953	636	317	849	303	546
Parura Rampur	2522	1266	780	486	1256	556	700
Kusra	2462	968	667	301	1494	665	829
Parura	3739	2052	1251	801	1687	704	983
Deoar	1809	861	569	292	948	377	571
Akhgaon	3094	1834	1099	735	1260	527	733
Partappur	1552	1065	598	467	487	171	316
Kholpur	2429	1237	886	351	1192	428	764
Dehri	2183	1147	766	381	1036	352	684
Bardiha	1283	654	444	210	629	254	375
Jamuaon	4261	2042	1346	696	2219	951	1268
Udaibhanpur	156	57	43	14	99	43	56

**Project: Sand Mining Project (Bhoj Son 18 Sand Ghat) At Riverbed of Son River at Mauja–Khandol, Anchal- Sandesh, District- Bhojpur, Bihar.**

Bara	997	678	393	285	319	121	198
Bartiar	1788	1009	640	369	779	302	477
Kosdihra	766	353	246	107	413	148	265
Kori	6821	3549	2261	1288	3272	1173	2099
Baranhpur	84	59	38	21	25	7	18
Khandaul	5179	2624	1657	967	2555	1029	1526
Phulari	5036	3194	1990	1204	1842	692	1150
Bhatauli	2482	1427	928	499	1055	396	659
Chanchar	Uninhabited Village						
Mahadeopur	Uninhabited Village						
Ahiman Chak	1457	727	475	252	730	261	469
Balra	Uninhabited Village						
<b>TOTAL (10km)</b>	<b>325661</b>	<b>182744</b>	<b>113020</b>	<b>69724</b>	<b>142917</b>	<b>57033</b>	<b>85884</b>
<i>Source-Census of India, 2011</i>							

### **Economic Profile of Bhojpur District:**

Agriculture is the main source of income for majority of people of the district. Rice, Wheat & Gram are the three main crops grown in the district. The other major economic activities of the district are dairy, rice-milling, petty trade, transport, etc. The district is major producer of rice and milk.

Sand is major mineral of Bhojpur district of Bihar. Yellow sand in Sone river and Ganga river are major source of revenue collection in district as well as soil/clay is actively mined for bricks and pottery industry. In the financial year, huge amount of clay was produced for these purposes. It is also used as a decorative material in landscaping. Specific types of sand are used in the manufacture of glass and as a molding material for metal casting. Wide flood plains and high banks are the common features in the course of the Ganga and the Sone along with silt and clay deposits.

In 2006 the Indian government named Bhojpur one of the country's 250 most backward districts (out of a total of 640). It is one of the 38 districts in Bihar currently receiving funds from the Backward Regions Grant Fund Programme (BRGF).

### **Workers Scenario:**

Occupational studied to assess the skills of people in the study area. Occupational pattern helps in identifying major economic activities of the area. In the study area the Main and Marginal Workers population was observed as 72991(22.0%) and 42232(13.0%) to the total population (325661), while the remaining 210438(65.0%) persons were recorded as non-

**Project: Sand Mining Project (Bhoj Son 18 Sand Ghat) At Riverbed of Son River at Mauja–Khandol, Anchal- Sandesh, District- Bhojpur, Bihar.**

workers. Thus it implies that the semi-skilled and non-skilled work-force required in study area for the project is available in aplenty.

The village-wise main and marginal worker's population with further classification as casual, agricultural, households and other workers is shown as follows in **Table 3.34**

**Project: Sand Mining Project (Bhoj Son 18 Sand Ghat) At Riverbed of Son River at Mauja–Khandol, Anchal- Sandesh, District- Bhojpur, Bihar.**

**Table 3.34 :Village-wise Occupational Pattern (10km)**

Name of the Village	MAIN WORK_P	MAIN_CL_ P	MAIN_AL_ P	MAIN_HH_ P	MAIN_OT_ P	MARG WORK_P	MARG_CL_ P	MARG_AL_ P	MARG_HH_ P	MARG_OT_ P
1. District Patna, Bihar										
Nathupur	107	82	5	2	18	193	43	131	3	16
Doghra	450	16	304	73	57	904	49	432	215	208
Etwa	335	183	125	1	26	104	27	74	0	3
Bindaul	868	239	400	18	211	154	12	132	0	10
Taregna	291	10	219	9	53	115	5	15	4	91
Mahuar	251	64	48	97	42	328	64	209	2	53
Pande Chak	155	25	25	0	105	40	10	27	0	3
Kelhanpur	612	88	373	0	151	42	9	27	4	2
Machhalpurlai	674	40	72	29	533	415	20	186	11	198
Rampur Hasan lai	232	28	49	10	145	278	84	60	0	134
Nagabihta	197	63	107	2	25	11	3	3	0	5
Ramtari	398	160	113	12	113	219	11	73	19	116
Mathura Pur	97	17	75	0	5	105	5	99	0	1
Mithapur	110	81	0	0	29	14	3	11	0	0
Akhtiarpur	153	29	49	1	74	283	15	231	4	33
Babhan lai	819	539	168	17	95	656	239	314	35	68
Ghoratap	387	133	128	18	108	141	15	82	25	19
Dihri	161	120	5	0	36	253	79	159	1	14
Dalelganj	148	102	42	0	4	38	3	34	0	1
Sikaria	249	110	74	7	58	364	15	345	0	4
Tara Nagar	291	10	180	31	70	82	0	24	14	44
Pakrandha	139	47	33	41	18	523	31	332	26	134
Patut	2428	533	1224	131	540	979	76	483	79	341
Barah	1567	209	709	73	576	1087	96	780	33	178
Katari	363	158	88	8	109	589	13	425	3	148
Birdhaur	808	115	305	47	341	179	7	84	9	79
Berar	685	262	239	41	143	463	55	155	52	201
Janpara	517	60	241	19	197	414	30	339	2	43



**Project: Sand Mining Project (Bhoj Son 18 Sand Ghat) At Riverbed of Son River at Mauja–Khandol, Anchal- Sandesh, District- Bhojpur, Bihar.**

Lahladpur	432	202	99	5	126	587	105	388	9	85
Dullahpur	329	235	24	17	53	172	9	21	2	140
Donrapur	328	103	195	10	20	158	15	136	1	6
Wazirpur	1657	801	676	50	130	418	219	155	7	37
Raghunathpur	572	247	223	34	68	696	175	317	129	75
Kanpa	767	242	319	45	161	461	26	278	78	79
Saidabad	413	82	203	14	114	702	102	353	51	196
Anharipur	124	2	61	1	60	5	0	1	0	4
Gona	912	194	195	49	474	435	23	235	17	160
Habaspur	709	392	223	16	78	670	230	259	152	29
Chandni	85	37	48	0	0	89	0	83	6	0
Barda	485	122	212	51	100	356	43	164	115	34
Gopalpur	291	158	40	7	86	121	2	107	5	7
Bara	392	148	55	109	80	238	24	171	17	26
Beni Bigha	401	126	167	32	76	519	10	434	48	27
Chihunta	712	385	206	7	114	100	30	47	6	17
Shahjahanpur	371	51	178	26	116	257	15	105	4	133
Baigawan	343	8	148	106	81	127	5	1	89	32
Hathsar	44	4	4	6	30	120	3	37	5	75
Painapur	625	309	127	118	71	144	28	61	3	52
Chichourha	156	0	8	80	68	100	1	37	55	7
Jamalpur	571	77	240	106	148	168	3	67	34	64
Akhtiarpur	455	25	263	46	121	916	54	592	132	138
Nagahra	1324	378	607	198	141	576	31	309	96	140
Faridpur	214	19	176	4	15	197	24	135	20	18
Baghakol	443	228	91	7	117	280	37	213	2	28
Moriawan	512	161	138	64	149	637	32	237	98	270
Shivgarh	228	115	31	7	75	600	55	463	10	72
Baijalpur	392	105	27	146	114	38	2	1	16	19
Nisarpura	1020	357	354	152	157	567	143	389	12	23
Kab	3344	1042	1174	101	1027	865	167	389	74	235
Dorwan	521	82	230	8	201	175	7	98	4	66

**Project: Sand Mining Project (Bhoj Son 18 Sand Ghat) At Riverbed of Son River at Mauja–Khandol, Anchal- Sandesh, District- Bhojpur, Bihar.**

Belhauri	812	166	283	29	334	257	16	108	36	97
Silhour	1048	229	549	24	246	334	36	271	6	21
Khapuri	158	56	28	6	68	163	3	106	29	25
Ganipur	Uninhabited Village									
Gulal Chak	131	3	122	1	5	18	0	5	0	13
Bhalua	441	116	262	5	58	113	29	53	8	23
Sadawe	1556	445	363	37	711	448	43	187	31	187
Andehri	459	17	309	26	107	76	8	27	4	37
Baduri	227	10	46	0	171	49	14	10	3	22
Paipura Khurd	552	302	204	32	14	77	1	34	26	16
Rajipur	1230	39	287	4	900	387	32	281	9	65
Saraiya	845	385	399	19	42	138	10	87	23	18
Kalyanpur	877	155	665	1	56	318	11	236	1	70
Jalpura	166	89	20	1	56	240	160	42	1	37
Masaurha	404	183	137	22	62	597	98	360	70	69
Udaipur	240	48	64	33	95	542	38	436	39	29
Mohabbatpur	93	80	6	0	7	27	17	9	0	1
Hasanpur	38	17	13	0	8	52	8	41	0	3
Dariapur Pem	354	84	221	12	37	481	35	245	13	188
Paipura Kalan	540	211	298	1	30	10	8	2	0	0
Ijarta	178	35	87	8	48	216	2	207	2	5
2. District Bhojpur, Bihar										
Bishambharpur	278	29	161	70	18	21	10	3	3	5
Khangaon	2534	1112	992	25	405	545	73	340	101	31
Guri	240	79	110	6	45	49	13	19	7	10
Manpur	369	5	110	24	230	17	4	2	0	11
Kusihan	293	38	204	15	36	30	1	22	0	7
Lodipur I	447	100	187	47	113	13	1	10	1	1
Jalpura	2853	1174	840	93	746	1491	102	1156	37	196
Bhagwatpur	708	164	108	1	435	81	5	70	0	6
Bishunpur	574	133	270	8	163	39	3	32	0	4
Sundra	90	0	78	1	11	595	4	587	1	3

**Project: Sand Mining Project (Bhoj Son 18 Sand Ghat) At Riverbed of Son River at Mauja–Khandol, Anchal- Sandesh, District- Bhojpur, Bihar.**

Jahanpur	295	119	158	0	18	605	16	586	1	2
Jogta	1854	940	760	13	141	1067	144	830	22	71
Sarimpur Bachri	708	353	283	5	67	102	16	84	0	2
Lodipur 2	23	6	12	0	5	1	0	1	0	0
Narainpur	633	149	287	34	163	23	2	10	3	8
Nansagar	57	35	21	1	0	0	0	0	0	0
Nasratpur	438	76	281	15	66	359	202	90	33	34
Chilhauns	556	118	184	10	244	660	82	340	8	230
Turkaul	501	120	256	40	85	432	11	334	55	32
Jansara	425	12	385	5	23	105	3	19	2	81
Ahpura	1022	119	699	101	103	111	25	41	16	29
Salempur	16	0	4	0	12	244	43	200	0	1
Sandesh	1591	106	507	344	634	684	42	290	66	286
Panpura	123	1	111	0	11	5	0	4	0	1
Kanharpur	240	68	105	0	67	109	10	72	0	27
Chela	368	186	113	3	66	365	135	212	4	14
Panrepur	138	24	80	17	17	16	6	2	2	6
Basauri	128	95	32	0	1	0	0	0	0	0
Gaighat	Uninhabited Village									
Bhanpura	Uninhabited Village									
Dihra	484	242	83	29	130	469	15	446	0	8
Maniach	188	128	9	1	50	648	37	535	6	70
Bichhiaon	389	178	38	9	164	559	80	341	14	124
Dharampur	161	113	15	7	26	493	24	449	3	17
Surungapur	431	123	273	4	31	465	176	170	1	118
Chauria	Uninhabited Village									
Dalelganj	287	99	131	6	51	163	41	105	3	14
Parura Rampur	336	27	267	10	32	883	10	806	26	41
Kusra	1036	347	565	107	17	113	49	40	15	9
Parura	944	155	497	157	135	579	70	324	34	151
Deoar	245	193	16	1	35	457	8	423	4	22
Akhgaon	527	44	292	26	165	166	12	82	16	56

**Project: Sand Mining Project (Bhoj Son 18 Sand Ghat) At Riverbed of Son River at Mauja–Khandol, Anchal- Sandesh, District- Bhojpur, Bihar.**

Partappur	195	101	23	10	61	265	18	228	0	19
Kholpur	494	155	246	6	87	518	91	313	14	100
Dehri	546	294	28	14	210	205	24	99	6	76
Bardiha	81	46	2	8	25	308	42	70	61	135
Jamuaon	814	161	341	41	271	665	139	393	24	109
Udaibhanpur	24	24	0	0	0	1	1	0	0	0
Bara	329	144	93	54	38	53	0	6	38	9
Bartiar	539	132	163	158	86	211	14	119	23	55
Kosdihra	154	125	8	0	21	38	4	30	1	3
Kori	2100	166	1545	52	337	154	4	131	4	15
Baranhpur	15	8	5	0	2	11	2	9	0	0
Khandaul	783	329	331	7	116	767	26	632	11	98
Phulari	912	150	515	5	242	658	200	294	11	153
Bhatauli	239	39	147	20	33	335	27	276	11	21
Chanchar	Uninhabited Village									
Mahadeopur	Uninhabited Village									
Ahiman Chak	223	37	91	46	49	269	14	208	17	30
Balra	Uninhabited Village									
<b>TOTAL (10km)</b>	<b>72991</b>	<b>21551</b>	<b>29567</b>	<b>4226</b>	<b>17647</b>	<b>42232</b>	<b>5289</b>	<b>26181</b>	<b>2844</b>	<b>7918</b>

*Source-Census of India, 2011*

**ABBREVIATIONS:**

**MAIN WORKERS POPULATION:** **MAIN\_WORK\_P:** Main worker's total population, **MAIN\_CL\_P:** Main cultivated labour population, **MAIN\_AL\_P:** Main agricultural labour population, **MAIN\_HH\_P:** Main workers population involved in household industries, **MAIN\_OT\_P:** Main other worker's population

**MARGINAL WORKERS POPULATION:**

**MARG\_WORK\_P:** Marginal worker's total population, **MARG\_CL\_P:** Marginal cultivated labors total population, **MARG\_AL\_P:** Marginal agricultural labors population, **MARG\_HH\_P:** Marginal workers involved in household industries, **MARG\_OT\_P :** Marginal other workers Population

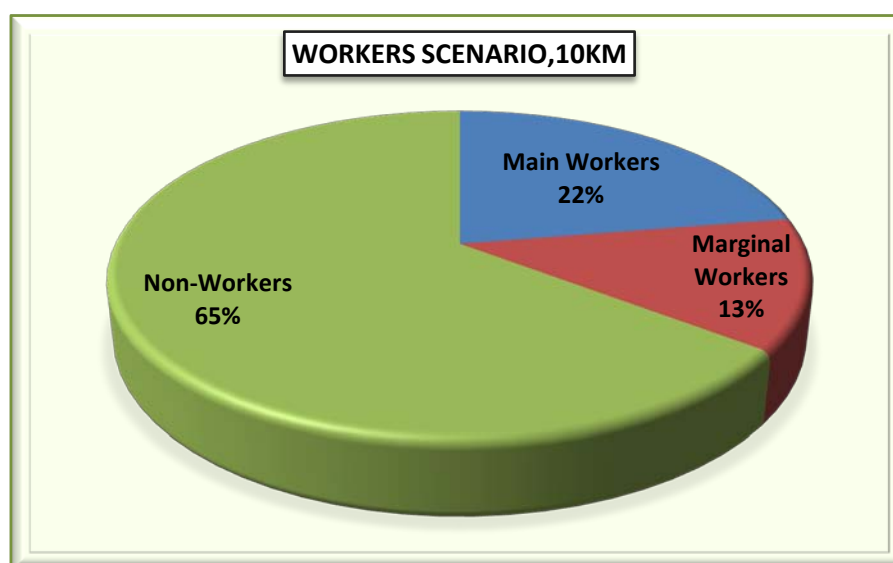
**Project: Sand Mining Project (Bhoj Son 18 Sand Ghat) At Riverbed of Son River at Mauja–Khandol, Anchal- Sandesh, District- Bhojpur, Bihar.**

Distribution of work participation rate of the study area population is shown in **Table 3.35** as follows;

**Table 3.35: Distribution of Work Participation Rate(10km)**

Occupation Class	Year, 2011
<b>Main Workers</b>	<b>72991 (22.0%)</b>
Male	55287(75.7%)
Female	17704(24.3%)
<b>Marginal Workers</b>	<b>42232(13.0%)</b>
Male	24929(59.0%)
Female	17303(41.0%)
<b>Non-Workers</b>	<b>210438(65.0%)</b>
Male	89837 (42.7%)
Female	120601(57.3%)
<b>Total Population (10km)</b>	<b>325661</b>
<i>Source: Census of India Records, 2011</i>	

Graphical representation of Workers Scenario is given below as **Figure 3.11**



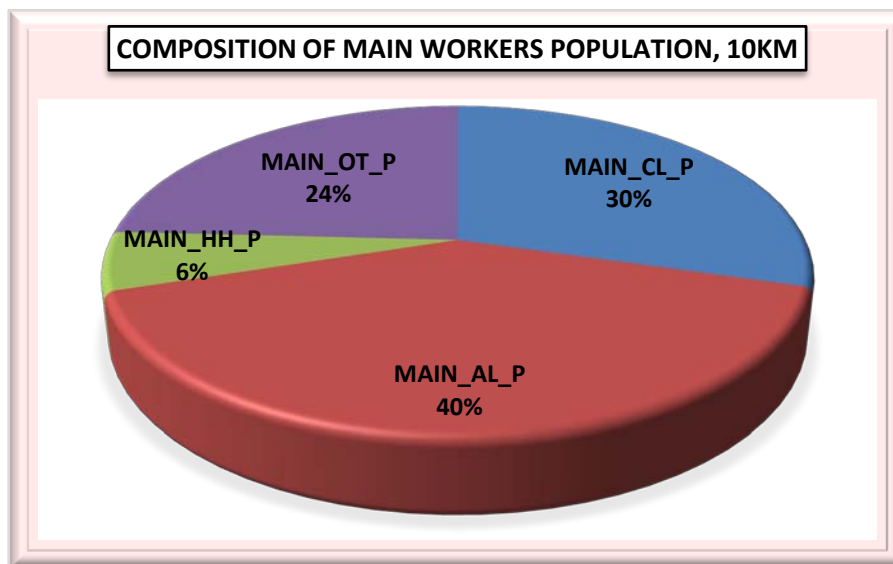
**Figure 3.11 :Workers Scenario of Study Area**

**Composition of Main Workers:**

**Project: Sand Mining Project (Bhoj Son 18 Sand Ghat) At Riverbed of Son River at Mauja–Khandol, Anchal- Sandesh, District- Bhojpur, Bihar.**

The ‘Main Workers’ were observed as 72991 persons (22.0%) to the total population (325661) of the study area and its composition is made-up of Casual laborers as 21551 (30.0%), Agricultural laborers as 29567 (40.0%), Household workers 4226 (6.0%) and other workers as 17647 (24.0%) respectively. Composition of Main workers is shown below as

**Figure 3.12**



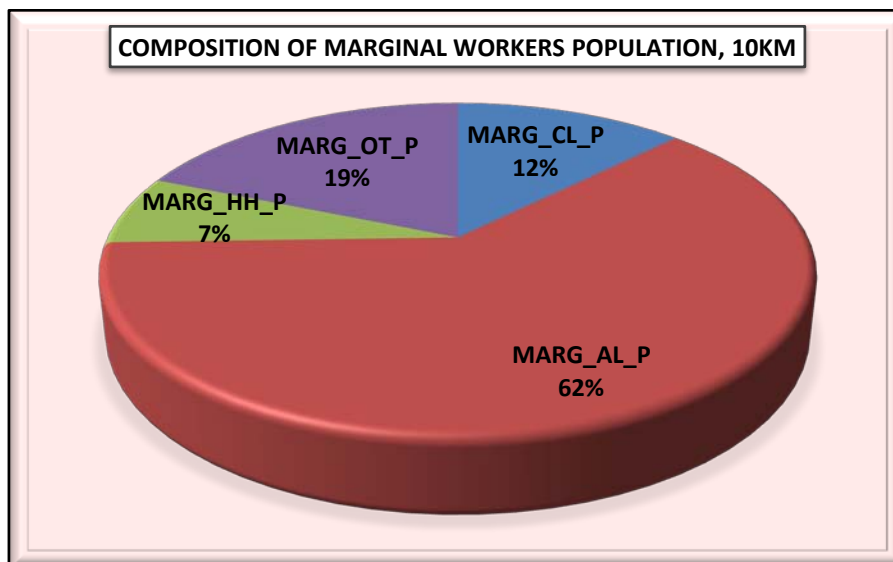
**Figure 3.12: Composition of Main Workers Population**

#### **Composition of Marginal Workers:**

The total marginal workers are observed as 42232 which constitute 13.0% to the total population (325661) comprising of Marginal Casual Laborers as 5289 (12.0%), Marginal Agricultural Laborers as 26181 (62.0%), Marginal Household laborers as 2844 (7.0%) and marginal other workers were also observed as 7918 (19.0%) of the total marginal workers respectively.

Details about marginal workers in the study area are tabulated in Table Composition of Marginal workers is shown in **Figure 3.13** as follows.

**Project: Sand Mining Project (Bhoj Son 18 Sand Ghat) At Riverbed of Son River at Mauja–Khandol, Anchal- Sandesh, District- Bhojpur, Bihar.**



**Figure 3.13: Composition of Marginal Workers**

#### **Composition of Non-Workers:**

The total Non-worker's population was observed as 210438 which accounts 65.0% to the total population (325661) of the study area. Male-female wise Non-worker's population was recorded as 89837 Males (42.7%) and 120601 Females (57.3%) respectively.

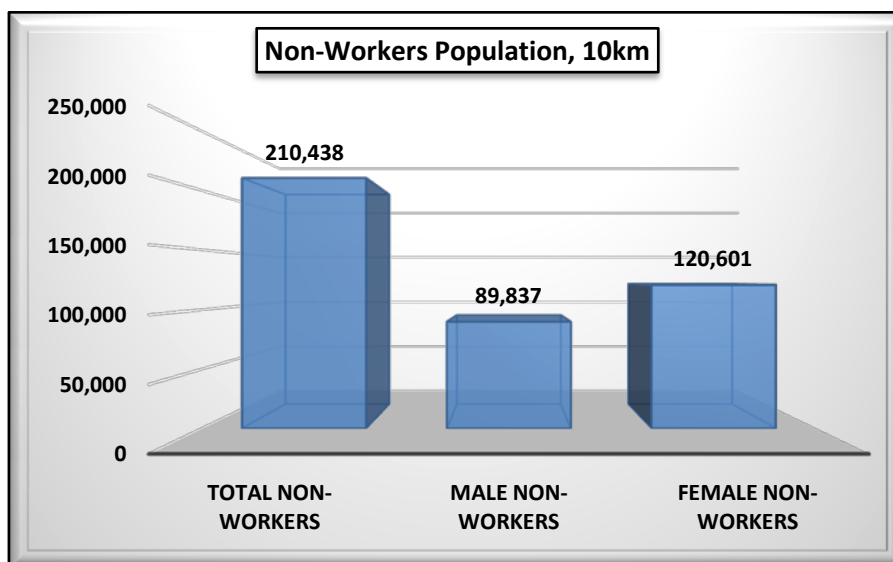
Details about Total Non-workers in the study area are compiled in **Table 3.36**. Graphical representation of Non-worker's population is shown as follows in **Figure 3.14**.

