बिहार सरकार

DISTRICT SURVEY REPORT OF SHEOHAR

Sand and Brick Earth Mining

3/8/2018

As per Notification No. S.O.141 (E) New Delhi, the 15th January, 2016 of Ministry of Environment Forest and Climate change, Government of India

Submitted to

Under Secretary
Mines & Geology Department, Government of Bihar

Prepared by

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PREFACE

The Ministry of Environment, Forests & Climate Change (MoEFCC), Government of India, made Environmental Clearance (EC) for mining of minerals mandatory through its Notification of 27th January, 1994 under the provisions of Environment Protection Act, 1986. Keeping in view the experience gained in environmental clearance process over a period of one decade, the MoEFCC came out with Environmental Impact Notification, SO 1533 (E), dated 14th September 2006. It has been made mandatory to obtain environmental clearance for different kinds of development projects as listed in Schedule-1 of the Notification.

Further, In pursuance to the order of Hon'ble Supreme Court dated the 27th February, 2012 in I.A. No.12- 13 of 2011 in Special Leave Petition (C) No.19628-19629 of 2009, in the matter of Deepak Kumar etc. Vs. State of Haryana and Others etc., prior environmental clearance has now become mandatory for mining of minor minerals irrespective of the area of mining lease; And also in view of the Hon'ble National Green Tribunal, order dated the 13th January, 2015 in the matter regarding sand mining has directed for making a policy on environmental clearance for mining leases in cluster for minor Minerals, The Ministry of Environment, Forest and Climate Change in consultation with State governments has prepared Guidelines on Sustainable Sand Mining detailing the provisions on environmental clearance for cluster, creation of District Environment Impact Assessment Authority and proper monitoring of minor mineral mining using information technology and information technology enabled services to track the mined out material from source to destination.

The DEIAA and DEAC will scrutinize and recommend the prior environmental clearance of mining of minor minerals on the basis of District Survey Report. This will a model and guiding document which is a compendium of available mineral resources, geographical set up, environmental and ecological set up of the district and replenishment of minerals and is based on data of various departments, published reports, journals and websites. The District Survey Report will form the basis for application for environmental clearance, preparation of reports and appraisal of projects. The Report will be updated once every five years.

OBJECTIVES

The main objective of the preparation of District Survey Report (as per the Sustainable Sand Mining Guideline, 2016) is to ensure the following –

- Identification of areas of aggradations or deposition where mining can be allowed; and
- Identification of areas of erosion and proximity to infrastructural structures and installations where mining should be prohibited and calculation of annual rate of replenishment and allowing time for replenishment after mining in that area.
- Identification of mineral wealth in the district.

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CHPATER-1

Introduction

As per Gazette Notification of 15th January, 2016 of Ministry of Environment, Forest and Climate Change a survey shall be carried out by the District Environment Impact Assessment Authority (DEIAA) with assistance of Irrigation department, Drainage department, Forest department, Mining department and Revenue department in district of preparation of District Survey Report as per the sustainable sand mining guidelines to ensure identification of area of aggradations or deposition where mining can be allowed, and identification of areas of erosion and proximity to infrastructural structures and installation where mining should be prohibited and calculation of annual rate of replenishment and allowing time for replenishment after mining in that area.

Every