**Table 3.36: Composition of Non-Workers**

Non-Workers Population		
Persons	Males	Females
210438	89837 (42.7%)	120601 (57.3%)



**Project: Sand Mining Project (Bhoj Son 18 Sand Ghat) At Riverbed of Son River at Mauja–Khandol, Anchal- Sandesh, District- Bhojpur, Bihar.**



**Figure 3.14: Composition of Non-Workers**

#### **Basic Infrastructure Facilities Availability (as per the census records of 2011)**

A review of basic infrastructure facilities (Amenities) available in the study area has been done on the basis of the field survey and Census records, 2011 for the study area inhabited villages of 2 major districts i.e. Bhojpur and Patna districts in Bihar state. The study area has average level of basic infrastructure facilities like educational, medical, potable water and power supply and transport & communication network.

As per the Census Records 2011, the study area has a total of 141 villages lying mainly under 2 districts namely Bhojpur and Patna in Bihar state. Overall study area villages are falling mainly under 7 tehsils namely Bihta (21 villages), Bikram (35 villages), Dulhin Bazar (16 villages), Paliganj (09 villages) of Patna district and Barhara (01 village), Koilwar (11 villages) and Sandesh (48 villages) of Bhojpur district respectively in Bihar State. No town found in the study area. There are seven (07) villages found as uninhabited villages in the study area.

#### **Educational Facilities**

There is a total no. of 162 Primary Schools existing in the 10km radius study area. About 129 no of Middle schools are found in the study area. About 107 Higher Secondary School (SS) and 14 Senior Secondary School (SSS) facility is available in the study area. The educational facilities have been further strengthening now and a number of private public schools and colleges are also functioning in the surroundings of the study area. Besides, there are

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Engineering and Medical colleges available in Towns and District headquarters only. Higher education facilities are available in Towns of the district. There is a considerable improvement in educational facility. The villages of the study area have no such facilities can reach within 5 to 10 km range. No town was found in the 10 km radial study area.

### **Availability of University Education in Bhojpur District**

There are several affiliated and constituted colleges of the Veer Kunwar Singh University, Arrah which impart under graduate and post graduate education in the district. IGNOU (Indira Gandhi National Open University) has opened study center H D Jain College in Arrah where one can study many distance courses of under graduate, post graduate and vocational etc.

### **Medical Facilities**

The medical facilities are provided by different agencies like Govt. & Private individuals and voluntary organizations in the study area. As per the census 2011, only 26 primary health centers exist in the study area; most of the study area villages depend upon the towns & district HQ of the study area having such facility. No community health centre exists in the study area. Only forty-two (42) Primary Health Sub-Centers exist in the villages of the study area. Only twenty-six (26) no of Mother & Child Welfare Centers are found in the study area. No allopathic hospital exists in the study area. Only 18 medical dispensaries were found in the study area. Only twenty-six (26) family welfare centers are found in the study area. Overall study area villages are served by average medical facilities. Specialized medical facilities are available only in towns and District Headquarter (HQ) only.

### **Potable Water Facilities**

Potable water facility is available in most of the villages of the study area. The entire study area has average level of potable water facilities. Hand Pump (HP) water facility is commonly observed in the study area as potable water facility. Out of the total 141 villages, 55 villages (39.0%) are served with River/Canal water in the study area. As per the census records 2011, only 6 villages were found being served with Tank/Pond/Lake as potable water facility in the study area.

### **Communication, Road & Transport Facilities**

Apart from Post & Telegraph Office (PTO) services, transport is the main communication linkage in the study area. Compiled census 2011, data shows that the study area has good

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postal facilities in the 10km radius zone. About 51 villages(36.2%) were found serving with Post Office facilities in the study area, remaining villages are depending upon towns of the study area.

The study area has average rail and road network, passes from the area. Only 9 villages were found with railway station facility in the study area. Nearest railway station is Koilwar Railway station in NE direction from the mine lease area site. Nearest town and District headquarter Arrah, in Northwest.

Site is well connected by Nearest State Highway (SH-81) is passing towards North direction from the site. Nearest airport is Jayprakash Narayan International Airport Patna, in Bihar state, situated in Northeast direction from the mine lease area site.

### **Communication**

**Roads** - The district of Bhojpur is well served by a network of roads. Road communication is the main mode of transportation in this district. The roads are classified as the National Highways, State Highways, Major district roads and other district roads. They are maintained by the Public Works Department, the Rural Engineering Organisation, the Zila Parishad and Municipalities. It is also connected with the interior of the district by metalled road. Two National Highway NH-30 and NH-84 pass through the district.

The district has been fairly rich in road communication for a long time. Francis Buchanan has mentioned in 'Shahabad Journal' that there are some very good roads in the district. He traveled "by a very good road with brick bridges from Koilwar to Ara" he also mentions a few other good roads viz., "The great road of Buxar, the Banaras road, road to Sasaram and the great road of Dumraon. Patna-Ara-Buxar road, Bihia-Piro road, Sasaram-Bikramganj-Ara road are also worth mentioning.

**Railways** - The district of Bhojpur has a railway communication system. It is served by East Central Railway. Ara, the District Headquarters, is on the main line of Eastern Railway. It enters the district at Koilwar on the East and moves via Buxar to Moghalsarai on the West. Earlier, there was a narrow-gauge rail link from Ara to Sasaram. A new Broad-gauge rail line is being constructed between Ara and Sasaram.

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**Airways** –The district of Bhojpur is not served by any regular air service.

**Boats** – The Ganga is navigable river in whole year round and goods are transported across the river to the Uttar Pradesh in the North through boats also play in the Sone intermittently, through the district has a network of canals.

### **Banking Facility**

The study area has almost all the schedule commercial banks with ATM facility at urban areas and the district HQ.

*Trade and Commerce* - The development of the means of communication has had a great impact on the trade and commerce of the district. The district may now be said to be fairly well- connected by Road and Rail.

Ara town is the hub of commercial activities of the district. In Bhojpur district, trade consists mainly of export of pulses, rice, castor seed, milk products and vegetables and import of cotton textiles, iron and steel products, cement, coal and consumer goods.

### **Power Supply**

It is revealed from the compiled information on amenities availability as per the census record of 2011; most of the villages and towns are with poor electrification for Domestic, Agriculture, and Commercial & for all purposes in the study area. Only 69 villages (49.0%) of the study area are electrified for domestic purpose, only 37 villages (26.2%) were found for agricultural purpose, 25 villages (17.7%) for commercial purpose & for all purposes in the study area. Out of 141 villages in the study area, 71 villages (50.4%) including 07 uninhabited villages (5.0%) are not electrified for any purpose in the study area.

The district receives its entire power supply from Bihar State Electricity Board. All the towns of Bhojpur district have electricity. In the rural areas, the Government is trying to extend electric line to the maximum number of villages by implementing various schemes for rural electrification. There are 3 rural power sub-stations of 33/11 K.V. at Koilwar, Behia and Shahpur in the district Bhojpur. Four other rural Power sub-stations of the same capacity are under construction at Garahani, Piro, Jagdishpur and Saraia. Total numbers of villages electrified in the district are 420.

Village/town wise Basic Infrastructure and Amenities availabilities data for the entire study area is compiled and presented in **Table 3.37** as follows;



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**Project: Sand Mining Project (Bhoj Son 18 Sand Ghat) At Riverbed of Son River at Mauja-Khandol, Anchal- Sandesh, District- Bhojpur, Bihar.**

**Table 3.37: Village wise Basic Amenities Availability**

Name of the Village	Educational				Medical							Drinking Water						C T	Communication & Transport				Approach to the Village				Power Supply				Nearest Town & Distance, km			
	P	M	S S	S S	C H C	P H C	P H S C	M C W C	H	D	F W C	T	W	H P	T W	R	T k		P O	P T O	B S	R S	P R	K R	N W	F P	E D	E Ag.	E C	E A				
1. District Patna, Bihar																																		
Nathupur	1	1	1	1	1	0	0	0	0	0	0	0	2	2	1	1	2	2	2	1	1	1	1	1	1	2	1	1	1	1	1	1	1	Bihata,8km
Doghra	1	1	1	0	0	0	0	0	0	0	0	0	2	2	1	1	1	2	2	1	2	2	2	1	1	2	1	1	1	1	2	2	Bihata,11km	
Etwa	2	1	1	0	0	0	0	0	0	0	0	0	2	2	1	1	2	2	2	1	2	2	2	2	2	2	1	1	1	2	2	Bihata,10km		
Bindaul	1	1	1	0	0	0	0	0	0	0	0	0	2	2	1	1	1	2	2	1	2	2	2	2	1	1	1	1	1	1	1	1	Bihata,10km	
Taregna	1	1	1	0	0	0	0	0	0	0	0	0	2	2	1	2	2	2	2	2	2	2	2	2	2	2	1	1	2	2	2	2	Bihata,11km	
Mahuar	1	1	1	0	0	0	0	0	0	0	0	0	2	2	1	1	1	2	2	2	2	2	1	1	1	1	1	2	2	2	2	2	Bihata,11km	
Pande Chak	1	1	1	0	0	0	0	0	0	0	0	0	2	2	1	1	1	2	2	2	2	2	1	1	2	1	1	2	2	2	2	2	Bihata,11km	
Kelhanpur	1	1	1	0	0	0	0	0	0	0	0	0	2	2	1	1	2	2	2	2	2	2	2	2	2	2	1	1	2	2	2	2	Bihata,11km	
Machhalpurlai	1	1	1	0	0	0	0	0	0	0	0	0	2	2	1	1	2	2	2	1	2	2	2	1	1	2	1	1	2	2	2	2	Bihata,10km	
Rampur Hasan lai	1	1	1	0	0	1	1	1	0	1	1	2	2	1	1	2	2	2	2	2	2	2	1	1	2	1	1	2	2	2	2	2	Bihata,10km	
Nagabihta	1	1	1	1	0	0	0	0	0	0	0	2	2	1	1	2	2	2	1	1	1	1	1	1	2	1	1	1	1	1	1	1	Bihata,20km	
Ramtari	1	1	1	0	0	0	1	0	0	0	0	2	2	1	1	1	2	2	2	2	1	2	1	1	2	1	1	1	1	1	1	1	Bihata,28km	
Mathura Pur	1	1	1	1	0	0	0	0	0	0	0	2	2	1	2	2	2	2	1	1	1	1	1	1	2	1	1	1	1	1	1	1	Bihata,20km	
Mithapur	1	1	1	1	0	0	0	0	0	0	0	2	2	1	1	2	2	2	2	1	1	1	1	1	1	2	1	1	1	1	1	1	Bihata,20km	
Akhtiarpur	1	1	1	1	0	0	0	0	0	0	0	2	2	1	1	2	2	2	1	1	1	1	1	1	1	2	1	1	1	1	1	1	Bihata,20km	
Babhan lai	1	1	1	0	0	0	0	0	0	0	0	2	2	1	1	2	1	2	2	2	2	2	2	2	2	2	1	1	2	2	2	2	Bihata,10km	
Ghoratap	1	1	1	0	0	1	1	1	0	1	1	2	2	1	1	1	2	2	2	2	2	2	1	1	1	1	1	1	2	2	2	2	Bihata,10km	
Dihri	1	1	1	0	0	0	0	0	0	0	0	2	2	1	1	2	2	2	2	2	2	2	1	1	2	1	1	2	2	2	2	2	Bihata,8km	
Dalelganj	1	1	1	0	0	0	0	0	0	0	0	2	2	1	1	2	2	2	2	2	2	2	2	1	2	1	1	2	2	2	2	2	Bihata,8km	
Sikaria	1	1	1	0	0	0	1	0	0	0	0	2	2	1	1	2	2	2	2	2	2	2	1	1	2	1	1	2	2	2	2	2	Bihata,7km	
Tara Nagar	1	1	1	0	0	0	0	0	0	0	0	2	2	1	1	2	2	2	1	2	2	2	2	1	2	1	1	2	2	2	2	2	Bihata,8km	
Pakrandha	1	1	1	0	0	1	1	1	0	1	1	2	2	1	1	2	2	2	2	2	2	1	1	1	2	1	1	1	1	1	1	1	Bihata,8km	
Patut	1	1	1	2	0	0	1	0	0	0	0	2	1	1	1	2	2	2	1	2	2	2	1	1	2	1	1	2	2	2	2	2	Bikram,5km	
Barah	1	1	1	0	0	1	1	1	0	1	1	2	1	1	2	2	2	2	1	2	2	2	1	2	2	1	1	1	1	1	2	2	Bikram,10km	
Katari	2	1	1	0	0	0	0	0	0	0	0	2	2	1	1	2	2	2	2	2	2	2	2	2	2	2	1	2	1	2	2	2	Bikram,10km	
Birdhaur	1	1	1	0	0	1	1	1	0	1	1	2	2	1	1	1	2	2	1	2	2	2	2	2	2	2	1	1	2	2	2	2	Bikram,6km	
Berar	2	2	2	0	0	0	0	0	0	0	0	2	2	1	2	2	2	2	2	2	2	2	1	2	2	1	1	1	1	1	1	1	Bikram,8km	
Janpara	1	1	1	0	0	1	1	1	0	1	1	2	2	1	1	2	2	2	2	2	2	2	1	2	2	1	1	1	1	2	2	2	Bikram,15km	



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**Project: Sand Mining Project (Bhoj Son 18 Sand Ghat) At Riverbed of Son River at Mauja-Khandol, Anchal- Sandesh, District- Bhojpur, Bihar.**

Lahladpur	1	1	1	0	0	0	0	0	0	0	0	0	2	2	1	1	1	2	2	1	2	2	2	2	2	1	2	2	2	2	Bikram,15km	
Dullahpur	1	1	1	0	0	0	0	0	0	0	0	0	2	2	1	2	2	2	2	1	1	2	2	1	1	1	1	2	2	2	Bikram,10km	
Donrapur	1	1	1	0	0	0	0	0	0	0	0	0	2	2	1	1	1	2	2	2	2	2	2	1	1	1	1	1	2	2	Bikram,8km	
Wazirpur	1	1	1	1	0	0	0	0	0	0	0	0	2	2	1	2	1	2	2	1	1	2	2	1	1	2	1	1	2	2	Bikram,5km	
Raghunathpur	3	3	3	0	0	0	0	0	0	0	0	0	2	2	1	2	2	2	2	2	2	1	2	2	2	2	1	2	2	2	Bikram,6km	
Kanpa	1	1	1	0	0	0	1	0	0	0	0	0	2	1	1	2	2	2	2	2	2	1	2	1	2	2	1	2	2	2	Bikram,7km	
Saidabad	2	2	2	0	0	0	0	0	0	0	0	0	2	2	1	1	1	2	2	1	2	1	2	1	1	2	1	2	2	2	Bikram,8km	
Anharipur	1	1	1	0	0	0	0	0	0	0	0	0	2	2	1	2	1	2	2	2	2	2	2	1	2	2	1	1	2	2	Bikram,10km	
Gona	1	1	1	0	0	1	1	1	0	1	1	2	2	1	2	1	2	2	2	2	2	2	2	1	1	2	1	2	2	2	Bikram,10km	
Habaspur	1	1	1	0	0	0	0	0	0	0	0	0	2	2	1	1	1	2	2	1	2	2	2	1	1	1	1	1	2	2	Bikram,7km	
Chandni	1	1	1	0	0	0	0	0	0	0	0	0	2	2	1	2	2	2	2	2	2	1	2	2	2	2	1	2	2	2	Bikram,10km	
Barda	1	1	1	0	0	0	0	0	0	0	0	0	2	1	1	1	1	2	2	2	2	2	2	2	1	2	1	1	1	1	Bikram,7km	
Gopalpur	1	1	1	0	0	1	1	1	0	1	1	2	2	1	1	2	2	2	2	2	2	2	2	2	1	2	1	2	2	2	Bikram,7km	
Bara	1	1	1	0	0	0	0	0	0	0	0	0	2	1	1	1	1	2	2	2	2	2	1	2	2	1	1	1	1	1	Bikram,7km	
Beni Bigha	1	1	1	0	0	0	1	0	0	0	0	0	2	2	1	1	1	2	2	1	2	2	2	1	1	1	1	1	1	2	2	Bikram,8km
Chihunta	1	1	1	0	0	1	1	1	0	1	1	2	2	1	1	1	1	2	2	2	2	2	2	2	1	1	1	2	2	2	Bikram,8km	
Shahjahanpur	1	1	1	0	0	1	1	1	0	1	1	2	2	1	1	1	2	2	2	2	2	2	2	1	1	1	1	1	1	2	2	Bikram,7km
Baigawan	1	1	1	0	0	0	0	0	0	0	0	0	2	2	1	1	1	2	2	2	2	2	2	2	1	1	2	1	2	2	2	Bikram,7km
Hathsar	1	1	1	0	0	1	1	1	0	1	1	2	2	1	1	1	2	2	2	2	2	2	2	2	1	2	1	1	1	1	1	Bikram,7km
Painapur	1	1	1	0	0	0	1	0	0	0	0	0	2	2	1	1	2	2	2	2	2	2	2	1	2	2	2	1	2	2	2	Bikram,3km
Chichourha	1	1	1	0	0	1	1	1	0	1	1	2	2	1	1	1	2	2	1	2	2	2	2	1	1	2	1	2	2	2	2	Bikram,3km
Jamalpur	1	1	1	0	0	1	1	1	0	1	1	2	2	1	1	1	2	2	2	2	2	2	2	2	1	1	2	1	1	2	2	Bikram,3km
Akhtiarpur	1	1	1	0	0	0	0	0	0	0	0	0	2	2	1	1	1	2	2	1	2	2	1	1	1	2	1	2	2	2	2	Bikram,4km
Nagahra	1	1	1	0	0	0	0	0	0	0	0	0	2	2	1	1	1	2	2	2	2	2	2	2	1	1	2	1	1	2	2	Bikram,5km
Faridpur	3	3	3	0	0	0	0	0	0	0	0	0	2	2	1	1	1	2	2	2	1	2	1	2	1	2	2	1	2	2	2	Bikram,5km
Baghakol	1	1	1	0	0	0	0	0	0	0	0	0	2	2	1	1	2	2	2	2	2	2	2	2	1	1	2	1	1	2	2	Bikram,5km
Moriawan	1	1	1	0	0	0	0	0	0	0	0	0	2	2	1	2	2	2	2	2	2	2	2	2	1	1	2	1	1	1	2	Bikram,6km
Shivgarh	1	1	1	0	0	0	0	0	0	0	0	0	2	2	1	2	1	2	2	2	2	2	2	2	1	1	1	1	2	2	2	Bikram,5km
Baijalpur	1	1	1	0	0	0	0	0	0	0	0	0	2	2	1	1	2	2	2	1	2	2	2	2	1	1	2	1	1	1	1	Masurahi,24km
Nisarpura	1	2	2	0	0	0	0	0	0	0	0	0	2	2	1	2	1	2	2	2	2	2	1	2	1	1	2	1	1	1	1	Masurahi,27km
Kab	1	1	1	2	0	1	1	1	0	1	1	2	1	1	1	2	2	2	2	1	1	1	2	1	2	1	1	1	1	1	1	Masurahi,24km
Dorwan	1	1	1	0	0	0	0	0	0	0	0	0	2	2	1	2	1	2	2	2	2	2	2	2	1	1	1	1	1	2	2	Masurahi,21km
Belhauri	3	3	3	0	0	0	0	0	0	0	0	0	2	2	1	2	2	2	2	1	1	1	2	1	1	2	1	1	1	1	1	Masurahi,19km
Silhouari	4	4	4	0	0	0	0	0	0	0	0	0	2	1	1	2	1	2	1	2	2	2	2	2	1	1	2	1	1	1	1	Masurahi,19km
Khapuri	1	1	1	0	0	0	0	0	0	0	0	0	2	2	1	2	1	2	2	2	2	2	2	2	1	1	1	1	1	2	2	Masurahi,22km
Ganipur	Uninhabited Village																													Masurahi,16km		
Gulal Chak	1	1	1	0	0	0	0	0	0	0	0	0	2	2	1	1	1	2	2	2	2	2	2	1	1	1	1	1	2	2	2	Masurahi,20km
Bhalua	1	1	1	0	0	0	0	0	0	0	0	0	2	2	1	2	1	2	2	2	2	2	2	2	1	1	1	1	2	2	2	Masurahi,21km
Sadawe	1	1	1	0	0	0	1	0	0	0	0	0	2	2	1	2	1	2	2	1	2	2	2	2	1	1	1	1	1	2	2	Masurahi,21km
Fatehpur	1	1	1	0	0	0	0	0	0	0	0	0	2	2	1	2	2	2	2	2	2	2	2	2	1	2	1	1	1	1	1	Masurahi,23km



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**Project: Sand Mining Project (Bhoj Son 18 Sand Ghat) At Riverbed of Son River at Mauja–Khandol, Anchal- Sandesh, District- Bhojpur, Bihar.**

Baduri	1	1	1	0	0	0	0	0	0	0	0	2	2	1	1	2	2	2	1	2	2	2	2	1	2	1	1	1	1	1	Masurahi,23km		
Paipura Khurd	2	2	2	0	0	0	0	0	0	0	0	2	2	1	1	1	2	2	2	2	1	2	2	1	1	1	1	1	1	1	1	Masurahi,24km	
Rajipur	1	1	1	1	0	0	0	0	0	0	0	2	2	1	1	2	2	2	1	2	2	2	2	1	1	1	1	1	1	1	1	Masurahi,25km	
Saraiya	1	1	1	0	0	0	0	0	0	0	0	2	2	1	1	2	2	2	2	2	2	2	2	1	1	2	1	1	1	1	1	Masurahi,27km	
Kalyanpur	1	1	1	0	0	0	0	0	0	0	0	2	2	1	2	2	2	2	2	2	2	2	2	1	2	2	1	2	2	2	2	Jehanabad,25km	
Jalpura	1	1	1	0	0	1	1	1	0	1	1	2	2	1	2	1	2	2	2	2	2	2	2	2	1	1	2	1	2	2	2	2	Jehanabad,28km
Masaurha	1	1	1	0	0	0	0	0	0	0	0	2	2	1	2	1	2	2	1	2	2	2	2	1	1	2	1	2	2	2	2	2	Jehanabad,28km
Udaipur	1	1	1	0	0	0	0	0	0	0	0	2	2	1	1	1	2	2	2	2	2	2	2	1	1	2	1	2	2	2	2	2	Jehanabad,30km
Mohabbatpur	1	1	1	0	0	0	0	0	0	0	0	2	2	1	1	2	2	2	2	2	2	2	2	1	1	2	1	2	2	2	2	2	Jehanabad,27km
Hasanpur	0	0	0	0	0	0	0	0	0	0	0	2	2	1	2	1	2	2	2	2	2	2	2	1	2	2	1	1	2	2	2	2	Jehanabad,25km
Dariapur Pem	2	2	2	0	0	0	0	0	0	0	0	2	2	1	2	2	2	2	2	2	2	2	2	1	2	2	1	1	2	2	2	2	Jehanabad,26km
Paipura Kalan	1	1	1	0	0	0	0	0	0	0	0	2	2	1	2	2	2	2	1	2	2	2	2	1	1	1	1	2	2	2	2	2	Jehanabad,25km
Ijarta	1	1	1	0	0	0	0	0	0	0	0	2	2	1	2	2	2	2	2	2	2	2	2	1	2	2	1	2	2	2	2	2	Jehanabad,25km
2. District Bhojpur, Bihar																																	
Bishambharpur	2	1	0	0	0	0	0	0	0	0	0	2	1	1	2	2	2	2	1	2	2	2	1	2	1	1	1	1	1	1	1	Arrah,25km	
Khangaon	7	3	2	1	0	1	1	1	0	0	1	2	2	1	1	2	2	2	1	2	2	2	2	1	1	1	1	1	1	1	1	1	Koilwar,9km
Guri	0	0	0	0	0	0	0	0	0	0	0	2	2	1	2	2	2	2	2	2	1	2	1	1	2	1	2	2	2	2	2	2	Koilwar,14km
Manpur	0	0	0	0	0	0	0	0	0	0	0	2	2	1	2	2	2	2	2	1	1	2	1	2	2	1	2	2	2	2	2	2	Koilwar,14km
Kusihan	1	0	0	0	0	0	1	0	0	0	0	2	2	1	2	2	2	2	2	2	1	2	1	1	2	1	2	2	2	2	2	2	Koilwar,14km
Lodipur 1	1	1	0	0	0	0	0	0	0	0	0	2	2	1	2	2	2	2	2	2	1	2	1	1	1	1	1	1	1	1	1	1	Koilwar,14km
Jalpura	5	2	2	0	0	1	1	1	0	0	1	2	2	1	1	2	2	2	1	2	2	2	1	1	1	1	1	2	2	2	2	2	Koilwar,10km
Bhagwatpur	1	0	0	0	0	0	0	0	0	0	0	2	2	1	2	2	2	2	2	2	1	2	1	1	1	1	1	2	2	2	2	2	Koilwar,14km
Bishunpur	1	1	0	0	0	0	0	0	0	0	0	2	2	1	2	2	2	2	2	2	2	1	2	1	1	1	1	2	2	2	2	2	Koilwar,14km
Sundra	2	0	0	0	0	0	0	0	0	0	0	2	2	1	1	1	2	2	2	2	2	2	1	2	1	1	2	2	2	2	2	2	Koilwar,16km
Jahanpur	2	0	0	0	0	0	0	0	0	0	0	2	2	1	1	1	2	2	2	2	2	2	2	1	1	1	1	2	2	2	2	2	Koilwar,16km
Jogta	3	1	1	1	0	0	1	0	0	0	0	2	2	1	1	1	2	2	2	2	2	2	2	1	1	1	1	2	2	2	2	2	Koilwar,15km
Sarimpur Bachri	1	0	0	0	0	0	0	0	0	0	0	2	2	1	2	1	2	2	2	2	2	1	2	1	1	2	1	2	2	2	2	2	Arrah,30km
Lodipur 2	1	1	0	0	0	0	0	0	0	0	0	2	2	1	2	2	2	2	2	2	2	2	2	1	1	2	1	2	2	2	2	2	Arrah,30km
Narainpur	1	1	0	0	0	1	1	1	0	0	1	2	2	1	2	2	2	2	2	2	2	1	2	1	1	2	1	2	2	2	2	2	Arrah,30km
Nansagar	0	0	0	0	0	1	1	1	0	0	1	2	2	1	2	2	2	2	2	2	2	2	2	1	1	2	1	2	2	2	2	2	Arrah,30km
Nasratpur	1	1	1	0	0	0	0	0	0	0	0	2	2	1	2	2	2	2	1	2	1	2	1	1	2	1	2	2	2	2	2	2	Arrah,26km
Chilhauns	2	1	1	0	0	0	1	0	0	0	0	2	2	1	2	2	2	2	1	2	1	2	1	1	2	1	2	2	2	2	2	2	Arrah,30km
Turkaul	2	0	0	0	0	0	0	0	0	0	0	2	2	1	2	1	2	2	2	2	2	1	2	1	1	2	1	1	2	2	2	2	Arrah,30km
Jansara	1	1	0	0	0	0	0	0	0	0	0	2	2	1	2	2	2	2	2	2	2	1	2	1	1	2	1	2	2	2	2	2	Arrah,30km
Ahpura	1	1	0	0	0	0	0	0	0	0	0	2	2	1	1	2	2	2	2	2	1	1	2	1	1	2	1	1	1	2	2	2	Arrah,30km
Salempur	0	0	0	0	0	0	0	0	0	0	0	2	2	1	1	2	2	2	2	2	2	2	2	1	1	2	1	2	2	2	2	2	Arrah,32km
Sandesh	1	0	1	1	0	1	1	1	0	1	1	2	2	1	2	1	1	2	1	1	1	1	2	1	1	2	1	1	2	2	2	2	Arrah,30km





# CHAPTER-3

# BASELINE DATA DESCRIPTION

**Project: Sand Mining Project (Bhoj Son 18 Sand Ghat) At Riverbed of Son River at Mauja-Khandol, Anchal- Sandesh, District- Bhojpur, Bihar.**

Panpura	0	0	0	0	0	0	0	0	0	0	0	0	2	2	2	1	1	1	2	2	2	2	2	1	1	2	1	2	2	2	Arrah,30km
Kanharpur	1	1	0	0	0	0	0	0	0	0	0	0	2	2	1	2	1	2	2	2	2	2	2	1	2	1	2	2	2	2	Arrah,32km
Chela	1	1	0	0	0	0	0	0	0	0	0	0	2	2	1	2	2	2	2	2	2	2	1	2	1	1	2	1	2	2	Arrah,30km
Panrepur	1	0	0	0	0	0	0	0	0	0	0	0	2	2	1	1	2	2	2	2	2	2	2	2	1	1	2	1	2	2	Arrah,30km
Basauri	0	0	0	0	0	0	0	0	0	0	0	0	2	2	1	1	2	2	2	2	2	2	2	2	2	1	1	2	1	2	Arrah,30km
Gaighat	Uninhabited Village																												Arrah,30km		
Bhanpura	Uninhabited Village																												Arrah,30km		
Dihra	1	1	0	0	0	1	1	1	0	1	1	2	2	1	1	1	2	2	1	1	2	2	1	1	1	1	2	2	2	Arrah,22km	
Maniach	2	2	0	0	0	1	1	1	0	0	1	2	2	1	1	2	2	2	1	2	2	2	2	1	1	1	1	2	2	2	Arrah,22km
Bichhiaon	1	1	0	0	0	1	1	1	0	0	1	2	2	1	2	2	2	2	1	2	2	2	2	1	1	1	1	2	2	2	Arrah,22km
Dharampur	2	1	0	0	0	1	1	1	0	0	1	2	2	1	1	2	2	2	1	2	2	2	2	1	1	1	1	2	2	2	Arrah,22km
Surungapur	1	0	0	0	0	0	0	0	0	0	0	2	2	2	1	2	2	2	2	2	2	2	2	1	1	2	1	2	2	2	Arrah,30km
Chauria	Uninhabited Village																												Arrah,30km		
Dalelganj	1	1	0	0	0	0	0	0	0	0	0	2	2	1	2	1	2	2	2	2	2	2	2	1	1	1	1	2	2	2	Arrah,30km
Parura Rampur	1	1	0	0	0	0	0	0	0	0	0	2	2	1	2	2	2	2	1	1	1	1	1	1	1	1	2	2	2	2	Arrah,25km
Kusra	1	0	1	0	0	0	0	0	0	0	0	2	1	1	1	1	1	2	1	2	2	2	2	1	1	1	1	2	2	2	Arrah,30km
Parura	1	1	0	0	0	0	1	0	0	1	0	2	2	1	2	1	1	2	1	1	1	2	1	1	1	1	1	2	2	2	Arrah,30km
Deoar	1	1	0	0	0	0	1	0	0	0	0	2	2	1	2	1	1	2	1	2	2	2	2	1	1	1	1	2	2	2	Arrah,30km
Akhgaon	1	1	1	0	0	1	1	1	0	0	1	2	2	1	2	2	2	2	1	2	1	2	1	1	2	1	1	2	2	2	Arrah,30km
Partappur	1	1	0	0	0	0	0	0	0	0	0	2	2	1	2	1	2	2	1	2	2	2	2	1	1	2	1	1	2	2	Arrah,30km
Kholpur	1	0	0	0	0	0	1	0	0	0	0	2	2	1	1	2	2	2	1	2	2	2	2	1	1	1	1	2	2	2	Arrah,30km
Dehri	1	1	0	0	0	0	1	0	0	0	0	2	2	1	1	2	2	2	2	2	2	2	2	1	1	1	1	2	2	2	Arrah,30km
Bardiha	1	0	0	0	0	0	0	0	0	0	0	2	2	1	1	2	2	2	2	2	2	2	2	1	1	2	1	2	2	2	Arrah,30km
Jamuaon	2	1	1	0	0	1	1	1	0	0	1	2	2	1	2	2	2	2	1	2	2	2	2	1	1	2	1	2	2	2	Arrah,30km
Udaibhanpur	0	0	0	0	0	0	0	0	0	0	0	2	1	1	2	2	2	2	2	2	2	2	2	1	1	1	1	2	2	2	Arrah,25km
Bara	1	1	0	0	0	0	0	0	0	0	0	2	2	1	1	2	1	2	2	2	2	2	2	1	1	1	1	2	2	2	Arrah,24km
Bartiar	1	1	0	0	0	0	0	0	0	0	0	2	2	1	1	2	2	2	2	2	2	2	2	1	1	1	1	2	2	2	Arrah,24km
Kosdihra	1	0	0	0	0	0	0	0	0	0	0	2	2	1	2	2	2	2	2	2	2	2	2	1	1	1	1	2	2	2	Arrah,30km
Kori	1	1	1	0	0	0	1	0	0	0	0	2	2	1	1	2	2	2	1	1	1	2	1	1	2	1	1	2	2	2	Arrah,30km
Baranhpur	0	0	0	0	0	0	0	0	0	0	0	2	1	1	1	2	2	2	2	2	2	2	2	1	1	2	1	2	2	2	Arrah,28km
Khandaul	1	1	0	0	0	0	0	0	0	0	0	2	2	1	2	1	2	2	2	1	1	2	1	1	2	1	1	1	2	2	Arrah,30km
Phulari	3	1	1	0	0	0	1	0	0	0	0	2	2	1	2	2	2	2	1	2	1	2	1	1	2	1	1	2	2	2	Arrah,30km
Bhatauli	1	1	1	0	0	0	0	0	0	0	0	2	2	2	1	1	1	2	2	1	2	2	2	1	1	2	1	2	2	2	Arrah,20km
Chanchar	Uninhabited Village																												Arrah,30km		
Mahadeopur	Uninhabited Village																												Arrah,30km		
Ahiman Chak	1	0	0	0	0	0	0	0	0	0	0	2	2	1	1	1	2	2	2	2	1	2	1	1	2	1	2	2	2	2	Arrah,30km
Balra	Uninhabited Village																												Arrah,30km		



**Project: Sand Mining Project (Bhoj Son 18 Sand Ghat) At Riverbed of Son River at Mauja-Khandol, Anchal- Sandesh, District- Bhojpur, Bihar.**

<b>TOTAL (10km)</b>	<b>1</b>	<b>1</b>	<b>1</b>			<b>2</b>				<b>1</b>	<b>2</b>	<i>Status for Availability and Non-Availability is shown as A (1) &amp; NA (2) respectively</i>
	<b>6</b>	<b>2</b>	<b>0</b>	<b>1</b>		<b>2</b>						
	<b>2</b>	<b>9</b>	<b>7</b>	<b>4</b>	<b>0</b>	<b>6</b>	<b>42</b>	<b>26</b>	<b>0</b>	<b>8</b>	<b>6</b>	

Source-<http://www.censusindia.gov.in/2011census/dchb/DCHB.html>

**Abbreviations:**

**Educational Facilities:** P-Primary School, M-Middle School, SS-Higher Secondary Schools, SSS-Senior Secondary School

**Medical Facilities:** CHC-Community Health Centre, PHC-Primary Health Centre, PHSC-Primary Health Sub-Centre, MCWC-Maternity and Child Welfare Centre, H-Hospital, D-Dispensary, FWC-Family Welfare Centre

**Drinking Water Facilities:** T-Tap Water, W-Well Water, HP-Hand Pump, TW-Tube Well Water, R-River Water, Tk-Tank Water, O-Other Drinking Water Facility, CT-Community Toilet

**Communication & Transport Facilities:** PO-Post Office, SPO-Sub-Post Office, PTO-Post & Telegraph Office, Tel. -Telephone Connection, Mob. -Mobile Phone Coverage, BS-Bus Services, RS-Railways Services

**Approach to Village:** PR-Paved Roads, KR-Kuchha Road, FP-Foot Path

**Power Supply:** ED-Power Supply for Domestic use, E Ag. -Power Supply for Agricultural use, EC- Power supply for Commercial use, EA-Electricity for All Purposes

**Nearest Town & Distance, km :** a for < 5 Km, b for 5-10 Km and c for 10+ km of nearest place where facility is available is given.

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**Brief Description of Places of Religious, Historical or Archaeological Importance and Tourist interest in Villages and Towns of the District:** *(District level information only)*

Brief description of place of religious, historical or archaeological and tourist interest are as follows;

*Dalaur* - The village is situated 2 kilometres east of Jadishpur and is noted as the site of the final battle between Babu Kuer Singh and the British forces in 1857. Situated 6 kilometres from Kulharia Railway Station in Koilwar block, the village is noted for the large contingent it provides to the Indian army.

*Koilwar* - The recently declared notified area committee, the town lies on the western bank of river Sone about 50 Kms. West of Patna and is the headquarters of the development block-cum-anchal of the same name. It is supposed to have a healthy climate and a sanatorium for T.B. patients has been built at a distance of two kilometers from the main town. There is a long road-cum-rail bridge over the river Sone. The upper part of the bridge serves the railways whereas pedestrians and vehicular traffic use the lower part.

*Kulharia* - The village lying in the Koilwar block is famous because of the Kulharia family whose members have great contributions towards the welfare of the State. One of the biggest college in the State, B.N. College of Patna was founded by Babu Bisheshwar Narain Singh, an ex-Zamindar of Kullharia family. His descendants have the credit of starting various other education institutions.

*Bibiganj* - The 1961 Census Report mentions the village as follows: “The village, situated 6 kilometers west of Arrah on the Arrah-Shahpur Road, has a bridge which is famous as the site of a battle between the Britisher and Babu Kuer Singh in 1857. There is also a forest known as ‘Sarayan’ used as the headquarters of guerilla warfare by Babu Kuer Singh “.

*Sasurhi (Katho)* - The village, which is situated 5 kilometres east of Jagdishpur, has a 300-year-old grave of the Muslim saint, Masar Dewan. It is held as sacred by the Muslims. Tar situated about 10 kms. North-west of Piro the village derives its name from Tadika, a giantess killed by Lord Rama. There is an old tank in the village which is said to be the wrestling ground of Tadika.

*Behea* - A notified town during 80's lies Jagdishpur subdivision. It is on the main line of the East Central Railway. It is well connected by road. Behea was formerly the home of a branch of Harihobans Rajputs. It is believed that the Raja, Bhopat Deo, violated Mahini, a Brahmin

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woman, who thereupon hurt herself to death and in dying imprecated the most fearful curses on the Harihobans Rajputs. After this tragedy the clan left Behea and moved across the Ganges to Ballia. The tomb of Mahini lies under a Pipal tree close to the Railway at Behea and is visited by hundreds of worshippers especially the women.

*Deo* - The village has the remains of a temple of Sun God, believed to have been built by the Sea God in ancient times. The temple was ravaged by Mahmud Ghazni. Indra, Baroon and Kuber are enshrined in it.

*Arrah* - The District Gazetteer of Shahabad (1966) describes the town as follows:

General Gunningham has identified Arrah with the place mentioned by Hiuen-Tsiang as that at which Asoka set up a Stupa to commemorate the conversion by Buddha of the demons of the desert who feasted on the blood and flesh of men. Even to this day, a legend lingers that this part of the country was the home of a powerful demon named Bakra, whose daily food was a human being supplied either by the village of Bakri or by Ghakrapur, as Arrah was then called. During their wanderings, the five Pandavas came to Ghakrapur and were entertained by a Brahman whose turn it was to supply a victim for the demon. Bhim Pandava, on hearing this declared that as he had eaten the Brahman's salt, he would go himself to the demon; and setting forth, he fought and killed him at Bakri, and then brought his body to Ghakrapur. This myth is found in a more complete form in the Mahabharatas and General Gunningham considers that it must have been one of the five honoured legends of antiquity which the Buddhists adopted for the glorification of their great teacher. The village Bakri still exists in the near neighbourhood of Arrah, and though there are no ancient remains at either place, the Brahmanical legend of Bakrasur is, in the opinion of General Gunningham, so clearly identical with that of the man eating demons described by the Chinese pilgrim that he accepts Arrah as the site of the stupa and lion pillar erected by Ashoka “.

#### *Social, Cultural Events*

In the district of Bhojpur, no major social or cultural event has taken place during the decade. However, the district has been famous for fairs and melas held at different places throughout the year.

Fairs and festivals are held regularly in the district. There are some shopkeepers who keep on moving from fair to fair throughout the year. Some of the fairs held in the district are quite old.

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**Rehabilitation & Resettlement (R & R)**

Policy to be adopted (Central/State) in respect of the project affected persons including home or land oustees and landless labour. Hence, any planning with respect to Rehabilitation & Resettlement is not applicable.

#### **4.0 GENERAL**

Identification of all potential environmental impacts due to project is an essential step of Environmental Impact Assessment. In case of mining projects, impacts on biodiversity, air pollution, water pollution, waste management and social issues are significant. Both direct and indirect environmental impacts will be created on various environmental attributes due to proposed mining activity in the surrounding environment, during the operational phase.

The occurrence of sand (minor mineral) deposits, being site specific, their exploitation often does not allow for any choice except adoption of eco-friendly operation. Positive impacts on socio-economic environment are expected due to creation of employment opportunities. Mining activities are normally carried out over a long period which also encourages development in the area such as roads, schools, hospitals etc.

Keeping in mind, the environmental baseline scenario as detailed in Chapter III and the proposed mining activity described in Chapter II, it is attempted to assess the likely impact and its extent on various environmental parameters and likely mitigation measures to be adopted.

The following parameters are of significance in the Environmental Impact Assessment and are being discussed in detail:

1. Land Environment
2. Water Environment
3. Air Environment
4. Noise Environment
5. Biological Environment
6. Socio-Economic Environment
7. Solid Waste
8. Traffic Environment

#### **4.1 LAND ENVIRONMENT**

The proposed extraction of stream bed materials, mining below the existing streambed, and alteration of channel-bed form and shape may lead to several impacts such as erosion of channel bed and banks, increase in channel slope, and change in channel morphology if, the operations are not carried out scientific & systematically.

The mining and allied activities involved due to mining result in creation of temporary haul roads and formation of mined pits, etc. affecting the land use pattern. In this project, silt and clay are also produced as a constituent along with minerals, which are considered to be waste.

##### **Anticipated Impacts:**

- Mining activity will impact river bed topography by formation of excavation voids.
- River bed mining may bring in some change in topography at the nearby area of the mine lease.
- Stacks of solid waste generated from mining activity may hinder the flow of water in monsoon season.

##### **Mitigation measures:**

Adopting suitable, site-specific mitigation measures can reduce the degree of impact of mining on land. Some of the land-related mitigation measures are as follows:

- Excavated pits will get replenished annually in monsoon itself & will be restored to original.
- The mine working will remain confined to allotted river bed only, so it will not disturb any surface area outside the mine lease area which may affect topography or drainage.
- Solid waste will not be stacked on the bank side as it will hinder the flow of water in monsoon season.

#### **4.2 WATER ENVIRONMENT**

##### **Anticipated Impacts:**



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Mining of sand from within or near *river* has an indirect impact on the physico-chemical habitat characteristics during monsoon season. These characteristics include in stream roughness elements, depth, velocity, turbidity, sediment transport and stream discharge.

The detrimental effects, if any, to biota resulting from bed material mining are caused by following:

- Alteration of flow patterns resulting from modification of the *river*
- An excess of suspended sediment during monsoon season.

### **Mitigation measures**

Project activity will be carried out only in the dry part of the Son River. Hence, none of the project activities affect the water environment directly. In the project, it is not proposed to divert or truncate any stream in monsoon season only. No proposal is envisaged for pumping of water either from the *River* (in monsoon) or tapping the ground water.

In the lean months, the proposed mining will not expose the base flow of the *River* and hence, there will not be any adverse impact on surface hydrology.

The deposit will be worked from the top surface up to a maximum depth of 3m below ground level or above the ground water table whichever comes first. Hence mining will not affect the ground water regime as well.

Further mining will be completely stopped during the monsoon seasons to allow the excavated area to regain its natural profile.

## **4.3 AIR ENVIRONMENT**

### **Impact On Air Quality**

The proposed project includes various activities like development of benches, approach roads, haul roads, excavation and transportation of mineral and waste materials. These operations generally result in generation of dust and thereby pose health hazards. However, it is proposed that adequate control measures will be provided at every stage of operation such as, water sprinkling at loading, unloading points and on haul roads before transportation to reduce the

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fugitive dust emissions.

The mining is proposed to be carried out by opencast manual method. The air borne particulate matter (PM10) generated by ore and waste handling operations, transportation and screening of ore is the main respirable air pollutant. The emissions of Sulphur dioxide (SO<sub>2</sub>), Nitrogen Oxides (NO<sub>2</sub>) contributed by vehicles plying on haul roads will be marginal. Prediction of impacts on air environment has been carried out taking into consideration proposed production and net increase in emissions.

#### **4.3.1 Emissions Details**

Loading - unloading and transportation of sand material, wind erosion of the exposed area and movement of light vehicles will be the main polluting source in the proposed mining activities releasing Particulate Matter (PM10) affecting Ambient Air of the area. Emission during, Loading and unloading was calculated by the area sources. Details of emission during loading/unloading and transportation on the haul road, wind erosion of the exposed area and road maintenance were discussed and combined impact was predicted in the worst case scenario under worst meteorological condition given as follows:

Loading and Unloading - US EPA, 2008, revision of emission factor for AP-42 was used to calculate emission of particulate matter released into the atmosphere during loading and unloading separately. Emission during loading was found more than during unloading. Emission of PM10 during loading was calculated and found to be  $1.92 \times 10^{-3}$  g/s/m<sup>2</sup> based on moisture content 10-20% mine. It is assumed that moisture content was 10% and further moisture content will be increased to 10-20% to reduce emission of PM10 during unloading and average wind speed was 0.92 m/s as observed with site data as shown in wind rose and discussion of local meteorology of the area.

Haul Road - US EPA, 2006, revision of emission factor for AP-42 was used to calculate emission of particulate matter released into the atmosphere during transportation of ore and over burden by trucks operated per hour on haul road. Emission of PM10 due to transportation of sand on haul road was  $1.65 \times 10^{-4}$  g/s/m<sup>2</sup> based on assumption that silt content spread on road surface

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was 5%, and efficiency of PM10 emission control 90%. Truck will be fully covered with tarpaulin material and emission of PM10 during on the haul road will be insignificant.

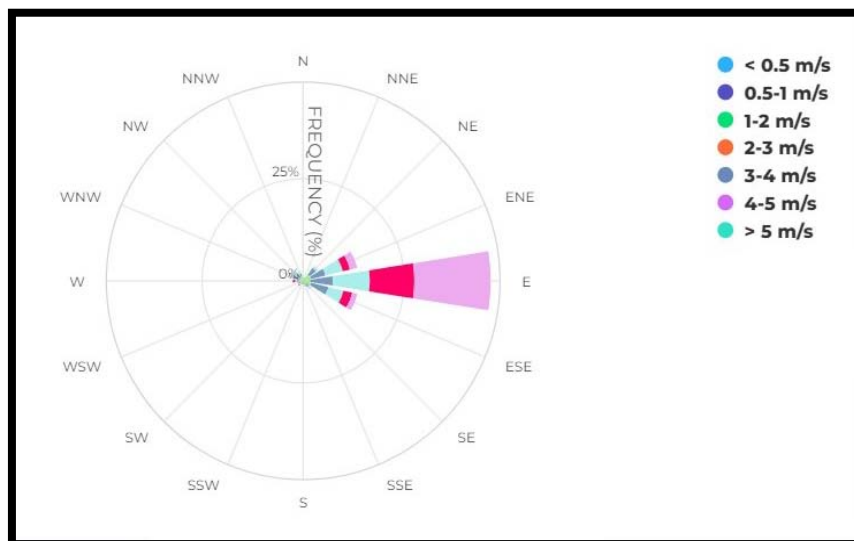
Based on the above consideration that there was low emission of PM10 during transportation of ore and overburden, however during loading & unloading, transportation of ore over the haul road, emission of PM10 of the exposed area due to wind erosion and movement of light vehicles on the road were not considered and combined with mining activities. US EPA based Dispersion ISCST-3 model was used for prediction of impact with 24-h meteorological data of the study period for the assessment of GLC.

#### **4.3.2 Meteorological Data**

The meteorological data recorded at hourly interval during the month of March to May 2023 on wind speed 0.92 m/s, wind direction, dry & wet bulb temperature, humidity, cloud cover and rainfall was processed to extract hourly mean meteorological data as per the guidelines of CPCB/MoEF for prediction of impacts from the area source. Stability was computed by Turner's method and mixing height was obtained from publication of IMD "Atlas of Hourly Mixing Height in India, 2008.

Data recorded from authorized source/Govt. agency were used as meteorological input for Dispersion Model which was stored in the computer for further analysis and interpretation to study the local meteorology of the study area. It was observed that westerly & north westerly was pre-dominant wind during summer as shown in wind rose (Figure 4.1) with low wind speed and 13.6 % calm condition was observed during study period at the site which was very much close and cumbersome with long term meteorological data of IMD. Average wind speed was 0.92m/s. Impact of the pollutants was anticipated in southeast sector under influence of northeasterly & westerly winds. Ambient air quality locations were selected based on the long term wind rose pattern of the area. Air quality sampling locations were finalized to study the baseline status around the proposed site and to study impact at various locations. 24-h maximum impact of PM10 was envisaged in southeast sector at very short distance from the site due to moderate to low wind speed.

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**Figure 4.1: Wind Rose Diagram**

Stable atmospheric condition E & F dominates in early morning and night hours and B, C & D in day hours were observed. Pollutants were dispersed from the proposed source under influence of local meteorology and dispersed on the ground in downwind direction close (~100 m) to the source under influence of moderate to low wind speed. High temperature and low humidity were observed at site with high temperature in day hours and low during night. There was no significant rain fall received and sky was clear of clouds in most of the days.

### 4.3.3 Frame work of Computation & Model details

By using the above-mentioned inputs, ground level concentrations due to the mining activities have been estimated to know the incremental rise in ambient air quality and impact in the study area. The effect of air pollutants upon receptors are influenced by concentration of pollutants and their dispersion in the atmosphere. Air quality modeling is an important tool for prediction, planning and evaluation of air pollution control activities besides identifying the requirements for emission control to meet the regulatory standards and to apply mitigation measures to reduce impact caused by mining activities.

PM10 was the major pollutant occurred during mining activities. Impact of area source emission

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was considered and prediction of impact was made on various monitoring locations in the study area due to i) loading and unloading and iii) transportation of vehicles on the haul road in the mining area. Impact was predicted in the worst case scenario due to combined impact of loading and unloading and emission due to transportation of vehicles on mine on haul road of mining area and other mining activities will occur simultaneously.

Impact was predicted over the distance of 10,000 m and 2,000 m around the source in grids of 200m & 20 m respectively in Cartesian coordinates(X,Y) to assess the impact at each receptor separately at the various locations and maximum incremental GLC value at the project site. Maximum impact of PM10 was observed close to the source due to low to moderate wind speeds. Incremental value of PM10 was superimposed on the base line data monitored at the proposed site to predict total GLC of PM10 due to combined impacts.

**Mitigation measures**

The collection and lifting of minerals will be done by loaders. Therefore, the dust generated is likely to be insignificant as there will be no drilling & blasting. The only air pollution sources are the road transport network of the trucks. The mitigation measures like the following will be resorted:

- ✓ Water sprinkling will be done on the haul roads twice in a day.
- ✓ Deploying PUC certified vehicles to reduce their emissions
- ✓ Proper tuning of vehicles to keep the gas emissions under check
- ✓ Monitoring to ensure compliance with emission limits would be carried out during operation
- ✓ There is no major source of emissions except emission from combustion of fuels from the Transportation Vehicles and Material Handling.
- ✓ Besides this, to control the emissions further regular preventive maintenance of Equipment / Transportation Vehicles will be carried out on contractual basis.
- ✓ It will be ensured that all transportation vehicles carry a valid PUC certificate.
- ✓ Plantation will be carried out along the approach road, river banks & at all strategic places in the vicinity area.

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- ✓ Periodic air quality monitoring will be done to assess the quality and for timely corrective actions.
- ✓ Water sprinkling will be done on the haul roads twice in a day. This will reduce dust emission further.
- ✓ Speed limits will be enforced to reduce airborne fugitive dust from vehicular traffic.
- ✓ Spillage from the trucks will be prevented by covering tarpaulin over the trucks.

#### **4.4 NOISE ENVIRONMENT**

The proposed mining activity is semi-mechanized in nature. No drilling & blasting is envisaged for the mining activity. Hence, the only impact is anticipated is due to movement of vehicles deployed for transportation of minerals.

##### **Anticipated Impacts:**

- Mental disturbance, stress& impaired hearing.
- Decrease in speech reception& communication.
- Distraction and diminished concentration affecting job performance efficiency.

The noise level in the working environment are compared with the standards prescribed by Occupational Safety and Health Administration (OSHA-USA) which has been adopted and enforced by the Govt. of India through model rules framed under Factories Act, 1980 and CPCB 2000 norms. The summary of the permissible exposures in cases of continuous noise as per above rules is given below:

**Table 4.1, Damage risk criteria for hearing loss OSHA regulations**

<b>Maximum allowable duration per day in hour</b>	<b>Sound pressure dB(A)</b>	<b>Remarks</b>
<b>(1)</b>	<b>(2)</b>	<b>(3)</b>
8.0	90	1. For any period of exposure falling in between any figure and lower figure as
6.0	92	
4.0	95	
3.0	97	

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2.0	100	indicated in column (1), the permissible sound is to be determined by extrapolation or proportionate scale.
1 ½	102	
1	105	
¾	107	
½	110	
¼	115	2. No exposure in excess of 115 dB (A) is permissible.

Noise at lower levels (sound pressure) is quite acceptable and does not have any bad effect on human beings, but when it is abnormally high- it incurs some maleficent effects.

#### **a. Mitigation measures**

The following measures have been envisaged to reduce the impact from the transportation of minerals:

- The vehicles will be maintained in good running condition so that noise will be reduced to minimum possible level.
- In addition, truck drivers will be instructed to make minimum use of horns in the village area and sensitive zones.
- No such machinery is used for mining which will create noise to have ill effects.
- Awareness will be imparted to the workers about the permissible noise levels & maximum exposure to those levels.

### **4.5 BIOLOGICAL ENVIRONMENT**

Mining which leads to the removal of channel substrate, re-suspension of streambed sediment and stockpiling on the streambed, will have ecological impacts. These impacts may have an effect on the direct loss of stream reserve habitat, disturbances of species attached to streambed deposits, reduced light penetration, reduced primary production, and reduced feeding opportunities. Sand mining generates additional traffic, which negatively impairs the environment.



**Anticipated Impacts:****Flora**

The proposed project of river bed sand mining shall be carried out on the riverbed of Son River. There are no trees in the project area. The project shall also not lead to any change in land use and will be replenished every year after successive rains. The proposed mining activity, which although is an economically gainful activity, also constitutes river training work. It allows for necessary dredging activity which may otherwise lead to flooding of the valley.

There shall be negligible air emissions or effluents from the project site during loading of the truck. This shall be a temporary effect and not anticipated to affect the surrounding vegetation significantly.

**Fauna**

Animals are sensitive to noise and avoid human territory. The project stretch of the river is not an identified drinking water point for the animals. However, any animal desirous of accessing the river can continue to do so upstream or downstream of the stretch during the mining activities, as there will not be any damming or diverting of water. Hence, no significant impact is anticipated from the proposed project.

**Mitigation measures**

As the proposed mining will be carried out in a scientific manner, not much significant impact is anticipated, however, the following mitigation measures will be taken to further minimize it:

**Flora**

Although, the project will not lead to any tree cutting, plantation activities shall be undertaken to improve the vegetation cover of the area. To avoid dust emissions, the mined materials will be covered with tarpaulin during transportation.

**Fauna**

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The workers shall be directed to not venture out of the leased area for collecting fuel wood, or hunting. They shall also be trained not to harm any wildlife. No work shall be carried out after sunset.

**4.6 TRAFFIC ANALYSIS****Transportation Route:**

The sand extracted will store the nearby storage point. From there sand will be transported to the market. Sand will be stored in to storage point and from there it will be transported in the night time when traffic load is low on nearest SH or NH.

**FIGURE 4.2 MAP SHOWING EVACUATION ROUTE FOR BHOJ SON 18**

Traffic analysis is carried out by understanding the existing carrying capacity of the roads near to the project site and the connecting main roads in the area. Then depending on the capacity of the

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mine, the number of trucks that will be added to the present scenario will be compared to the carrying capacity.

**Table 4.2(i): Existing Traffic Scenario & LOS for Bhoj Son 18**

Road	V	C	Existing V/C Ratio	LOS
State Highway (SH 81)	2500	15,000	0.16	A

Source: Capacity as per IRC: 64-1990

V= Volume of Vehicles in PCU's/day & C= Capacity of Road in PCU's/day

The existing Level of Service (LOS) is "A" & "B" i.e. excellent & very good.

V/C	LOS	Performance
0.0 - 0.2	A	Excellent
0.2 - 0.4	B	Very Good
0.4 - 0.6	C	Good / Average / Fair
0.6 - 0.8	D	Poor
0.8 - 1.0	E	Very Poor

Reference: ENVIS Technical Report, IISc, Bangalore.

During Mine operation for Sand **Bhoj Son 18**

Proposed Capacity of Mine/annum : **2417400** TPA

No. of working days : 250 days

Proposed Capacity of mine/day : 9669.6 or 9670

Truck Capacity : 16 tonnes

No. of trucks deployed/day : 604.37 or 605

Increase in PCU/day (605\*3) : 1815

**Table 4.2 (ii): Modified Traffic Scenario & LOS**

Road	V	C	Modified V/C Ratio	LOS
State Highway (SH 81)	2500+1815= 4315	15000	0.28	A

**Results**

From the above analysis it can be seen that the LOS has changed from 0.16 to 0.28 at Highway intersection that is remain 'A' i.e 'Excellent' to 'B' i.e. 'Very Good' Hence, there will not so much adverse affect on the proposed evacuation roads due to additional traffic. Traffic management has been proposed as given in below

**Traffic Management:**

1. Roads will be repaired regularly and maintained in good conditions.
2. Haul roads will be sprinkled with water to keep the dust suppressed.
3. A supervisor will be appointed to regulate the traffic movement near the site.
4. Speed breakers will be constructed near accident prone areas to calm the traffic and its speed.

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## **5.0 ANALYSIS OF ALTERNATIVE TECHNOLOGY AND SITE**

### **5.1 Site Alternatives under Consideration**

Presence of sand for commercial exploitation has been identified based on the result of geological investigations and exploration. The mining projects are site specific as such alternate sites were not considered.

### **5.2 Analysis of Alternative Technology**

#### **5.2.1 Choice of Method of Mining**

Factors in the choice of an actual mining method for a given deposit are deposit characteristics, requirement of health and safety and environmental concerns, production, scheduling scope of mechanization, workforce requirements wage rates, replenishment, operating and capital cost estimates. The selection of the mining method (development and extraction) is a key decision to be made in the opening up of a mine.

Surface or open cast mining is used for large, near-surface mineral deposits. Mineral is exploited, loaded into trucks, and hauled to a market.

The opencast mining method will be adopted because of the following reasons:

- The opencast mining operations ensure higher mineral conservation.
- Replenishment

The method used for mining is efficient for sand mining, so no alternative mining method is proposed.

\*\*\*\*\*

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## **6.0 INTRODUCTION**

Regular monitoring of the various environmental parameters is necessary to evaluate the effectiveness of the management programme so that the necessary corrective measures can be taken in case there are some drawbacks in the proposed programme. Since environmental quality parameters at work zone and surrounding areas are important for maintaining sound operating practices of the project in conformity with environmental regulations, the post project monitoring work forms part of Environmental Monitoring Program.

Environmental Monitoring Program will be implemented once the project activity commences. Environmental monitoring program includes (i) Environmental surveillance, (ii) analysis & interpretation of data, (iii) Preparation of reports to support environmental management system and (iv) Organizational set up responsible for the implementation of the programme.

## **6.1 ENVIRONMENTAL MONITORING AND REPORTING PROCEDURE**

Monitoring shall confirm that commitments are being met. This may take the form of direct measurement and recording of quantitative information, such as amounts and concentrations of discharges and wastes, for measurement against corporate or statutory standards, consent limits or targets. It may also require measurement of ambient environmental quality in the vicinity of a site using ecological/biological, physical and chemical indicators. Monitoring may include socio-economic interaction, through local liaison activities or even assessment of complaints.

The preventive approach to environment management may also require monitoring of process inputs, for example, type and method used, resource consumption, equipment and pollution control performance etc.

The key aims of environment monitoring are:

1. To ensure that results/ conditions are as forecast during the planning stage, and where they are not, to pinpoint the cause and implement action to remedy the situation.

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2. To verify the evaluations made during the planning process, in particular with risk and impact assessments and standard & target setting and to measure operational and process efficiency.
3. Monitoring will also be required to meet compliance with statutory and corporate requirements.
4. Finally, monitoring results provide the basis for auditing i.e. to identify unexpected changes.

## **6.2 MONITORING METHODOLOGIES AND PARAMETERS**

### **Air quality monitoring**

Air Quality monitoring is essential for evaluation of the effectiveness of abatement programmes and to develop appropriate control measures. Suspended Particulate Matter (SPM), Sulphur Dioxide (SO<sub>2</sub>) and Nitrogen Dioxide (NO<sub>2</sub>) will be monitored at the workplace i.e. core zone. The methodology proposed for is shown below:

**Table 6.1, Monitoring methodologies and parameters**

<b>Parameters</b>	<b>Technique</b>	<b>Technical Protocol</b>
PM <sub>10</sub>	Gravimetric method	<b>IS 5182 (Part-XXIII)</b>
Sulphur Dioxide	Improved West and Gaeke	<b>IS-5182 (Part-II)</b>
Nitrogen Dioxide	Modified Jacob & Hochheiser	<b>IS-5182 (Part-VI)</b>

### **Water quality monitoring**

Water quality monitoring involves periodical assessment of quality of surface water and the ground water near the mining project.

- Surface water samples will be analyzed for all the parameters as per EPA, 1986
- Ground water samples will be analyzed for all the parameters as per IS-10500:2012.



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**Soil quality monitoring**

The soil quality monitoring is carried out to assess the soil characteristic. The soil quality will be analyzed as per CPCB norms.

**Noise level monitoring**

Noise level monitoring will be done for achieving the following objectives:

- a) To compare sound levels with the values specified in noise regulations
- b) To determine the need and extent of noise control of various noise generating sources

Noise level monitoring will be done at the work zone to assess the occupational noise exposure levels. Noise levels will also be monitored at the noise generating sources like mineral handling arrangements, vehicle movements and also at the nearest village for studying the impact due to higher noise levels for taking necessary control measures at the source.

**Socio-economic Survey**

Socio economic condition will be monitored to assess the demographic particulars of the area including the impacts on the social & economical condition on the residents nearby.

**Plantation Monitoring Programme**

Plantation monitoring will be done to ensure survival & growth rate of plantations.

**6.3 MONITORING SCHEDULE**

The schedule has been shown below for the parameters proposed for monitoring.

**Table 6.2, Details of monitoring schedule**

S.No.	Description of Parameters	Schedule of Monitoring
1	Air Quality	24 hourly samples twice/Thrice a week in each season except monsoon
2	Water Quality (Surface & Groundwater)	Once a season for 4 seasons in a year
3	Soil Quality	Once in a year in project area

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<b>4</b>	Noise Level	Twice a year for first two years & then once a year
<b>5</b>	Socio-economic Condition	Once in 3 years
<b>6</b>	Plantation Monitoring	Once in a season

#### **6.4 MONITORING SCHEDULE - IMPLEMENTATION**

An implementation programme has been prepared as it serves no purpose if it is not implemented in letter and spirit.

Implementation of proposed control measures and monitoring programme has an implication on mining site as well as on the surrounding area. Therefore, mine management should strengthen the existing control measures as elaborated earlier in this report and monitor the efficacy of the control measures implemented in the entire study area:

- a) Collection of air and water samples at strategic locations with frequency suggested and by analyzing thereof. If the parameters exceed the permissible tolerance limits, corrective regulation measure will be taken.
- b) Collection of soil samples at strategic locations once every two years and analysis thereof with regard to deleterious constituents, if any.
- c) Measurement of water level fluctuations in the nearby ponds dug wells and bore wells and to assess if mining has got any impact on it or not.
- d) Measurement of noise levels at mine site and adjacent villages will be done twice a year for first two years and thereafter once a year.
- e) Post plantation, the area will be regularly monitored in every season for evaluation of success rate. For selection of plant species local people should also be involved.

An Environmental Management Cell (EMC) is envisaged which will be responsible for monitoring EMP and its implementation. EMC members should meet periodically to assess the progress and analyze the data collected during the month.

#### **6.5 BUDGET ALLOCATION FOR MONITORING**

The EMC will be responsible to carry on the monitoring. Budget allotment has also been proposed for the same:

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**Table 6.3, Budget for monitoring**

<b>S. No.</b>	<b>Description</b>	<b>Cost to be incurred (in lakhs/annum)</b>
<b>1</b>	Water Quality (Surface & Groundwater)	1.0
<b>2</b>	Soil Quality	0.50
<b>3</b>	Air Quality	1.0
<b>4</b>	Noise Level	0.5
<b>5</b>	Plantation Monitoring	0.5
<b>6</b>	Socio-economic Condition	0.5
<b>TOTAL</b>		<b>4.0</b>

## **6.6 REPORTING SCHEDULES OF THE MONITORING DATA**

It is proposed that voluntary reporting of environmental performance with reference to the EMP should be undertaken. The environmental monitoring cell shall co-ordinate all monitoring programmes at site to furnish the data to the State regulatory agencies regularly in respect of the stipulated prior environmental clearance terms and conditions. The proponent shall prominently advertise in the newspapers indicating that the project has been accorded environmental clearance and also the details of website where it is displayed.

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## **7.0 PUBLIC CONSULTATION**

This is Draft EIA report public hearing is yet to be conducted.

## **7.1 HAZARD IDENTIFICATION AND RISK ASSESSMENT METHODOLOGY**

Risk is to expose someone or something to danger, harm or loss. The different steps of risk assessment procedure are as given below:

### **Step I: Hazard Identification**

The purpose of hazard identification is to identify and develop a list of hazards for each job in the organization that are reasonably likely to expose people to injury, illness or disease if not effectively controlled. Workers can then be informed of these hazards and controls put in place to protect workers prior to them being exposed to the actual hazard.

### **Step II: Risk Assessment**

Risk assessment is the process used to determine the likelihood that people exposed to injury, illness or disease in the workplace arising from any situation identified during the hazard identification process prior to consideration or implementation of control measures.

Risk occurs when a person is exposed to a hazard. Risk is the likelihood that exposure to a hazard will lead to injury or health issues. It is a measure of probability and potential severity of harm or loss.

### **Step III: Risk Control**

Risk control is the process used to identify, develop, implement and continually review all practicable measures for eliminating or reducing the likelihood of an injury, illness or diseases in the workplace.

### **Step IV: Implementation of risk controls**

All hazards that have been assessed should be dealt in order of priority in one or more of the following hierarchy of controls

The most effective methods of control are:

- ✓ Elimination of hazards.
- ✓ Substitute something safer.
- ✓ Use engineering/design controls.

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- ✓ Use administrative controls such as safe work procedures.
- ✓ Protect the workers i.e. by ensuring competence through supervision and training, etc.

Each measure must have a designated person assigned for the implementation of controls. This ensures that all required safety measures will be completed.

### **Step V: Monitor and Review**

Hazard identification, risk assessment and control are an on-going process. Therefore regularly review the effectiveness of your hazard assessment and control measures. Make sure that you undertake a hazard and risk assessment when there is change to the workplace including when work systems, tools, machinery or equipment changes. Provide additional supervision when the new employees with reduced skill levels or knowledge are introduced to the workplace.

### **A) RISK ANALYSIS**

The risk assessment portion of the process involves three levels of site evaluation:

- a) Initial Site Evaluation,
- b) Detailed Site Evaluation,
- c) Priority Site Investigations and Recommendations.

The risk assessment criteria used for all levels of site evaluation take into account two basic factors:

- The existing site conditions
- The level of the travelling public's exposure to those conditions.

The Initial Site Evaluation and Detailed Site Evaluation both apply weighted criteria to the existing information and information obtained from one site visit. The Initial Site Evaluation subdivides the initial inventory listing of sites into 5 risk assessment site groups. The Detailed Site Evaluation risk assessment is then performed on each of the three highest risk site groups in order of the group priority level of risk. The result of the Detailed Site Evaluation process is a prioritized listing of the sites within each of the three highest risk site groups.

### **Risk analysis is done for:**

- Forecasting any unwanted situation

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- Estimating damage potential of such situation
- Decision making to control such situation
- Evaluating effectiveness of control measures

**Table 7.1, Risk Likelihood Table for Guidance**

Step 1: Assess the Likelihood				Step 2: Assess the Consequences		
<b>L1</b>	Happens every time we operate	Almost Certain	Common or repeating occurrence	<b>C1</b>	Fatality	Catastrophic
<b>L2</b>	Happens regularly (often)	Likely	Known to have occurred "has happened"	<b>C2</b>	Permanent disability	Major
<b>L3</b>	Has happened (occasionally)	Possible	Could occur or "heard of it happening"	<b>C3</b>	Medical/hospital or lost time	Moderate
<b>L4</b>	Happens irregularly (almost never)	Unlikely	Not likely to occur	<b>C4</b>	First aid or no lost time	Minor
<b>L5</b>	Improbable (never)	Rare	Practically impossible	<b>C5</b>	No injury	Insignificant

A logical systematic process is usually followed during a qualitative risk assessment to identify the key risk events and to assess the consequences of the events occurring and the likelihood of their occurrence Table 7.2

**Table 7.2, Qualitative Risk Assessment**

Risk Rank	L1	L2	L3	L4	L5
Likelihood Consequence	Almost certain	Likely	Possible	Unlikely	Rare
<b>C1</b> <b>Catastrophic</b>	1	2	4	7	11
<b>C2</b> <b>Major</b>	3	5	8	12	16
<b>C3</b>	6	9	13	17	20

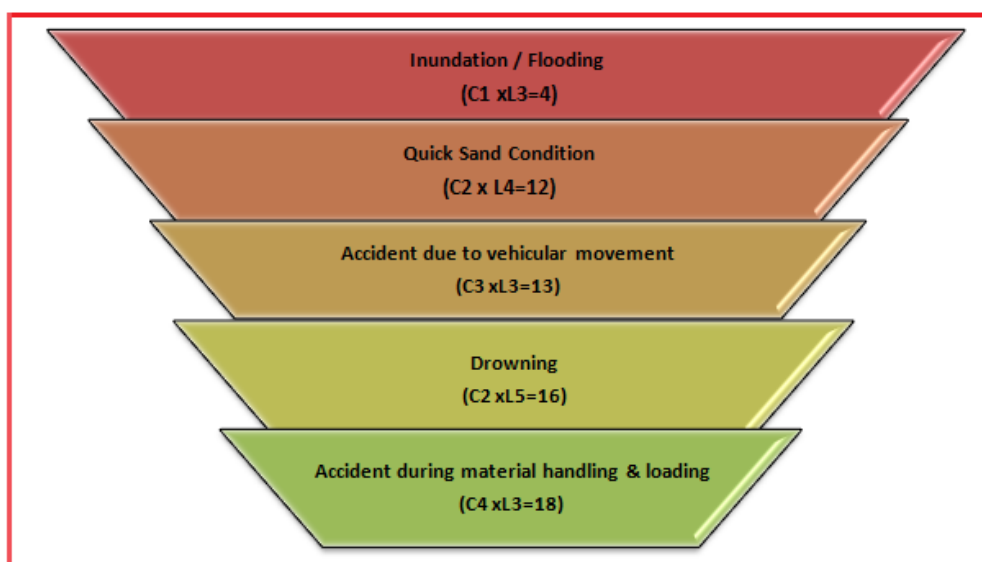
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Moderate					
C4 Minor	10	14	18	21	23
C5 Insignificant	15	19	22	24	25

### RISK RATING:

HIGH RISK 1-6	MEDIUM RISK 7-15	LOW RISK 16-25
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## 7.2 RISK ASSESSMENT



There are various factors, which can create unsafe working conditions/hazards in mining of minor minerals from bed of river.

The key risk (hazard x probability) event rating associated with sand mining and to assess its consequences of such events occurring and the likelihood based on above Table 7.1 (ii) are as:-

The Risk rating of such hazards is as follows:

### 7.2.1 INUNDATION/FLOODING

The risk rating assigned to this activity is assigned as '4' i.e., it is possible and will have catastrophic with major consequences, if work started without assessment of the *river* condition especially during monsoon season.



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Inundation or flooding is expected and beneficial for these mines as during this time only the mineral reserve gets replenished.

#### **Measures to prevent consequences of inundation/flooding**

Inundation or flooding is expected and beneficial for these mines as during this time only the mineral reserve gets replenished.

1. During monsoon months and heavy rains the mining operations are ceased.
2. There should be mechanism/warning system of heavy rains and discharges from the upstream dams.

#### **7.2.2 Quick Sand Condition**

The risk rating assigned to this activity is assigned as '12' i.e., it is an unlikely event with major consequences as frequency of this risk is less likely to occur.

Two things may create the conditions to form quicksand. Underground water may seep-up and saturate the sand, thereby reducing the friction between the sand grains and giving the sand a liquid nature. Or, sand or another soil may be sifted by the force of an earthquake so that friction is lessened and the earth becomes unsteady.

This creates danger condition to the trucks plying near the *river* and banks for transportation of minerals.

#### **Measures to Prevent Quick Sand Condition**

1. The only way to avoid quick sand condition is by avoiding mineral lifting below water table.
2. Mining will be done in layers rather than going for maximum depth at one time.

#### **7.2.3 ACCIDENT DUE TO VEHICULAR MOVEMENT**

The risk rating assigned to this activity is assigned as '13' i.e., it is possible event with moderate consequences as frequency of this operation is more but the predicted/assumed intensity is less like minor cuts, bodily injury. The possibilities of road accidents are due to reckless or untrained driver or overloading of trucks or in case pathway is not compacted suitably, etc.

#### **Measures to Prevent Accidents during Transportation**

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1. All transportation within the main working should be carried out directly under the supervision and control of the management.
2. The Vehicles will be maintained/repared and checked thoroughly by the competent person.
3. A statutory provision of constant education, training etc. will go a long way in reducing the incidents of such accidents.
4. Overloading will not be permitted and will be covered with tarpaulin.
5. The maximum permissible speed limit will be ensured.
6. The truck drivers will have valid driving license.

#### **7.2.4 DROWNING**

The risk rating assigned to this activity is assigned as ‘16’ i.e., it is a rare accident but will have major consequences, if occurred. This may occur due to flash floods etc due to which the workers at the site may get seriously injured or drowned.

##### **Measure to Prevent Drowning**

1. The mining will be done under strict supervision and only in the dry part of the *river*.
2. Mining will be completely stopped in monsoon season to avoid such accidents.
3. Deep water areas will be identified and ‘No Go Zones’ will be clearly marked and made aware to the mine workers.

#### **7.2.5 ACCIDENT DURING MATERIAL HANDLING & LOADING**

The risk rating assigned to this activity is assigned as ‘18’ i.e. it is possible event with minor consequences”, as frequency of this operation is more but the predicted/assumed intensity is less like minor cuts, abrasion, etc. may be due to bank of *river* collapse, over thrown boulders/pebbles, injuries due to carelessness use of hand tools, etc.

##### **Measures to Prevent Accidents during material handling & loading**

1. The truck should be brought to a lower level so that the loading operation suits to the ergonomic condition of the workers.
2. The loading should be done from one side of the truck only to avoid over throw of materials.
3. The workers should be provided with gloves and safety shoes during loading.

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All the activities will be done under strict supervision/control to avoid anticipated accidents so that the risk is reduced to a level considered **As Low As Reasonably Practicable (ALARP)** conditions which are adequately safe and healthy.

### **7.3 DISASTERS & ITS MANAGEMENT**

#### **7.3.1 Anticipated Disaster**

- 1. Floods:** Most of the areas of this district are flood prone owing to the presence of seasonal rivers. Rivers and its tributaries cause heavy losses to the human lives, livestock, land and property mainly due to flash floods. Hence no mining has been proposed during monsoon and flood alerts will be given, if any.
- 2. Earth Quake:** Bhojpur District like other areas of Bihar is moderately vulnerable to earthquake as it exists in Zone IV. However the vulnerability to damage near the site is quite low as there are no built in structures at the site.
- 3. Drought:** due to deficiency in rainfall prime reasons of recurring drought in Bihar is the nature of soil with low mineral and humus-contents besides extremely poor water holding capacity. Recurrent rainfall variability and sustained departure from the normal rainfall vis-a-vis low reliability, fluctuating both surface and underground water resources and extremely poor water holding capacity of the major soil group appear to have clubbed together to cause frequent droughts in Bihar. Besides, there is a positive relationship between reducing forest land and the increasing rainfall variability and the phenomenon is well manifested in Bihar scenario of recurrent droughts.

#### **7.3.2 Disaster Management Plan & Strategy**

The Disaster Management Plan has three components:

##### **(A) Risk Analysis and Vulnerability Assessment:**

The Risk Analysis and Vulnerability Assessment depict the present picture for each disaster-exposure, loss of life, property damage, etc. It also shows geographic distribution of each hazard. The various monitoring facilities, regulatory regimes, countermeasures available for each disaster are identified and listed.

##### **(B) Response Plan:**

The response plan presents an organizational structure of the District to effectively handle the disaster in a coordinated and quickest possible manner to mitigate the impact of

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disaster. It identifies functional areas such as relief, restoration, communication, information, transport, emergency health services etc and proposes assignments to various departments; including identifying lead and supporting departments. The response plan also lays down preparedness checklists and standing operating procedure (SOP) guidelines.

**(C) Mitigation Strategy:**

The mitigation strategy and plan focus on the long-term planning for impact reduction. It deals with the issues of continued commitment to hazard identification and risk assessment, applied research and technology transfer, investment- incentives for mitigation, and leadership and co-ordination for mitigation.

The mine management will be in regular contact with the District administration to gather information on natural disasters and will pass on the message at the site to avoid any loss of health or wealth due to impending disasters.

Though the responsibility of disaster management is vested with the center and state Governments, it is extremely difficult for them to deal effectively all the aspects of disaster management according to the needs of the affected people.

Thus disaster management plan of the Bhojpur District has been prepared through incorporation of the features of Community Based Disaster Management and involvement of local governments, Municipalities etc.

## **7.4 SOCIO-ECONOMIC IMPACT OF THE PROJECT & SAFETY MEASURES**

### **INTRODUCTION**

Socio-Economic Impact Assessment (SEIA) refers to systematic analysis of various social and economic characteristics of human being living in a given geographical area during a given period. The geographical area is often called Study Area or Impact Area. SEIA is carried out separately but concurrently with Environment Impact Assessment (EIA). The study area consists of core area where the project is located and a buffer area encircling the project area with a radius of 10 km from the periphery of the core area. For every new project or existing project under expansion or tied for modernization or change in product mix, Socio-economic Impact Assessment is mandatory. The Socio-economic impact assessment focuses the effect of the project on social and economic well-being of the

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community. The impact may be direct or indirect. Further, the impact may be positive or negative.

**OBJECTIVES OF SEIA**

The prime objective of the current study is to assess the impact of the proposed mining project on socio-economic characteristics of people living in the neighborhoods. Further, it is to be established whether the impending impact would be direct or indirect. Furthermore, it is to be examined whether the said impact would be positive or negative. Lastly, it is to be comprehended if the impact is positive how long it would sustain or if it is negative how soon the same could be eased.

**SCOPE**

The Scope of the study is as follows:

- a) To collect baseline data of the study area
- b) To comprehend socio-economic status of the people living in the study area.
- c) To assess probable impact of the project on social and economic aspects in the study area.
- d) To measure the impact of the project on Quality of life of the people living in the study area.
- e) To ensure sustainability of positive impact.
- f) To suggest mitigation measures and agency responsible for taking action in case of adverse impact.

**SOCIO-ECONOMIC IMPACT OF THE PROJECT*****Impact on Demographic Composition***

The proposed Project will hardly make any difference in the demographic composition of the study area as the additional employment it envisages to create will be met locally to the maximum extent. Hence, the chances of in-migration of people from outside the study area are remote. Accordingly, there will be no variation in the total population of the study area including that of sex ratio, when the mine starts operating.

**Project: Sand Mining Project (Bhoj Son 18 Sand Ghat) At Riverbed of Son River at Mauja–Khandol, Anchal- Sandesh, District- Bhojpur, Bihar.*****Employment Opportunities***

The proposed Project will provide employment to the local people. The number of workers to be deployed in the mining project will depend upon the quantity of minerals to be extracted from the mine by the lease holder. Both the miners and the unskilled workers will be recruited locally. It has estimated that around 64 people will get employment in this mining project for a period of ten months in a year. It is a positive impact of the project since it is providing employment opportunities to the local people. The project will not affect the vulnerable groups of people.

***Increased supply of sand in the market***

The demand for minerals is ever increasing with the growth of the infrastructure development in our country. Both Government departments and private developers have taken up construction of roads, bridges and buildings in a big way. The requirement for the building materials is always high and there is already an acute shortage of sand in the market and the construction industry is the main sufferer. With the commencement of the proposed mining project the supply of minerals will increase and the gap between demand & supply will decrease to some extent, if not fully.

***Impact on agriculture***

It is non-forest land and the proposed activity is to take place in the bed of the Son River. There will be no negative impact on agriculture as no cultivation is taking place on the proposed mining area. Since, scientific mining will be adopted in the proposed mining project the area will be free from annual floods, which destroy standing crops and land & property. This is a positive impact of the proposed mining project.

***Impact on road development***

Movement of trucks and other vehicles to and fro the mining site is expected to increase, when mining will start. The existing roads are connecting the quarry with the national highway connected by metalled followed by un-metalled roads. Hence, there is need for road maintenance and repairing regularly in the mining area. Further, there are risks of accidents during loading of extracted minerals into trucks and transportation to markets for sells. However, accidents can be avoided by taking due care and precautions.

**Income to Government**

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The proposed mining activity will benefit the State in the form of royalty, dead rent, fees and earnings from taxes.

***Impact on Law & Order***

As most of the workers to be employed in the proposed mining project are local residents no law & order problem is envisaged. It is expected that the workers will attend to their duties from their residence and return to their homes after the day's work. There would have been law & order problem if the workers were migrants and lived in shanties closed to the mining area. However, to meet any untoward incident one police post may be set up closed to the mining site.

***Impact on Health***

There are no chances of occurring diseases, due to mining. The minerals excavated are non-toxic. To avoid respiratory problem from dust necessary protection should be taken.

***Few safety measures are outlined below:***

- a) **Safe Working Environment:** The project proponent shall ensure health and safety of all the employees at work. Efforts will be made to provide and maintain a safe work environment and ensure that the machinery and equipment in use is safe for employees. Further, it will be ensured that working arrangements are not hazardous to employees.
- b) **Provision of First Aid:** The first aid treatment reflects the hazards associated with the mining of minerals. The first-aiders will be well trained in handling patients working in the Project.
- c) **Regular Health Examination:** For all mine workers regular health examination will be made compulsory. Treatment of serious back injury; existing asthma or respiratory diseases, existing skin diseases, lung function test (pre and post ventolin), Audiograms, Chest X- ray etc. will also be taken care of.
- d) **Health Education:** Adequate health education and information related to the job will be provided to the workers. Baseline health information will be recorded for future references.
- e) **Tie-up with the Nearest Hospital for Medical Assistance:** To meet the medical needs of the mine workers tie-up with nearest hospitals will be made. Efforts will be



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made to reserve few beds in the above hospitals for the workers of the mining project.

This will ensure timely medical aid to the affected persons.

- f) **Supply of Mask and Gloves:** The workers in the Sand mining project are subject to respiratory diseases. For protection from dust it will be made compulsory for all workers to wear masks and gloves, while working in the mine.
- g) **Administration of Anti-venom Injections:** Provision of Anti-venom therapy will be made available for administration to the workers in case of snake, spider and insect bites, while working in the mine.
- h) **Special Telephone Number:** A special telephone number will be made available to the workers in case of emergency so that they can dial the same for medical assistances. Further, efforts will be made to provide vehicles to the patients in short duration for shifting to a hospital.
- i) **Special Group Insurance Scheme:** All the mine workers will be covered under a Group Insurance Scheme of LIC or any other Insurance company.

## CONCLUSION

The commissioning of the Sand Mining Project (Bhoj Son 18 Sand Ghat) At Riverbed of Son River at Mauja – Khandol, Anchal- Sandesh, District- Bhojpur, Bihar provides employment to local people who are in search of the same. The granting of environment clearance to make mining of sand legally valid and it will generate revenue for the state. It is expected that prospective entrepreneurs will venture to set up industrial units in the vicinity in the near future making the area a mixed society, dependent on industry, trade and business. With the implementation of the project the occupational pattern of the people in the area will change making more people engaged in mining, industrial and business activities rather in agriculture only. The study area is still lacking in health and educational facilities. It is expected that same will improve to a great extent with opening of the project and associated industrial & business activities.

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## 8.0 GENERAL

Various benefits are envisaged while planning for the mining of sand from Son River Bed. Sand is very important minor mineral and is the principal raw material for meeting the huge demand of construction material required in building construction and infrastructure works, road material for construction and maintenance of roads / highway; elastic ballast material for rail tracks in the State of Bihar & and nearby cities and towns of Bihar. The natural available materials in shoal deposits of Son River bed quarry site have been found suitable from techno-economic consideration.

## 8.1 PHYSICAL BENEFITS

The opening of the proposed project will enhance the following physical infrastructure facilities in the adjoining areas.

- a. **Road Transport:** There will be improved road communication due to the proposed project and maintenance will also be done time to time.
- b. **Market:** Generating useful economic resource for construction. Excavated minor mineral sand will provide a good market opportunity.
- c. **Enhancement of green cover:** As a part of reclamation plan, plantation will be carried along the river banks or along the road sides or near the civic amenities.
- a. **Creation of community assets** (infrastructure) like provision for drinking water, construction of school buildings, village roads/ linked roads, dispensary & health centre, community centre, market place etc, as a part of corporate social responsibility.

## 8.2 SOCIAL BENEFITS

- a) **Increase in Employment Potential due to the project activity:** Employment opportunities will increase both directly as well indirectly.
- b) **Contribution to the Exchequer** as the saleable minerals will be given royalty. Since the quarries will be leased out to successful allottees, mining operation in the state will get legalized and it will fetch income to the state exchequer.
- c) **Increased Health related activities:** Healthcare promotional activities will be undertaken. Pre-placement & and Periodic medical checkups will be done, which will lift the general health status of the residents of the area. Health camps, medical aids, family welfare programs, immunization camp, sports will be arranged.

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**Table-8.1, Budget for Public Health**

S. No.	Activities recommended for communities level services	Tentative cost (Lakh Rs) For Each Mine
1	Awareness campaigns regarding health issues in the nearby villages.	1.0
2	Provide free health checkups & medicines to the nearby villagers of the project site.	1.0
3	Assistance to set up a temporary health center during the lease tenure.	0.50
	<b>Total</b>	<b>2.5</b>

- d) **Educational attainments:** Educational activities will be promoted by the lessee. Awareness program will be arranged covering basic issues related to primary level education, environment, health and hygiene etc.
- e) **Strengthening of existing community** facilities through the Community Development Programme.

**Table 8.2, Budget for Occupational Health**

Particulars	Recurring Cost per year (Rs.) For Each Mine
For routine checkup	1,00,000
Medical aid as per ESI Scheme	2,00,000
Training	1,00,000
<b>Total</b>	<b>4,00,000</b>

### 8.3 ENVIRONMENTAL BENEFITS

- Protection of banks
- Reducing submergence of adjoining agricultural lands due to flooding.
- Reducing aggradations of river level.
- Protection of crops being cultivated along the bank.
- A check on illegal mining activity.

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#### **8.4 CORPORATE ENVIRONMENTAL RESPONSIBILITY**

2% of capital cost of the project cost will be allotted for the Corporate Environmental Responsibility as per OM dated 1st May 2018. The following has been proposed considering the needs & demand of the people.

CSR cost will be 2% of the total project cost. This amount will be used for social welfare. CSR COST is 24,65,80,000/-x 2% = Rs. 49,31,600/-.

For each activity the funds to be earmarked by the proponent will be decided after discussion with the local authority/people and the beneficiaries during Public Hearing. It has been planned to undertake a concurrent evaluation of the activities to be taken up under the CER programme.

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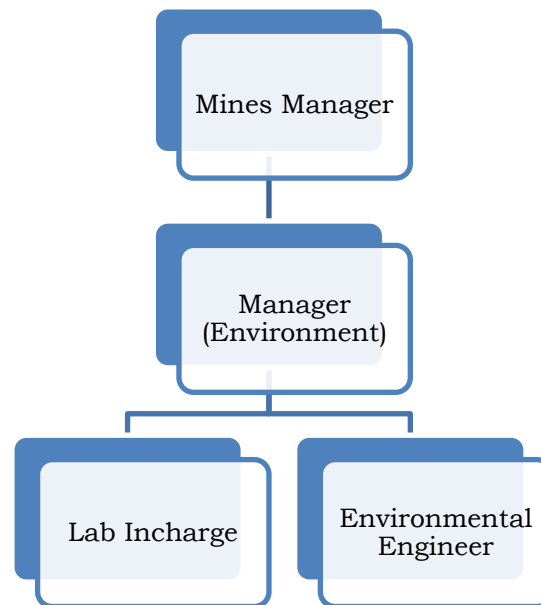
## **9.0 INTRODUCTION**

The environmental management must be integrated into the process of mine planning so that ecological balance of the area is maintained and adverse effects are minimized. The Environmental Management Plan (EMP) consists of a set of monitoring programme, mitigation measures, and management control strategies to minimize adverse environmental impacts.

The EMP has therefore been made considering implementation and monitoring of environmental protection measures during and after mining operations. Measures to be taken for each of the impact areas are detailed in the following paras:

## **9.1 ENVIRONMENTAL MANAGEMENT CELL (EMC)**

It is imperative to establish an effective organization to implement, maintain, monitor and control the environmental management system. A separate Environmental Management Cell (EMC) will be formed to look after the environment related matter of the mine. The structure of EMC is as follows:



**Figure 9.1 Environment Management Cell**

The EMC will perform the following activities:

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- EMC will oversee that environmental control measures are implemented as per the plan.
- EMC will ensure ambient Field monitoring like air monitoring, meteorological monitoring and noise monitoring in coordination with outside agencies.
- Coordinating the environment related activities within the organization as well as with outside agencies.
- Reporting the status report to the statutory authorities.
- Systematically document and record keeping w.r.t. environmental issues.
- Plantation and their maintenance
- Collection statistics of health of workers and population of surrounding villages.
- Environmental compliance to the regulatory authorities.
- Communication with the concerned department on the environmental issue.
- Monitoring the progress of implementation of environmental management programme.

## **9.2 AIR POLLUTION CONTROL MEASURES**

During the course of sand mining, no toxic substances are released into the atmosphere, so there seems to be no potential threat to health of human beings. In river bed mining activities, dust will be generated during mining, loading and transportation. The only source of fugitive gaseous emission during mining is vehicles which will be used for transportation. The environmental management for air pollution control includes:

- Plantation will be done along the road-sides and also the vacant land present under Gram Panchayat after consultation with local villagers/authority.
- Dust mask provided to the workers engaged at dust generation points like excavations, loading and unloading points.
- The only air pollution sources are the road transport network of the trucks. The dust suppression measures like water spraying will be done on the roads.
- Utmost care will be taken to prevent spillage of sand and stone from the trucks.

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- Water sprinkling will be done to reduce the emission of dust due to transportation of minerals.
- Overloading will be prevented. The trucks/ tractor trolley will be covered by tarpaulin covers.
- Plantation activities in consultation with village Panchayat along the roads will also reduce the impact of dust in the nearby villages.

### **9.3 WATER POLLUTION CONTROL MEASURES**

During the operational phase of mine no waste water or industrial effluent will be generated. The environmental management for water pollution control includes:

- Water requirements for drinking, plantation and dust suppression will be met by tanker supply on the daily basis.
- Local people will be employed and no permanent housing will be done so no permanent drainage pattern for sewerage system is required as domestic sewage shall be disposed off into septic tank followed by soak pits.
- Mining in the area will be done up to depth of 3.0m maximum from the surface level well above the ground water table, therefore impact on water regime is not anticipated.
- Monitoring of water quality of nearby surface water, ground water and domestic water will be conducted once in every season except monsoon to evaluate the performance of the mitigation measures.

### **9.4 NOISE POLLUTION CONTROL MEASURES**

As there will be no heavy earth moving machinery there will not be any major impact on noise level due to sand mining and other association activities a detailed noise survey has been carried out and results were cross referenced with standards and were found to be well within limits. Blasting technique is not used for sand mining hence no possibility of land vibration. It was found that the proposed mining activity will not have any significant impact on the noise environment of the region. The only impact will be due to transportation of sand and by excavator involve trucks and tractor trolleys.



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- Proper maintenance of all machines is being carried out, which help in reducing generation of noise during operations.
- No other equipments except the Transportation vehicles and Excavator and Loaders (as and when required) for loading is allowed.
- Noise generated by these equipments is intermittent and does not cause much adverse impact.
- Periodical monitoring of noise will be done to adopt corrective actions wherever needed.
- Plantation will be taken up along the approach roads. The plantation minimizes propagation of noise and also arrests dust.

## **9.5 BIOLOGICAL ENVIRONMENT**

Although, there are no significant adverse impacts from the project, the following measures are proposed to minimize anticipated impacts:

- It will be ensured that no mining activity will be carried out during the monsoon season to minimize impact on aquatic life which is mainly breeding season for many of the species.
- As the mining site has no vegetation, no clearance of vegetation will be done.
- Prior to closure of mining operations / during the rainy season the eroded bank will be restored / reclaimed to minimize negative impacts on aquatic habitats.
- Sprinkling will be done on the haul roads with water to avoid the dust emission, thus avoiding damage to the crops.
- Mining will be carried out on the dry part of the lease area to avoid disturbance to the aquatic habitat and movement of fish species.
- No discard of food, polythene waste etc. will be allowed in the lease area which would distract/attract the wildlife.
- No night time mining will be allowed which may catch the attention of wild life.
- Workers will be made aware of the importance of the wildlife and signage will be displayed at the sensitive areas to caution the workers & other passerby.

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- **Greenery development:** The project will not lead to any tree cutting. However, a social responsibility, greenery will be developed along the both sides of road and the bank of river. Community services will be deployed in raising these plantations. Trees of economic importance and native origin such as fruit trees shall be planted.
- Approx. 790 trees will be planted around haul road during the plan period.
- The trees proposed for plantation are:
- As per Sustainable Sand Management & Mining Guidelines 2016, minimum 5 plant per hectare will be proposed for development of greenbelt but in this cluster of projects 10 plants per hectare will be proposed for better condition of environment.
- Total Number of plants for Sand Block is given below.

Sand Ghat	Area (Ha)	Plants
Bhoj son 18	79.0	79.0*10 Plants= 790 plants
Total Plants		790 plants

**Table 9.1:- List of Plant selected for Green Belt Development**

	Agro-climatic zone & Sub zone	Middle Genetic Plains, North west alluvial sub zone	
S/n	Scientific name	Common Name	Pollution control features
1	<i>Ficus religiosa</i>	Peepal	Dust particles absorbance
2	<i>Acacia nilotica</i>	Babul	Tolerant to SO <sub>2</sub>
3	<i>Mangifera indica</i>	Aam	Tolerant to Dust control
4	<i>Tectona grandis</i>	Sagon	Tolerant to Dust control
5	<i>Azadirachta indica</i>	Neem	Tolerant to SO <sub>2</sub>
6	<i>Pithecolibium duclouxii</i>	Jungle jalebi	Tolerant to SO <sub>2</sub> and Dust control
7	<i>Ficus benghalensis</i>	Bargad	Tolerant to Dust control
8	<i>Scigium cumuni</i>	Jamun	To stop river bank erosion
9	<i>Terminalia arjuna</i>	Arjun	To stop river bank erosion
10	<i>Populus ciliate</i>	Popular	Fast growing, broad leaf

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## **9.6 LAND USE PLANNING**

Degradation of land is not a very significant adverse impact of riverbed mining due to creation of access roads, mining operations, and transportation of mined material. In order to prevent the environmental degradation of leased mine area and its surroundings, the following measures shall be taken;

- Mineral will be mined out after leaving sufficient safety zone from the bank as per sustainable sand mining guidelines-2016 for bank stability.
- The pits from where the material will be picked should not get deeper than 3.0 meter & shall follow the normal channel direction of the river.
- No foreign material shall be allowed to remain/spill in river bed and catchment area, or no pits/pockets will be allowed to be filled with such material.
- The mining is planned in non-monsoon seasons only, so that the excavated area gets replenished during the monsoon each year.
- Pits will get replenished naturally every year after monsoon.

## **9.7 OCCUPATIONAL HEALTH & SAFETY**

Occupational safety and health is very closely related to productivity and good employer-employee relationship. The factor of occupational health in Sand Ghat of M/s Tirupati Petro Mart, Prop- Rita Devi, Add.- Mahthu Jamhor, Aurangabad, Dist. - Aurangabad, Bihar, Pin - 824121 (Bhoj Son 18) is mainly dust. Safety of employees during operation and maintenance etc. shall be as per Mines rules and regulations.

To avoid any adverse effect on the health of workers due to various pollutants, sufficient measures relating to safety and health will also be practiced:

- Provision of rest shelters for mine workers with amenities like drinking water, portable toilets etc.
- All safety measures like use of safety appliances, such as dust masks, shoes, non breakable goggles as the case may be, shall be ensured. Safety awareness programs, awards, posters, slogans related to safety etc. will be encouraged.

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- Training of employees for use of safety appliances and first aid in vocational training center.
- Regular maintenance and testing of all equipment as per manufacturers' guidelines.
- Periodical Medical Examination (PME) of all workers by a Medical Officer.
- First Aid facility will be provided at the mine site.
- Close surveillance of the factors in working environment and work practices which may affect environment and worker's health.
- Working of mine as per approved mining plan and environmental plans.

## **9.8 SOCIO-ECONOMIC ENVIRONMENT**

This project operation will provide livelihood to the poorest section of the society. The overall impact of riverbed mining of sand on the social economics of the area shall be a very positive one, as not only it will generate employment opportunities for local population at mine site for transportation of mined material, etc. It will also give a good boost to the general economy of the area.

The proposed mining activity is expected to provide stimulus to socio-economic activities in the region and thereby accelerate further development processes. However, there is an apprehension that local people may get engaged in illegal activities if the proposed mining operation or the project is shelved or there is inordinate delay in its execution.

## **9.9 ENVIRONMENT POLICY**

M/s Tirupati Petro Mart, Prop- Rita Devi, Add.- Mahthi Jamhor, Aurangabad, Dist. - Aurangabad, Bihar, Pin - 824121 (Bhoj Son 18) of Sand Ghat believes that responsible environmental stewardship comprises diligent application of well-established natural resource management, controls and practices for the protection of the mined out land, preservation of biodiversity and proper disposal of waste if any following the best environmental practices during the process of mining.

Environmental policy prescribed for standard operating process to bring into focus any violation/deviation of the environment and forest norms/conditions that the company operations will implement operational and risk management practices that provide for



**Project: Sand Mining Project (Bhoj Son 18 Sand Ghat) At Riverbed of Son River at Mauja–Khandol, Anchal- Sandesh, District- Bhojpur, Bihar.**

maximum protection of people and the environment. To this end, the owner resolves that company will follow the below mentioned practices:

Operate in accordance with prescribed industry standards while complying with all applicable environmental, health and safety laws and regulations.

- Establish and maintain a well-defined environmental, health and safety management system to guide its operations.
- Ensure that all employees, officers and directors understand and adhere to its environmental, health and safety management program.
- Provide operations with the necessary resources, expertise and training to effectively carry out its EHS management programs.
- Engage employees at all levels in programs directed towards minimizing adverse effects on the environment resulting from mining activity.
- Work proactively with governments and the public in the development of cost effective and realistic regulations that promote enhanced environmental, health and safety protection.
- Promote environmental awareness among its employees, their families and the communities in which it operates.
- Require those who provide services and products to practice good environmental stewardship.
- Mitigate its environmental impacts through efficient use of resources, and the reduction of input materials and waste.
- Maintain a high degree of emergency preparedness.

#### **9.10 BUDGET ALLOCATION FOR EMP IMPLEMENTATION**

Annual budget for EMC is very essential for successful implementation of EMP. Costs will be both Capital and Recurring cost as given below. The fund allocated will not be diverted for any other purposes and the top management will be responsible for this.

**Project: Sand Mining Project (Bhoj Son 18 Sand Ghat) At Riverbed of Son River at Mauja-Khandol, Anchal- Sandesh, District- Bhojpur, Bihar.**

**Table 9.2, Budget of EMP (Bhoj Son-18)**

<b>Sl. No</b>	<b>Description</b>	<b>Capital Cost (lakh)</b>	<b>Recurring Cost (lakh)</b>
1	Pollution Control & Dust Suppression	Nil	1.5
2	Pollution Monitoring i) Air pollution ii) Water pollution iii) Soil pollution iv) Noise Pollution	--	2.0
3	Plantation and salary for one gardener (part time basis).	7.9	0.5
4	Haul road Maintenance Cost	2.5	1.5
<b>TOTAL</b>		<b>10.4</b>	<b>5.5</b>

Note: \*790 plants \* 1000 Rs (for each plants including hedges and fences) =Rs 7,90,000/-

- Salary of Labour for haul road maintenance 2 labor\*300=600 per day
- 600\* 250= 1,50,000/-
- \* 2.5 lakh per kilometer ( 2,50,000 \* 1.0 km haul road) = 2,50,000 /-

\*\*\*\*\*

**Project: Sand Mining Project (Bhoj Son 18 Sand Ghat) At Riverbed of Son River at Mauja–Khandol, Anchal- Sandesh, District- Bhojpur, Bihar.**

## **10.0 INTRODUCTION**

### **10.1 Purpose of the Report**

Environmental Impact Assessment report is prepared to comply with the Terms of Reference (TOR) received from SEIAA, Bihar under EIA notification of the MoEF&CC dated 14<sup>th</sup> September, 2006 and its subsequent amendment there-off and also the EIA Guidance Manual for Mining of Minerals (Feb, 2010) of MoEF&CC, Govt. of India, for seeking environmental clearance for mining of Sand in the applied mining lease area.

## **10.2 IDENTIFICATION OF PROJECT & PROJECT PROPONENT**

### **10.2.1 Identification of Project**

The Proposed Sand Mining Project is located on Son River at Bhoj Son–18 Sand Ghat at Mauja– Khandol, Anchal- Sandesh, Dist - Bhojpur, (Bihar) over an area of 79.0 hectares.

**The Proposed Production is 1422000 CUM or 2417400 Tonnes and Area of the project site is 79.0 ha.**

As per the Director of Geology, Bihar, the modification of mining plan has been approved .As per EIA notification 2016 and subsequent amendments, the project is coming under category ‘B’ (B1) and the lease area is more than 5.0 Ha, approved Mining Plan, Pre-feasibility Report and EMP are required for Environment Clearance in respect of the said quarry lease. Copy of letter is enclosed as **Annexure No. II.**

## **10.3 BRIEF DESCRIPTION OF PROJECT**

The proposed project is Open Cast Semi-Mechanized Mining of Sand with a proposed production of **1422000 CUM or 2417400 Tonnes** .The project has been proposed by (Bhoj Son 18)- M/s Tirupati Petro Mart, Prop- Rita Devi, Add.- Mahthu Jamhor, Aurangabad, Dist. - Aurangabad, Bihar, Pin - 824121.

The proposed project is over an area 79.0 ha on Son River at Mauja– Khandol, Anchal- Sandesh, District- Bhojpur, Bihar. As per MoEF, New Delhi Gazette dated 14<sup>th</sup> September 2006 and amended thereof, the proposed mining project is categorized as **Category ‘B-1’**. The estimated project cost for the proposed project is Bhoj Son 18 - Rs - **24,65,80,000/-** (including auction cost).

**Project: Sand Mining Project (Bhoj Son 18 Sand Ghat) At Riverbed of Son River at Mauja–Khandol, Anchal- Sandesh, District- Bhojpur, Bihar.**

The proposed mining lease area falls in Survey of India Toposheet 72C/11 & 72C/15.

The mine lease co-ordinates and connectivity details are listed below:

**Table: 10.1 Mine lease Co-ordinates (Bhoj Son 18)**

Pillar No.	Latitude /Longitude
1	25° 22' 49.094" N 84° 44' 43.194" E
2	25° 22' 52.628" N 84° 44' 36.220" E
3	25° 23' 13.289" N 84° 44' 34.261" E
4	25° 23' 15.470" N 84° 44' 37.245" E
5	25° 23' 26.939" N 84° 44' 33.551" E
6	25° 23' 37.776" N 84° 44' 37.990" E
7	25° 23' 35.845" N 84° 44' 55.432" E
8	25° 23' 27.490" N 84° 44' 53.317" E
9	25° 23' 18.768" N 84° 44' 55.672" E
10	25° 23' 12.887" N 84° 45' 1.068" E
11	25° 22' 47.465" N 84° 44' 46.407" E

The details of environmental setting are given in **Table-10.2**.

**Table-10.2: Details of Environmental Setting**

Sr. No.	Particulars	Details
1	<b>Location</b>	
a	Village	Mauja– Khandol, Anchal- Sandesh, Dist - Bhojpur, (Bihar)
b	Anchal	Sandesh
c	District	Bhojpur
d	State	Bihar
2	Elevation above	(64.5 AMSL - 65.5 AMSL)
3	Nearest National Highway/State Highway	NH 139: approx. 2.50 KM towards East direction. SH 81: approx. 0.50 km towards West direction.



**Project: Sand Mining Project (Bhoj Son 18 Sand Ghat) At Riverbed of Son River at Mauja–Khandol, Anchal- Sandesh, District- Bhojpur, Bihar.**

Sr. No.	Particulars	Details		
		Block	Railway Station	Distance (Km) Direction
4	Nearest Railway station	Bhoj Son 18	Garhani Railway Station	approx. 17.80 km in West direction
5	Nearest Airport	Block	Airport	Distance (Km) Direction
		Bhoj Son 18	Jay Prakash Narayan International Airport Patna	approx. 42 km towards NE direction
6	Ecological Sensitive Areas (Wildlife Sanctuaries)	There is no any Ecological Sensitive Areas Like National Park, Wildlife Sanctuaries, etc are found within 10 km of the study area.		
7	Seismic Zone	Zone- IV <i>Source</i> <i>BMTC</i> <i>2<sup>nd</sup></i> <i>edition</i> <a href="https://www.bmtpc.org/disaster%20resistance%20technologies/ZONE%20IV.htm">https://www.bmtpc.org/disaster%20resistance%20technologies/ZONE%20IV.htm</a>		

## 10.4 PROJECT DESCRIPTION

### 10.4.1 Salient features of mine lease

The salient features of mine lease are given below:

**Table-10.3: Salient features of mine lease**

Sr. No.	Parameter	Description
1	Name of the Mine	Sand Mining Project (Bhoj Son 18 Sand Ghat) At Riverbed of Son River at Mauja – Khandol, Anchal- Sandesh, District- Bhojpur, Bihar
2	Mining Capacity	The Proposed Production is 1422000 CUM or 2417400 Tonnes and Area of the project site is 79.0 ha.
3	Method of mining	Open cast semi-mechanized mining/OTFM
4	Total ML area	79.0 ha

**Project: Sand Mining Project (Bhoj Son 18 Sand Ghat) At Riverbed of Son River at Mauja-Khandol, Anchal- Sandesh, District- Bhojpur, Bihar.**

Sr. No.	Parameter	Description
5	Depth of mining	3.0 m depth
6	Manpower	64 persons
9	Water Requirement	10.59 ~ 10.60
10	Source of Water	Tanker/ Nearby village.

#### 10.4.2 Mineable Reserves and production

Mineable reserves have been computed up to 3m depth from surface. Benches having height 1.5m & width 6.0m drawn from the ultimate pit limit. Area of each benches have been calculated multiplied by strike influence to get the volume. The volume multiplied by bulk density (1.7 g/cm<sup>3</sup>) to get the tonnage.

**Table 10.4 Classification Mineable Reserves**

Bench Level (mRL)	Length (m)	Width (m)	Depth (m)	Volume (cum)	Tonnes
65-63.5	1443	527	1.5	1140692	1939177
63.5-62	1433	517	1.5	1111292	1889197
<b>Total</b>				2251983	3828372

In the lease area the river flow being reduced and sediment load get deposited. During flood season, the area gets replenished with sediments and source of erosion at this location. It is a river bed deposit and mined out area shall be replenished each year during monsoon period and depth of quarry shall be filled back by river sand each year and area will restore its original topography.

#### 10.4.3 Conceptual Plan

Mine Applied Area will be worked for Bhoj Son 18 Sand Ghat. However, as the digging depth will be restricted to 3.0 m only. This will be further replenished during rainy season. Sand Ghat will be worked systematically as the width is limited while length is much more. As the lease period is only 5 (Five) years, some of the area will be left un-worked at the end of lease period.

**Project: Sand Mining Project (Bhoj Son 18 Sand Ghat) At Riverbed of Son River at Mauja–Khandol, Anchal- Sandesh, District- Bhojpur, Bihar.**

(i) Final Slope Angle to Be Adopted: Height of the bench is limited to 1.5 m while width of individual bench shall be kept 6.0m. River bank side will be protected by working in dry part of the river and by leaving safety distance of the width of the river of 5 meter. Bank side natural slope will not be disturbed. This will prevent collapse of bank and erosion. However, the height of the bank with respect to river bed is varying from 3-4 meters.

(ii) During plan period workings will be carried out in the Sand Ghat at a time of the Applied Area simultaneously. Scattered workings will ensure safety, remove congestion of vehicles and will have better control and management.

(iii) Ultimate Capacity of Dumps: There will be no OB removal / during the plan period. Therefore no proposal has been envisaged for its separate dumping. No outside material will be filled up in the extracted zone..

The conceptual plan & section of each mining plots are attached with mine plan.

#### **10.4.4 Method of Mining**

Mining activity will be carried out by open cast semi- mechanized method/OTFM. The operation will be semi-mechanized/OTFM with use of excavators/JCBs truck /tractors combination or Manually etc. The sand will be collected in its existing form.

#### **10.5 AFFORESTATION PROGRAMME**

Topsoil if any would be utilized for intensive plantation and greenbelt development, all along the bank of the river. The details of plantation and number of saplings to be planted are given below. Approx. 790 trees will be planted around haul road during the plan period.

#### **10.6 LAND USE PATTERN**

The mine lease area is flat river bed and river banks. There is no forest land or agriculture land in the mine lease area. The entire mining lease lies within River.

#### **10.7 BASELINE ENVIRONMENTAL STATUS**

##### **10.7.1 Soil Quality**

**Project: Sand Mining Project (Bhoj Son 18 Sand Ghat) At Riverbed of Son River at Mauja–Khandol, Anchal- Sandesh, District- Bhojpur, Bihar.**

Three soil samples were collected in and around the mine lease area to assess the present soil quality of the region. The pH of the soil indicates that the soil is slightly alkaline in nature. Based on the results, it is evident that the soils are not contaminated by any polluting sources.

#### **10.7.2 Meteorology**

Meteorological data at the site was monitored during March to May 2023 representing pre monsoon. It was observed that the during study period, temperature ranged from 21 °C to 44.0 °C.

#### **10.7.3 Ambient Air Quality**

Ambient Air Quality Monitoring (AAQM) has been carried out at 05 locations. The Particulate Matter (PM<sub>10</sub>) conc. ranged of **71.6 µg/m<sup>3</sup> to 87.5 µg/m<sup>3</sup>**. The Particulate Matter (PM<sub>2.5</sub>) ranged from **36.8 µg/m<sup>3</sup> to 44.9 µg/m<sup>3</sup>**. Sulphur dioxide (SO<sub>2</sub>) between **4.1 µg/m<sup>3</sup> to 8.7 µg/m<sup>3</sup>**. Oxides of Nitrogen (NO<sub>2</sub>) between **7.2 µg/m<sup>3</sup> to 16.0 µg/m<sup>3</sup>**. The results thus obtained indicate that the concentrations of PM<sub>10</sub>, SO<sub>2</sub> and NO<sub>2</sub> in the ambient air are well within the National Ambient Air Quality (NAAQ) standards for Residential and Rural areas.

#### **10.7.4 Water quality**

To assess the physical and chemical properties of water in the region, water samples from 03 locations were collected from various water sources around the mine lease area. The pH was varying for ground waters from 7.32 to 7.51. The total dissolved solids are varying from **415 mg/l to 471 mg/l**.

The results indicate groundwater is generally in conformity with the drinking water standards (IS: 10500).

#### **10.7.5 Noise Quality**

Noise monitoring reveals that the minimum & maximum noise levels at day time were recorded as **41.2 dB(A) to 50.1 dB(A)** respectively. The minimum & maximum noise levels at night time were found to be **32.1 dB (A) & 40.30 dB (A)** respectively.

#### **10.7.6 Ecological Environment**

**Project: Sand Mining Project (Bhoj Son 18 Sand Ghat) At Riverbed of Son River at Mauja–Khandol, Anchal- Sandesh, District- Bhojpur, Bihar.**

Based on the field studies and review of published literature, There is no any Ecological Sensitive Areas Like National Park, Wildlife Sanctuaries, etc are found within 10 km of the study area.

**10.8 ANTICIPATED ENVIRONMENTAL IMPACTS****10.8.1 Impact on Air Environment**

The proposed mining activities loading and movement of other transport vehicles used in mining will generate dust (SPM/RSPM). Proper water sprinkling shall be carried out at the mine site. The mineral will be transported by road through covered tarpaulin trucks/tippers to reduce the fugitive emission caused by the wind.

**10.8.2 Impact on Water Environment**

Mining of sand from within or near river has an indirect impact on the physico-chemical habitat characteristics during monsoon season. These characteristics include in stream roughness elements, depth, velocity, turbidity, sediment transport and stream discharge.

The detrimental effects, if any, to biota resulting from bed material mining are caused by following:

- Alteration of flow patterns resulting from modification of the river
- An excess of suspended sediment during monsoon season.

Project activity will be carried out only in the dry part of the Son River. Hence, none of the project activities affect the water environment directly. In the project, it is not proposed to divert or truncate any stream in monsoon season only. No proposal is envisaged for pumping of water either from the *River* (in monsoon) or tapping the ground water.

**10.8.3 Impact on Water Quality**

Analysis results of water samples collected from the buffer zone indicate that the pH, total dissolved solids (TDS) are well below the prescribed limits.

No wastewater generation is envisaged due to the mining operations. The sanitary wastewater will be sent to septic tanks.

**10.8.4 Impact on Noise Environment**

**Project: Sand Mining Project (Bhoj Son 18 Sand Ghat) At Riverbed of Son River at Mauja-Khandol, Anchal- Sandesh, District- Bhojpur, Bihar.**

The proposed mining activity is semi-mechanized/OTFM in nature. No drilling & blasting is envisaged for the mining activity. Hence, the only impact is anticipated is due to movement of vehicles deployed for transportation of minerals. The vehicles will be maintained in good running condition so that noise will be reduced to minimum possible level.

**10.8.5 Impact on Land Environment**

The proposed extraction of stream bed materials, mining below the existing streambed, and alteration of channel-bed form and shape may lead to several impacts such as erosion of channel bed and banks, increase in channel slope, and change in channel morphology if, the operations are not carried out systematically.

The systematic and scientific removal of sand will not cause bed degradation. The silt and clay generated as waste will be used for plantation or filling up low lying area elsewhere. The mining is planned in non monsoon seasons only, so that the excavated area gets replenished gradually during the monsoons each year.

**10.8.6 Impact on flora and fauna**

As the proposed mining will be carried out in a scientific manner, not much significant impact is anticipated. No mining will be carried out during the monsoon season to minimize impact on aquatic life which is mainly breeding season for many of the species. The mining site has no vegetation; no clearance of vegetation will be done. Haul roads will be sprinkled with water which would reduce the dust emission, thus avoiding damage to the crops.

**10.8.7 Impact on Socio - Economic Aspects**

The mine area does not cover any habitation. Hence the mining activity does not involve any displacement of human settlement. No public buildings, places, monuments etc exist within the lease area or in the vicinity. The mining operation will not disturb/ relocate any village or need resettlement. Thus no adverse impact is anticipated. The impact of mining activity in the area is positive on the socio-economic environment of the region. Sand mining will be providing employment to local people whenever there is requirement of manpower.

**Project: Sand Mining Project (Bhoj Son 18 Sand Ghat) At Riverbed of Son River at Mauja–Khandol, Anchal- Sandesh, District- Bhojpur, Bihar.**

### 10.9 ENVIRONMENTAL MANAGEMENT PLAN

- Extraction will be done from the bed leaving safety zone from bank.
- The maximum working depth will remain above ground water table of the area.
- Provide health facilities to the workers & surrounding people in the impact area to reduce the health impacts.
- Ensuring wildlife protection & arranging awareness campaigns for the same.
- Minimize activities that release fine sediment to the river.
- Effective mitigation measures will be adopted to minimize disturbance during transportation & handling of minerals:
- Establishment of reclamation program with plantation of local/native & fast growing species
- Establishment of restoration plan during the closure of mine at the onset of monsoon season.
- Establishment of effective Disaster Management Plan to take timely precautionary measures to avoid effects of impending disasters.
- Establishment of effective Monitoring Program monitored by Environment Management Cell.

### 10.10 ENVIRONMENTAL MONITORING PROGRAM

**Table 10.5: Post project environmental monitoring**

S.No.	Description of Parameters	Schedule of Monitoring
1	Air Quality	24 hourly samples twice a week in each season except monsoon
2	Water Quality (Surface & Groundwater)	Once a season for 4 seasons in a year
3	Soil Quality	Once in a year in project area
4	Noise Level	Twice a year for first two years & then once a year
5	Socio-economic Condition	Once in 3 years
6	Plantation Monitoring	Once in a season

**Project: Sand Mining Project (Bhoj Son 18 Sand Ghat) At Riverbed of Son River at Mauja–Khandol, Anchal- Sandesh, District- Bhojpur, Bihar.**

### 10.11 ENVIRONMENTAL PROTECTION COST

The details of the cost to be incurred for successful monitoring of environmental parameters and implementation of control measures are given in **Table-10.6**.

**Table 10.6: Cost of Environmental Protection Measures**

#### **Budget of EMP (Bhoj Son 18)**

Sl. No	Description	Capital Cost (lakh)	Recurring Cost (lakh)
1	Pollution Control & Dust Suppression	Nil	1.5
2	Pollution Monitoring i) Air pollution ii) Water pollution iii) Soil pollution iv) Noise Pollution	--	2.0
3	Plantation and salary for one gardener (part time basis).	7.9	0.5
4	Haul road Maintenance Cost	2.5	1.5
<b>TOTAL</b>		<b>10.4</b>	<b>5.5</b>

Note: \*790 plants \* 1000 Rs (for each plants including hedges and fences) =Rs 7,90,000/-

- Salary of Labour for haul road maintenance 2 labor\*300=600 per day
- 600\* 250= 1,50,000/-
- \* 2.5 lakh per kilometer ( 2,50,000 \*1.0 km haul road) = 2,50,000/-

### 10.12 ADDITIONAL STUDIES

#### 10.12.1 Risk Assessment

The complete mining operation will be carried out under the management control and direction of a qualified mine manager holding. The DGMS have been regularly issuing standing orders, model, standing orders and circulars to be followed by the mine management in case of disaster, if any.

#### 10.12.2 Disaster Management Plan

Emergency preparedness is an important aspect in the planning of Disaster Management. Personnel would be trained suitably and prepared mentally and physically in emergency



<b>Project: Sand Mining Project (Bhoj Son 18 Sand Ghat) At Riverbed of Son River at Mauja–Khandol, Anchal- Sandesh, District- Bhojpur, Bihar.</b>
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response through carefully planned, simulated procedures. Similarly, the key personnel and essential personnel shall be trained in the operations.

### 10.12.3 Public Consultation

This is a draft EIA report. Public Hearing will be incorporated in FEIA report.

### 10.13 PROJECT BENEFITS

**Physical Benefits:** Road Transport, Market, Enhancement of green cover & Creation of community assets.

**Social Benefits:** Increase in Employment Potential, Contribution to the Exchequer, Increased Health related activities, Educational attainments & Strengthening of existing community facilities.

**Environmental Benefits:**

- Controlling river channel and protection of banks.
- Reducing submergence of adjoining agricultural lands due to flooding.
- Reducing aggradation of river level.
- A check on illegal mining activity.

### Corporate Social Responsibility

2% of capital cost of the project cost will be allotted for the Corporate Environmental Responsibility as per OM dated 1<sup>st</sup> May 2018. The following has been proposed considering the needs & demand of the people.

CSR cost will be 2% of the total project cost. This amount will be used for social welfare. CSR COST is 24,65,80,000/- x 2% = Rs. 49,31,600/-.

For each activity the funds to be earmarked by the proponent will be decided after discussion with the local authority/people and the beneficiaries during Public Hearing. It has been planned to undertake a concurrent evaluation of the activities to be taken up under the CER programme.

### 10.14 CONCLUSIONS

- The mining operations will meet the compliance requirements of MoEF&CC;

**Project: Sand Mining Project (Bhoj Son 18 Sand Ghat) At Riverbed of Son River at Mauja–Khandol, Anchal- Sandesh, District- Bhojpur, Bihar.**



- Community impacts will be beneficial, as the project will generate significant economic benefits for the region;
- Monitoring program will be followed till the mining operations continue.
- With the effective implementation of the Environment Management Plan (EMP) during the mining activities, the proposed project can proceed without any significant negative impact on environment.

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**Project: Sand Mining Project (Bhoj Son 18 Sand Ghat) At Riverbed of Son River at Mauja–Khandol, Anchal- Sandesh, District- Bhojpur, Bihar.**

### CONSULTANT

<b>Name of the Consultant</b>	P and M Solution
<b>Address</b>	C-88, Sector 65, Noida -201301 – U.P
<b>Credentials</b>	Accredited by QCI/NABET
Consultant accreditation details are given below:	


**Quality Council of India**  
 National Accreditation Board for  
 Education & Training
 

**CERTIFICATE OF ACCREDITATION**

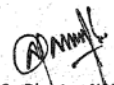
**P and M Solution**  
 First Floor, C-88, Sector-65, Noida, Uttar Pradesh- 201301

Accredited as Category -A organization under the QCI-NABET Scheme for Accreditation of EIA Consultant Organizations: Version 3 for preparing EIA/EMP reports in the following sectors:

Sl. No	Sector Description	Sector (as per)		Cat.
		NABET	MoEFCC	
1.	Mining of minerals including opencast / underground mining	1	1 (a) (i)	A
2.	River Valley projects	3	1 (c)	B
3.	Metallurgical industries (ferrous & non-ferrous)	8	3 (a)	B
4.	Highways,	34	7 (f)	A
5.	Building and construction projects	38	8 (a)	B
6.	Townships and Area development projects	39	8 (b)	B

**Note:** Names of approved EIA Coordinators and Functional Area Experts are mentioned in IA AC Minutes dated December 20, 2019 on QCI-NABET website.

The Accreditation shall remain in force subject to continued compliance to the terms and conditions mentioned in NABET's letter of accreditation bearing no. QCI/NABET/ENV/ACO/20/1223 dated February 3, 2020. The accreditation needs to be renewed before the expiry date by P and M Solution, Noida following due process of assessment.

  
 Sr. Director, NABET  
 Dated: February 3, 2020

Certificate No.  
 NABET/EIA/1922/IA0053

Valid till  
 Dec 10, 2022

For the updated List of Accredited EIA Consultant Organizations with approved Sectors please refer to QCI-NABET website.

**Project: Sand Mining Project (Bhoj Son 18 Sand Ghat) At Riverbed of Son River at Mauja–Khandol, Anchal- Sandesh, District- Bhojpur, Bihar.**



National Accreditation Board for Education and Training



QCI/NABET/ENV/ACO/23/2770

June 02, 2023

To

**P and M Solution**  
C-88, Sector-65 Noida  
Noida, UP

Sub.: Extension of Validity of Accreditation till Sept 01, 2023 – regarding  
Ref.. 1. Certificate no. NABET/EIA/1922/IA0053  
2. Request e-mail dated May 30, 2023

Dear Sir/Madam

This has reference to the accreditation of your organization under the QCI-NABET EIA Scheme, the validity of **P and M Solution** is hereby extended till Sept 01, 2023 or completion of the assessment process, whichever is earlier.

The above extension is subject to the submitted documents/required information with respect to your application and timely submission and closure of NC/Obs during the process of assessment.

You are requested not to use this letter after expiry of the above stated date.

With best regards.

(A K Jha)  
Sr. Director, NABET

NABET

**Project: Sand Mining Project (Bhoj Son 18 Sand Ghat) At Riverbed of Son River at Mauja–Khandol, Anchal- Sandesh, District- Bhojpur, Bihar.**

**Consultant Contact Details:**

**P and M Solution**

**Address –C-88, Sector 65 Noida**

**Mobile no. - +8377871554, 8826287364**

<b>S No</b>	<b>Name</b>	<b>EC/FAE</b>	<b>DETAILS</b>
1	Pravin Kumar Sinha	EC	EC
2	Pravin Kumar Sinha	FAE	GEO
3	Tapan Majumdar	FAE	HG
4	Subhash Kumar	FAE	SC
5	Manoj Kumar Pandey	FAE	EB
6	R K Tiwary	FAE	RH,AP
7	Rahul kumar	FAE	AQ
8	Abhay Nath Mishra	FAE	SE
9	Hussain Ziauddin	FAE	WP
10	Poonam Kumari Mangalam	FAE	LU
11	Jatin kumar srivastava	FAE	NV

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# EXECUTIVE SUMMARY

FOR

SAND MINING PROJECT BHOJ SON 18 SAND  
GHAT, DISTRICT - BHOJPUR

At

**Mauja– Khandol, Anchal- Sandesh,  
Dist - Bhojpur , State – Bihar**

<b>SAND BLOCK</b>	<b>BHOJ SON 18</b>
<b>AREA</b>	<b>79.0 HA</b>
<b>PRODUCTION</b>	<b>2417400 TPA</b>

## PROJECT PROPONENT

**M/s Tirupati Petro Mart**

**Prop- Rita Devi**

**Add.- Mahthu Jamhor, Aurangabad,  
Dist. - Aurangabad, Bihar, Pin - 824121.**

## Environment Consultant

**P and M Solution**

**(Accredited by QCI/NABET)**

**Accreditation No. : NABET/EIA/1992/IA0053**

**C-88, Sector 65 Noida**

**[www.pmsolution.in](http://www.pmsolution.in)**



## **EXECUTIVE SUMMARY**

### **INTRODUCTION**

As per MoEF & CC, New Delhi Gazette dated 14<sup>th</sup> September 2006 and amended thereof, the proposed mining project is categorized as **Category 'B1'** project.

### **Bhoj Son 18**

The project has been proposed by M/s Tirupati Petro Mart, Prop- Rita Devi. The proposed project is over an area of 79.0 Ha at Khata no. – 533 Khasra No.- 4670, 4671, 4672, 4673(P) & 4674 on Son River at mauja– Khandol, Anchal- Sandesh, Dist - Bhojpur (Bihar). LOI issued to lessee via letter no 4960/M, dated 14-12-2022. The Draft EIA report has been prepared according to EIA notification 2006 and its subsequent amendment thereof. TOR of the proposed project has been issued by SEIAA Bihar dated 06-04-2023.

It has been proposed to mine around **2417400** Tonnes per annum for applied lease. The estimated project cost for the proposed project is **Rs 24,65,80,000/-** (including auction cost)

### **PROJECT DESCRIPTION**

#### **LOCATION**

#### **Bhoj Son 18**

The proposed mining lease area falls in Survey of India Toposheet Topo sheet No- 72C/11 & 72C/15. The lease area is located in Mauja– Khandol, Anchal- Sandesh, Dist - Bhojpur, (Bihar).

The mine lease co-ordinates are listed below:

<b>Pillar No.</b>	<b>Latitude /Longitude</b>
1	25° 22' 49.094" N 84° 44' 43.194" E
2	25° 22' 52.628" N 84° 44' 36.220" E
3	25° 23' 13.289" N 84° 44' 34.261" E
4	25° 23' 15.470" N 84° 44' 37.245" E
5	25° 23' 26.939" N 84° 44' 33.551" E
6	25° 23' 37.776" N 84° 44' 37.990" E

7	25° 23' 35.845" N 84° 44' 55.432" E
8	25° 23' 27.490" N 84° 44' 53.317" E
9	25° 23' 18.768" N 84° 44' 55.672" E
10	25° 23' 12.887" N 84° 45' 1.068" E
11	25° 22' 47.465" N 84° 44' 46.407" E

**Area & production:** The total ML area is 79.0 Ha. Proposed rate of production will be 2417400 TPA.

### **Connectivity:**

#### **Bhoj Son 18**

Bhoj Son 18 Sand Ghat is well connected to SH 81 via an approach road of approx. 1.0 km. NH 139: approx. 2.50 KM towards East direction. SH 81: approx. 0.50 km towards West direction. Garhani Railway Station, approx. 17.80 km in West direction.

### **Salient Features of Project**

#### **Bhoj Son 18**

Name of the applicant	M/s Tirupati Petro Mart Prop- Rita Devi
Address of Lessee	M/s Tirupati Petro Mart Prop- Rita Devi Add.- Mahthu Jamhor, Aurangabad, Dist. - Aurangabad, Bihar, Pin - 824121. Mob. 9279078282 Email. hptirupatipetromart@gmail.com
Name of Mine	Sand Mining Project (Bhoj Son 18 Sand Ghat) At Riverbed of Son River
Village	Mauja- Khandol
District & State	Bhojpur, Bihar
Mineral	Sand
Area (ha)	79.0 hectare

### **MINING**



The mining process is opencast semi-mechanized method without drilling & blasting. This is an open-cast mining project. The operation will be semi-mechanized/OTFM with use of excavators/JCBs truck /tractors combination or Manually etc. The sand will be collected in its existing form.

The mining will be done in a rotational way. As the working is going to be methodical i.e. mining will be done in benches. There would be no risk to the employee working in the mines.

Mining will be done in layers.

The deposit will be worked from the surface of the bed up to 3 m bgl or above ground water level, whichever comes first. Hence, at no point of time mining will intersect with ground water table. Mining will be done only during the day time and completely stopped during the monsoon season.

### **RESERVE AND PRODUCTION**

Mineable reserves have been computed up to 3m depth from surface. Benches having height 1.5m & width 6.0m drawn from the ultimate pit limit. Area of each benches have been calculated multiplied by strike influence to get the volume. The volume multiplied by bulk density (1.7 g/cm<sup>3</sup>) to get the tonnage.

The minerals excavated from the river bed will be replenished gradually during the monsoon season every year. And the area pertaining to paleochannels of the river will be leveled & restored back.

The bench-wise annual exploitation of sand of is given below:

#### **Bhoj Son 18**

<b>Bench Level (mRL)</b>	<b>Length (m)</b>	<b>Width (m)</b>	<b>Depth (m)</b>	<b>Volume (cum)</b>	<b>Tonnes</b>
65-63.5	1443	527	1.5	1140692	1939177
63.5-62	1433	517	1.5	1111292	1889197
<b>Total</b>				2251983	3828372

Total Mineable Reserve = **2251983 CUM** or **3828372 Tonnes**

It is a river bed deposit and mined out area shall be replenished each year during monsoon period and depth of quarry shall be filled back by river sand each year and area will restore its original topography.

## **SITE FACILITIES AND UTILITIES**

### **Water Supply**

Water will be provided to workers for drinking & domestic purpose. Water will also be required for dust suppression. A total cluster water of 10.59 ~ 10.60 KLD will be required for the proposed project. Fresh water will be only used for drinking purpose. The water will be supplied from available sources from nearby village.

### **Temporary Rest Shelter**

A temporary rest shelter will be provided for the workers near to the site for rest. In addition, First aid box along with anti-venoms to counteract poison produced by certain species of small insects, if any and sanitation facility i.e. septic tank or community toilet facility will be provided for the workers.

## **BASELINE ENVIRONMENTAL STATUS**

Environmental data has been collected in relation to proposed mining for Air, Noise, Water, Soil, Flora & Fauna. The baseline environment study was carried out over an area with radial distance of 10 km around the mining lease area during pre monsoon from March to May 2023

### **Meteorology**

The Summarized Meteorological Data for the Monitoring Period March to May 2023) is given below:

<b>Month</b>	<b>Temperature °C</b>		<b>Wind Speed (Km/Hr)</b>	
	<b>Min</b>	<b>Max</b>	<b>Avg.</b>	<b>Max</b>
March 2023	14	29	9.7	16.8
April 2023	17	33	10.7	17.8
May 2023	18	32	9.4	15.6

**Table Baseline Environmental Status**

<b>Attribute</b>	<b>Baseline status</b>
Ambient Air Quality	Ambient Air Quality Monitoring reveals that the minimum & maximum concentrations of PM <sub>2.5</sub> amongst all the 05 AQ monitoring stations were found to be 36.8 µg/m <sup>3</sup> to 44.9 µg/m <sup>3</sup> respectively; PM <sub>10</sub> was in the range of 71.6 µg/m <sup>3</sup> to 87.5 µg/m <sup>3</sup> As far as the gaseous pollutants SO <sub>2</sub> and NO <sub>2</sub> are concerned, the

	prescribed CPCB limit of $80 \mu\text{g}/\text{m}^3$ for residential and rural areas has never been surpassed at any station.
Noise Levels	The results of the monitoring program indicated that both the daytime and night time levels of noise were well within the prescribed limits of NAAQS, at all the 05 locations monitored.
Water Quality	The ground water from all sources remains suitable for drinking purposes as all the constituents are within the limits prescribed by drinking water standards promulgated by IS: 10500.  Surface water analysis from River Son results it is evident that most of the parameters of the samples comply with 'Category B' standards of CPCB, indicating their suitability for outdoor bathing.
Soil Quality	Samples collected from identified locations indicate the soil is sandy type and the pH value ranging from 7.30 to 8.3, which shows that the soil is slightly alkaline in nature.
Ecology and Biodiversity	There is no Ecological Sensitive Areas are found within 10 km of the study area.

## **ANTICIPATED ENVIRONMENTAL IMPACTS**

### **Impact on Air Environment**

The proposed mining activities loading and movement of other transport vehicles used in mining will generate dust (SPM/RSPM). Proper water sprinkling shall be carried out at the mine site. The mineral will be transported by road through covered tarpaulin trucks/tippers to reduce the fugitive emission caused by the wind.

### **Impact on Water Environment**

Mining of sand from within or near *river* has an indirect impact on the physico-chemical habitat characteristics during monsoon season. These characteristics include in stream roughness, elements, depth, velocity, turbidity, sediment transport and stream discharge.

The detrimental effects, if any, to biota resulting from bed material mining are caused by following:

- Alteration of flow patterns resulting from modification of the *river*

- An excess of suspended sediment during monsoon season.

Project activity will be carried out only in the dry part of the Son River. Hence, none of the project activities affect the water environment directly. In the project, it is not proposed to divert or truncate any stream in monsoon season only. No proposal is envisaged for pumping of water either from the *River* (in monsoon) or tapping the ground water.

### **Impact on Land Environment**

The proposed extraction of stream bed materials, mining below the existing streambed, and alteration of channel-bed form and shape may lead to several impacts such as erosion of channel bed and banks, increase in channel slope, and change in channel morphology if, the operations are not carried out systematically.

The systematic and scientific removal of sand will not cause bed degradation. The silt and clay generated as waste will be used for plantation or filling up low lying area elsewhere. The mining is planned in non monsoon seasons only, so that the excavated area gets replenished gradually during the monsoons each year.

### **Impact on Noise Environment**

The proposed mining activity is semi-mechanized in nature. No drilling & blasting is envisaged for the mining activity. Hence, the only impact is anticipated is due to movement of vehicles deployed for transportation of minerals. The vehicles will be maintained in good running condition so that noise will be reduced to minimum possible level.

### **Impact on Biological Environment**

As the proposed mining will be carried out in a scientific manner, not much significant impact is anticipated. No mining will be carried out during the monsoon season to minimize impact on aquatic life which is mainly breeding season for many of the species. The mining site has no vegetation; no clearance of vegetation will be done. Haul roads will be sprinkled with water which would reduce the dust emission, thus avoiding damage to the crops.

### **Impact on Socio Economic Environment**

The impact of mining activity in the area is positive on the socio-economic environment of the region. Sand mining will be providing employment to local people whenever there is requirement of manpower.

## **POST PROJECT ENVIRONMENTAL MONITORING**

<b>S.No.</b>	<b>Description of Parameters</b>	<b>Schedule of Monitoring</b>
<b>1</b>	Air Quality	24 hourly samples twice/thrice a week in each season except monsoon
<b>2</b>	Water Quality (Surface & Groundwater)	Once a season for 4 seasons in a year
<b>3</b>	Soil Quality	Once in a year in project area
<b>4</b>	Noise Level	Twice a year for first two years & then once a year
<b>5</b>	Socio-economic Condition	Once in 3 years
<b>6</b>	Plantation Monitoring	Once in a season

## **ADDITIONAL STUDIES**

### **Public Hearing**

Public hearing is yet to be conducted.

### **Risk Assessment**

The complete mining operation will be carried out under the management control and direction of a qualified mine manager holding. The DGMS have been regularly issuing standing orders, model standing orders and circulars to be followed by the mine management in case of disaster, if any. Moreover, mining staff will be sent to refresher courses from time to time to keep them alert.

### **Disaster Management Plan**

Emergency preparedness is an important aspect in the planning of Disaster Management. Personnel would be trained suitably and prepared mentally and physically in emergency response through carefully planned, simulated procedures. Similarly, the key personnel and essential personnel shall be trained in the operations.

## **PROJECT BENEFITS**

**Physical Benefits:** Road Transport, Market, Enhancement of green cover & Creation of community assets.

**Social Benefits:** Increase in Employment Potential, Contribution to the Exchequer, Increased Health related activities, Educational attainments & Strengthening of existing community facilities.

**Environmental Benefits:**

- Controlling *river* channel and protection of banks.
- Reducing submergence of adjoining agricultural lands due to flooding.
- Reducing aggradation of *river* level.
- A check on illegal mining activity.

**CORPORATE SOCIAL RESPONSIBILITY**

2% of capital cost of the project cost will be allotted for the Corporate Environmental Responsibility as per OM dated 1<sup>st</sup> May 2018. The following has been proposed considering the needs & demand of the people.

CSR cost will be 2% of the total project cost. This amount will be used for social welfare. CSR COST is 24,65,80,000/-x 2% = Rs. 49,31,600/-.

For each activity the funds to be earmarked by the proponent will be decided after discussion with the local authority/people and the beneficiaries during Public Hearing. It has been planned to undertake a concurrent evaluation of the activities to be taken up under the CER programme.

**❖ PLANTATION:**

- The project will not lead to any tree cutting. However, a social responsibility, greenery will be developed along the both sides of road and the bank of river. Community services will be deployed in raising these plantations. Trees of economic importance and native origin such as fruit trees shall be planted.
- Approx. 790 trees will be planted around haul road during the plan period.
- The trees proposed for plantation are:
- As per Sustainable Sand Management & Mining Guidelines 2016, minimum 5 plant per hectare will be proposed for development of greenbelt but in this cluster of projects 10 plants per hectare will be proposed for better condition of environment.
- Peepal, Arjun, Jamun, Banyan, Neem, Mango etc trees will be planted.

## **ENVIRONMENTAL MANAGEMENT PLAN (EMP)**

- Extraction will be done from the bed leaving safety zone from bank.
- The maximum working depth will remain above ground water table of the area.
- Provide health facilities to the workers & surrounding people in the impact area to reduce the health impacts.
- Ensuring wildlife protection & arranging awareness campaigns for the same.
- Minimize activities that release fine sediment to the *river*.
- Effective mitigation measures will be adopted to minimize disturbance during transportation & handling of minerals
- Establishment of reclamation program with plantation of local/native & fast growing species
- Establishment of restoration plan during the closure of mine at the onset of monsoon season.
- Establishment of effective Disaster Management Plan to take timely precautionary measures to avoid effects of impending disasters.
- Establishment of effective Monitoring Program monitored by Environment Management Cell.

## **BUDGET ALLOCATION FOR EMP IMPLEMENTATION**

**Table, Budget of EMP (Bhoj Son 18)**

<b>Sl. No</b>	<b>Description</b>	<b>Capital Cost (lakh)</b>	<b>Recurring Cost (lakh)</b>
1	Pollution Control & Dust Suppression	Nil	1.5
2	Pollution Monitoring i) Air pollution ii) Water pollution iii) Soil pollution iv) Noise Pollution	--	2.0
3	Plantation and salary for one gardener (part time basis).	7.9	0.5
4	Haul road Maintenance Cost	2.5	1.5
<b>TOTAL</b>		<b>10.4</b>	<b>5.5</b>

Note: \*790 plants \* 1000 Rs (for each plants including hedges and fences) =Rs 7,90,000/-

- Salary of Labour for haul road maintenance 2 labor\*300=600 per day
- 600\* 250= 1,50,000/-
- \* 2.5 lakh per kilometer ( 2,50,000 \*1.0 km haul road) = 2,50,500 /-

## **CONCLUSION**

Based on the EIA study it is observed that there will be an increase in the dust pollution, which will be controlled by sprinkling of water and plantation. There will be an insignificant impact on ambient environment and ecology due to the mining activities moreover the mining operation will lead to direct and indirect employment generation in the area. Green belt development around the area will also be taken up as an effective pollution mitigative technique, as well as to control the pollutants released from the premises of the Mine. Monitoring program will be followed till the mining operations continue. Hence, it can be summarized that the development of the mine will have a positive impact on the socio-economic environment of the area and lead to sustainable development of the region.

\*\*\*\*\*



# कार्यकारी सारांश

## बालू खनन परियोजना भोज सोन 18 बालू घाट के लिए

मौजा - खांडोल,  
अंचल- सन्देश, जिला - भोजपुर

बालू ब्लॉक	भोज सोन 18
क्षेत्र	79.0 हेक्टेयर
उत्पादन	2417400 टन प्रति वर्ष

## आवेदन कर्ता

### मैसर्स तिरुपति पेट्रो मार्ट

प्रोप. - रीता देवी

पता - महथु जम्होर, औरंगाबाद,  
जिला - औरंगाबाद, बिहार, पिन - 824121



एनवायरनमेंट कन्सल्टेंट :  
**पी & एम सल्यूशन**



(क्वालिटी कौंसिल ऑफ़ इंडिया द्वारा मान्यता प्राप्त)  
सी-88 सेक्टर 65 नॉएडा उत्तर-प्रदेश

[www.pmsolution.in](http://www.pmsolution.in)

Accreditation No. : NABET/EIA/1992/IA0053

## कार्यकारी सारांश

### ❖ परिचय

MoEF & CC (एमओईएफ एंड सीसी), नई दिल्ली राजपत्र दिनांक 14 सितंबर 2006 और उसमें समय समय पर किये गए संशोधन के अनुसार, प्रस्तावित खनन परियोजना को श्रेणी 'बी1' परियोजना के रूप में वर्गीकृत किया गया है।

### ❖ भोज सोन 18

परियोजना के प्रस्ताव मैसर्स तिरुपति पेट्रो, मार्ट प्रोप. - रीता देवी ने दिया है। प्रस्तावित बालू खनन परियोजना मौजा- खांडोल, अंचल- सन्देश, जिला-भोजपुर (बिहार) में ब्लॉक संख्या - 18 बालू घाट पर सोन नदी पर स्थित है। पत्र संख्या 4960/एम दिनांक 14.12.2022 के माध्यम से पट्टेदार को एलओआई जारी किया गया।

ईआईए अधिसूचना 2006 और इसके बाद के संशोधन के अनुसार ड्राफ्ट ईआईए रिपोर्ट तैयार की गई है। प्रस्तावित परियोजना का टीओआर SEIAA बिहार दिनांक 06-04-2023 द्वारा जारी किया गया है।

आवेदित पट्टे के लिए प्रति वर्ष लगभग 2417400 टन खनन प्रस्तावित किया गया है, प्रस्तावित परियोजना के लिए अनुमानित परियोजना लागत 24,65,80,000/- रुपये (नीलामी लागत सहित) है।

### ❖ परियोजना विवरण

**स्थान:**

**भोज सोन 18**

प्रस्तावित खनन पट्टा क्षेत्र सर्वे ऑफ इंडिया टोपोशीट टोपो शीट संख्या- 72C/11, 72C/15 के अंतर्गत आता है। पट्टा क्षेत्र मौजा- खांडोल, अंचल- सन्देश, जिला-भोजपुर, राज्य- बिहार में स्थित है। खान पट्टा समन्वय नीचे सूचीबद्ध हैं:

स्तंभ	अक्षांश / देशांतर
1	25° 22' 49.094" N 84° 44' 43.194" E
2	25° 22' 52.628" N 84° 44' 36.220" E

<b>3</b>	25° 23' 13.289" N 84° 44' 34.261" E
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<b>10</b>	25° 23' 12.887" N 84° 45' 1.068" E
<b>11</b>	25° 22' 47.465" N 84° 44' 46.407" E

❖ **क्षेत्र और उत्पादन:** कुल क्षेत्रफल 79.0 हेक्टेयर है। उत्पादन की प्रस्तावित दर 2417400 टीपीए होगी।

## ❖ संयोजकता

### भोज सोन 18

भोज सोन 18 बालू घाट, लगभग 1.0 कि.मी. की एक संपर्क सड़क के माध्यम से SH 81 से अच्छी तरह से जुड़ा हुआ है। NH 139 लगभग 2.50 किमी पूर्व दिशा की ओर है। SH 81 लगभग 0.50 किमी पश्चिम दिशा की ओर है। गड़हनी रेलवे स्टेशन , लगभग 17.80 किमी पश्चिम दिशा की ओर है।

### परियोजना की मुख्य विशेषताएं

### भोज सोन 18

आवेदक का नाम	मैसर्स तिरुपति पेट्रो मार्ट प्रोप. - रीता देवी
पट्टेदार का पता	मैसर्स तिरुपति पेट्रो मार्ट प्रोप. - रीता देवी पता - महथु जम्होर, औरंगाबाद, जिला - औरंगाबाद, बिहार, पिन - 824121
नाम	बालू खनन परियोजना भोज सोन 18 बालू घाट (सोन नदी)

गाँव	मौजा - खांडोल,
जिला और राज्य	भोजपुर, बिहार
खनिज	बालू
क्षेत्र (हेक्टेयर)	79.0 हेक्टेयर

## ❖ ड्रिलिंग

ड्रिलिंग और ब्लास्टिंग की आवश्यकता नहीं है।

## ❖ खनिज का उपयोग

बालू का उपयोग निर्माण कार्यवो में किया जाता है सड़क निर्माण में भी इसका उपयोग किया जाता है

## ❖ खनन

खनन प्रक्रिया ड्रिलिंग और ब्लास्टिंग के बिना खुली अर्ध-मशीनीकृत विधि है। यह एक ओपन कास्ट माइनिंग प्रोजेक्ट है। उत्खनन/जेसीबी ट्रक/ट्रैक्टर संयोजन या मैन्युअल आदि के उपयोग के साथ संचालन अर्ध-मशीनीकृत/ओटीएफएम होगा। बालू को अपने मौजूदा रूप में एकत्र किया जाएगा।

खनन रोटेशनल तरीके से किया जाएगा। चूंकि काम व्यवस्थित होने जा रहा है यानी बेंचों में खनन किया जाएगा। खदान में काम करने वाले कर्मचारी को कोई खतरा नहीं होगा। खनन परतों में किया जाएगा।

निक्षेप को संस्तर की सतह से 3 एमबीजीएल या भूजल स्तर से ऊपर, जो भी पहले आए, तक कार्य किया जाएगा। इसलिए, किसी भी समय खनन भूजल स्तर को नहीं काटेगा। खनन केवल दिन के समय किया जाएगा और मानसून के मौसम में पूरी तरह बंद कर दिया जाएगा।

## ❖ रिजर्व और उत्पादन

खनन योग्य भंडार की गणना सतह से 3 मीटर की गहराई तक की गई है। टनभार प्राप्त करने के लिए वॉल्यूम को बल्क डेंसिटी (1.70 g/cm<sup>3</sup>) से गुणा किया जाता है।

हर साल मानसून के मौसम के दौरान नदी तल से उत्खनन किए गए खनिजों की फिर से भरपाई (रिप्लेनिशमेंट) हो जाएगी। नदी के पैलियो चैनल से संबंधित क्षेत्र को समतल करके वापस बहाल किया जाएगा।

बेंचवार बालू का वार्षिक दोहन नीचे दिया गया है:

### भोज सोन 18

बेंच स्तर (mRL)	लंबाई (M)	चौड़ाई (M)	गहराई (M)	मात्रा (घन मीटर)	टन
65-63.5	1443	527	1.5	1140692	1939177
63.5-62	1443	517	1.5	1111292	1889197
<b>कुल</b>				2251983	3828372

कुल खनन योग्य रिजर्व = 2251983 घन मीटर या 3828372 टन

यह नदी तल जमा है और खनन क्षेत्र हर साल मानसून अवधि के दौरान फिर से भर जाएगा और खदान की गहराई हर साल नदी की बालू से भर जाएगा (रिप्लेनिशमेंट) और क्षेत्र अपनी मूल स्थलाकृति बहाल को कर देगा।

#### ❖ साइट सुविधाएं और उपयोगिताएँ

##### • जलापूर्ति

श्रमिकों को पीने व घरेलू उपयोग के लिए पानी उपलब्ध कराया जाएगा। धूल के दमन के लिए भी पानी की आवश्यकता होगी। प्रस्तावित परियोजना के लिए 10.59 ~ 10.60 केएलडी के जल की आवश्यकता होगी। ताजे पानी का उपयोग केवल पीने के उद्देश्य के लिए किया जाएगा। आसपास के गांव के उपलब्ध स्रोतों से पानी की आपूर्ति की जाएगी।

##### • अस्थायी विश्राम गृह

विश्राम के लिए स्थल के पास श्रमिकों के लिए एक अस्थायी विश्राम आश्रय प्रदान किया जाएगा। इसके अलावा, छोटे कीड़ों की कुछ प्रजातियों द्वारा उत्पादित जहर का मुकाबला करने के लिए एंटी-वेनम के साथ प्राथमिक उपचार बॉक्स, यदि कोई हो और श्रमिकों के लिए स्वच्छता सुविधा जैसे सेप्टिक टैंक या सामुदायिक शौचालय की सुविधा प्रदान की जाएगी।

##### • आधारभूत पर्यावरणीय स्थिति

वायु, ध्वनि, जल, मिट्टी, वनस्पति एवं जीव-जन्तुओं के लिए प्रस्तावित खनन के संबंध में पर्यावरणीय डाटा एकत्र किया गया है। बेसलाइन पर्यावरण अध्ययन मार्च 2023 से मई 2023 तक प्री मानसून के मौसम के दौरान खनन पट्टा क्षेत्र के आसपास 10 किमी की रेडियल दूरी वाले क्षेत्र में किया गया था।

- **मौसम-विज्ञान**

निगरानी अवधि मार्च 2023 से मई 2023 के लिए संक्षिप्त मौसम संबंधी डेटा नीचे दिया गया है:

महीना	तापमान °C		हवा की गति (किमी/घंटा)	
	न्यूनतम	अधिकतम	औसत	अधिकतम
मार्च 2023	14	29	9.7	16.8
अप्रैल 2023	17	33	10.7	17.8
मई 2023	18	32	9.4	15.6

### आधारभूत पर्यावरणीय स्थिति

गुण	आधारभूत स्थिति
एम्बिएंट(परिवेशी) वायु गुणवत्ता	एम्बिएंट (परिवेशी) वायु गुणवत्ता निगरानी से पता चलता है कि सभी 05 AQ निगरानी स्टेशनों में PM2.5 की न्यूनतम और अधिकतम सांद्रता क्रमशः 36.8 µg/m <sup>3</sup> से 44.9 µg/m <sup>3</sup> पाई गई; PM10 71.6 µg/m <sup>3</sup> to 87.5 µg/m <sup>3</sup> की सीमा में था जहां तक गैसीय प्रदूषकों SO <sub>2</sub> और NO <sub>2</sub> का संबंध है, आवासीय और ग्रामीण क्षेत्रों के लिए 80 µg/m <sup>3</sup> की निर्धारित CPCB सीमा किसी भी स्टेशन पर पार नहीं की गई है।
शोर का स्तर	निगरानी कार्यक्रम के परिणामों ने संकेत दिया कि निगरानी किए गए सभी 05 स्थानों पर शोर के दिन

	और रात दोनों समय एनएएक्यूएस की निर्धारित सीमा के भीतर थे।
पानी की गुणवत्ता	सभी स्रोतों से भूजल पीने के उद्देश्यों के लिए उपयुक्त रहता है क्योंकि सभी घटक IS: 10500 द्वारा प्रख्यापित पेयजल मानकों द्वारा निर्धारित सीमा के भीतर हैं। सोन नदी के सतही जल विश्लेषण के परिणामों से यह स्पष्ट होता है कि नमूनों के अधिकांश पैरामीटर सीपीसीबी के 'श्रेणी बी' मानकों का अनुपालन करते हैं, जो इंगित करता है यह जल स्नान के लिए उपयुक्त हैं।
मिट्टी की गुणवत्ता	चिन्निहित किए गए स्थानों से एकत्र किए गए नमूने इंगित करते हैं कि मिट्टी रेतीली प्रकार की है और पीएच मान 7.30 से 8.3 के बीच है, जो दर्शाता है कि मिट्टी प्रकृति में थोड़ी क्षारीय है।
पारिस्थितिकी और जैव विविधता	अध्ययन क्षेत्र के 10 कि.मी. के भीतर कोई भी पारिस्थितिक संवेदनशील क्षेत्र नहीं है
सामाजिक आर्थिक	नदी तल पर बालू खनन परियोजना के कार्यान्वयन से स्थानीय लोगों को प्रत्यक्ष और अप्रत्यक्ष दोनों तरह के रोजगार के अवसर मिलेंगे। अध्ययन क्षेत्र में शिक्षा, स्वास्थ्य, आवास, पानी, बिजली आदि को और बेहतर किया जा सकता है। उम्मीद है कि प्रस्तावित खनन परियोजना और संबद्ध औद्योगिक और व्यावसायिक गतिविधियों के कारण इसमें काफी हद तक और सुधार होगा।

## ❖ अनुमानित पर्यावरणीय प्रभाव

### • वायु पर्यावरण पर प्रभाव

प्रस्तावित खनन गतिविधियां खनन में प्रयुक्त अन्य परिवहन वाहनों की लोडिंग और आवाजाही से धूल (SPM/RSPM) उत्पन्न होगी। खदान स्थल पर उचित जल छिड़काव किया जाएगा। हवा से होने वाले

क्षणिक उत्सर्जन को कम करने के लिए खनिज को ढके हुए तिरपाल ट्रकों/टिप्परों के माध्यम से सड़क मार्ग से ले जाया जाएगा।

### ● जल पर्यावरण पर प्रभाव

नदी के भीतर या उसके पास से बालू के खनन का मानसून के मौसम के दौरान भौतिक-रासायनिक आवास विशेषताओं पर अप्रत्यक्ष प्रभाव पड़ता है। इन विशेषताओं में धारा खुरदरापन, तत्व, गहराई, वेग, मैलापन, तलछट परिवहन और धारा निर्वहन शामिल हैं।

संस्तर सामग्री खनन से उत्पन्न बायोटा पर हानिकारक प्रभाव, यदि कोई हो, निम्नलिखित के कारण होते हैं:

- नदी के परिवर्तन के परिणामस्वरूप प्रवाह पैटर्न में बदलाव
- मानसून के मौसम में निलम्बित तलछट की अधिकता।

परियोजना गतिविधि केवल सोन नदी के शुष्क भाग में की जाएगी। इसलिए, परियोजना की कोई भी गतिविधि सीधे तौर पर जल पर्यावरण को प्रभावित नहीं करती है। परियोजना में केवल मानसून के मौसम में किसी धारा को मोड़ने या काट देने का प्रस्ताव नहीं है। नदी (मानसून में) या भूजल दोहन से पानी की पंपिंग के लिए किसी प्रस्ताव की परिकल्पना नहीं की गई है।

### ❖ भूमि पर्यावरण पर प्रभाव

स्ट्रीम बेड सामग्री का प्रस्तावित निष्कर्षण, मौजूदा स्ट्रीमबेड के नीचे खनन, और चैनल-बेड फॉर्म और आकार में परिवर्तन से चैनल बेड और बैंकों के क्षरण, चैनल ढलान में वृद्धि, और चैनल आकारिकी में परिवर्तन जैसे कई प्रभाव हो सकते हैं, यदि, संचालन व्यवस्थित रूप से नहीं किया जाता है।

बालू के व्यवस्थित और वैज्ञानिक तरीके से हटाने से क्यारियों का क्षरण नहीं होगा। कचरे के रूप में उत्पन्न गाद और मिट्टी का उपयोग वृक्षारोपण के लिए या निचले इलाकों को कहीं और भरने के लिए किया जाएगा। खनन की योजना गैर-मानसून मौसम में ही बनाई जाती है, ताकि उत्खनित क्षेत्र प्रत्येक वर्ष मानसून के दौरान धीरे-धीरे भर जाए (रिप्लेनिशमेंट)।

### ❖ शोर पर्यावरण पर प्रभाव



प्रस्तावित खनन गतिविधि प्रकृति में अर्ध-मशीनीकृत है। खनन गतिविधि के लिए कोई ड्रिलिंग और ब्लास्टिंग परिकल्पित नहीं है। इसलिए, केवल खनिजों के परिवहन के लिए तैनात वाहनों की आवाजाही के कारण प्रभाव का अनुमान लगाया गया है। वाहनों को अच्छी चालू स्थिति में रखा जाएगा ताकि शोर को न्यूनतम संभव स्तर तक कम किया जा सके।

### ❖ जैविक पर्यावरण पर प्रभाव

चूंकि प्रस्तावित खनन वैज्ञानिक तरीके से किया जाएगा, इसलिए ज्यादा महत्वपूर्ण प्रभाव का अनुमान नहीं है। जलीय जीवन पर प्रभाव को कम करने के लिए मानसून के मौसम के दौरान कोई खनन नहीं किया जाएगा जो कि कई प्रजातियों के लिए मुख्य रूप से प्रजनन का मौसम है। खनन स्थल पर कोई वनस्पति नहीं है; वनस्पति की सफाई नहीं की जाएगी। ढोने वाली सड़कों पर पानी का छिड़काव किया जाएगा जिससे धूल का उत्सर्जन कम होगा और इस प्रकार फसलों को होने वाले नुकसान से बचा जा सकेगा।

### ❖ सामाजिक आर्थिक पर्यावरण पर प्रभाव

क्षेत्र में खनन गतिविधि का प्रभाव क्षेत्र के सामाजिक-आर्थिक वातावरण पर सकारात्मक है। बालू खनन से स्थानीय लोगों को जब भी श्रमबल की आवश्यकता होगी रोजगार उपलब्ध होगा।

### पोस्ट प्रोजेक्ट पर्यावरण निगरानी

क्रम संख्या	पैरामीटर्स का विवरण	निगरानी की अनुसूची
1	हवा की गुणवत्ता	मानसून को छोड़कर प्रत्येक मौसम में सप्ताह में दो बार/तीन बार 24 घंटे के नमूने
2	जल गुणवत्ता (सतह और भूजल)	साल में 4 सीजन के लिए एक बार
3	मिट्टी की गुणवत्ता	परियोजना क्षेत्र में वर्ष में एक बार
4	शोर स्तर	साल में दो बार पहले दो साल और फिर साल में एक बार
5	सामाजिक-आर्थिक स्थिति	3 साल में एक बार

6	वृक्षारोपण निगरानी	एक बार एक मौसम में
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### ❖ अतिरिक्त अध्ययन

#### • सार्वजनिक सुनवाई

जन सुनवाई अभी बाकी है।

### ❖ जोखिम आकलन

पूर्ण खनन कार्य एक योग्य खदान प्रबंधक होल्डिंग के प्रबंधन नियंत्रण और निर्देशन में किया जाएगा। डीजीएमएस नियमित रूप से स्थायी आदेश, मॉडल स्थायी आदेश और आपदा, यदि कोई हो, के मामले में खान प्रबंधन द्वारा पालन किए जाने वाले परिपत्र जारी करता रहा है। साथ ही खनन कर्मचारियों को सतर्क रखने के लिए समय-समय पर रिफ्रेशर कोर्स में भेजा जाएगा।

### ❖ आपदा प्रबंधन योजना

आपदा प्रबंधन की योजना में आपातकालीन तैयारी एक महत्वपूर्ण पहलू है। कार्मिकों को उचित रूप से प्रशिक्षित किया जाएगा और सावधानीपूर्वक नियोजित, सिम्युलेटेड प्रक्रियाओं के माध्यम से आपातकालीन प्रतिक्रिया में मानसिक और शारीरिक रूप से तैयार किया जाएगा। इसी तरह, प्रमुख कर्मियों और आवश्यक कर्मियों को संचालन में प्रशिक्षित किया जाएगा।

### ❖ परियोजना लाभ

- **भौतिक लाभ:** सड़क परिवहन, बाजार, हरित आवरण में वृद्धि और सामुदायिक संपत्तियों का निर्माण।
- **सामाजिक लाभ:** रोजगार क्षमता में वृद्धि, राजकोष में योगदान, स्वास्थ्य संबंधी गतिविधियों में वृद्धि, शैक्षिक उपलब्धियां और मौजूदा सामुदायिक सुविधाओं का सुदृढीकरण।

### ❖ पर्यावरणीय लाभ:

- ❖ नदी चैनल को नियंत्रित करना और बैंकों की सुरक्षा करना।
- ❖ बाढ़ के कारण आसपास की कृषि भूमि के डूबने को कम करना।
- ❖ नदी के स्तर के उन्नयन को कम करना।
- ❖ अवैध खनन गतिविधि पर एक जांच।

## ❖ कॉर्पोरेट की सामाजिक जिम्मेदारी

दिनांक 1 मई 2018 के कार्यालय ज्ञापन के अनुसार परियोजना लागत की पूंजीगत लागत का 2% कॉर्पोरेट पर्यावरणीय उत्तरदायित्व के लिए आवंटित किया जाएगा। लोगों की जरूरतों और मांग को ध्यान में रखते हुए निम्नलिखित प्रस्तावित किया गया है।

भोज सोन 18 के लिए सीईआर (CER) लागत कुल परियोजना लागत का 2% होगी। इस राशि का उपयोग समाज कल्याण के लिए किया जाएगा। सीएसआर (CSR) लागत  $24,65,80,000/- \times 2\% = \text{रु. } 49,31,600/-$ .

प्रत्येक गतिविधि के लिए प्रस्तावक द्वारा निर्धारित की जाने वाली धनराशि का निर्धारण जन सुनवाई के दौरान स्थानीय प्राधिकारी/लोगों एवं हितग्राहियों से चर्चा के बाद किया जायेगा। सीईआर कार्यक्रम के तहत की जाने वाली गतिविधियों का समवर्ती मूल्यांकन करने की योजना बनाई गई है।

## ❖ वृक्षारोपण:

- परियोजना से कोई पेड़ नहीं कटेगा। तथापि, असामाजिक उत्तरदायित्व, सड़क के दोनों ओर और नदी के किनारे हरियाली विकसित की जाएगी। इन वृक्षारोपण को बढ़ाने के लिए सामुदायिक सेवाओं को तैनात किया जाएगा। आर्थिक महत्व के पेड़ और देशी मूल के पेड़ जैसे फलों के पेड़ लगाए जाएंगे।
- लगभग। योजना अवधि में हॉल रोड के आसपास 790 पौधे रोपे जाएंगे।
- वृक्षारोपण के लिए प्रस्तावित पेड़ हैं:
- सस्टेनेबल सैंड मैनेजमेंट एंड माइनिंग गाइडलाइंस 2016 के अनुसार ग्रीनबेल्ट के विकास के लिए प्रति हेक्टेयर न्यूनतम 5 पौधे प्रस्तावित किए जाएंगे लेकिन पर्यावरण की बेहतर स्थिति के लिए परियोजनाओं के इस समूह में 10 पौधे प्रति हेक्टेयर प्रस्तावित किए जाएंगे।
- पीपल, अर्जुन, जामुन, बरगद, नीम, आम आदि के पेड़ लगाए जाएंगे।

## पर्यावरण प्रबंधन योजना (ईएमपी)

- रिवर बैंक से सुरक्षा क्षेत्र छोड़कर नदी तल से निकासी की जाएगी।
- अधिकतम काम करने की गहराई क्षेत्र के भूजल तालिका के ऊपर रहेगी।

- स्वास्थ्य प्रभावों को कम करने के लिए प्रभाव क्षेत्र में श्रमिकों और आसपास के लोगों को स्वास्थ्य सुविधाएं प्रदान किया जायेगा ।
- वन्यजीव संरक्षण सुनिश्चित करना और उसी के लिए जागरूकता अभियान की व्यवस्था किया जायेगा।
- नदी में महीन तलछट छोड़ने वाली गतिविधियों को किया जायेगा।
- खनिजों के परिवहन और प्रबंधन के दौरान गड़बड़ी को कम करने के लिए प्रभावी शमन उपाय अपनाए जाएंगे
- स्थानीय/देशी और तेजी से बढ़ने वाली प्रजातियों के वृक्षारोपण के साथ सुधार कार्यक्रम की स्थापना किया जायेगा
- मानसून के मौसम की शुरुआत में खान के बंद होने के दौरान बहाली योजना की स्थापना किया जायेगा
- आसन्न आपदाओं के प्रभाव से बचने के लिए समय पर एहतियाती उपाय करने के लिए प्रभावी आपदा प्रबंधन योजना की स्थापना।
- पर्यावरण प्रबंधन प्रकोष्ठ द्वारा प्रभावी निगरानी कार्यक्रम की स्थापना किया जायेगा।

#### ❖ ईएमपी कार्यान्वयन के लिए बजट आवंटन

टेबल, ईएमपी का बजट (भोज सोन 18)

क्रम संख्या	विवरण	पूंजी लागत (लाख)	आवर्ती लागत (लाख)
1	प्रदूषण नियंत्रण और धूल दमन	Nil	1.5
2	प्रदूषण निगरानी i) वायु प्रदूषण ii) मृदा प्रदूषण iii) जल प्रदूषण iv) ध्वनि प्रदूषण	--	2.0
3	एक माली के लिए वृक्षारोपण और वेतन (अंशकालिक आधार पर)	7.9	0.5
4	परिवहन सड़क रखरखाव लागत	2.5	1.5
<b>TOTAL</b>		<b>10.4</b>	<b>5.5</b>

**नोट:** \*790 पौधे \* 1000 रुपये (हेज और बाड़ सहित प्रत्येक पौधे के लिए) = 7,90,000/- रुपये

- ढोना सड़क रखरखाव के लिए श्रम का वेतन 2 श्रमिक\*300=600 प्रति दिन
- 600\* 250= 1,50,000/-
- \*2.5 लाख प्रति किलोमीटर (2,50,000\*1.0 किमी लंबी सड़क) = 2,50,000/-

## निष्कर्ष

ईआईए अध्ययन के आधार पर यह देखा गया है कि धूल प्रदूषण में वृद्धि होगी, जिसे पानी के छिड़काव और वृक्षारोपण द्वारा नियंत्रित किया जाएगा। खनन गतिविधियों के कारण (एम्बिएंट) परिवेशी पर्यावरण और पारिस्थितिकी पर नगण्य प्रभाव पड़ेगा, इसके अलावा खनन संचालन से क्षेत्र में प्रत्यक्ष और अप्रत्यक्ष रोजगार सृजन होगा। क्षेत्र के चारों ओर हरित पट्टी का विकास एक प्रभावी प्रदूषण न्यूनीकरण तकनीक के साथ-साथ खान परिसर से निकलने वाले प्रदूषकों को नियंत्रित करने के लिए भी किया जाएगा। खनन कार्य जारी रहने तक निगरानी कार्यक्रम का पालन किया जाएगा। इसलिए, यह संक्षेप में कहा जा सकता है कि खान के विकास से क्षेत्र के सामाजिक-आर्थिक वातावरण पर सकारात्मक प्रभाव पड़ेगा और क्षेत्र के सतत विकास को बढ़ावा मिलेगा।

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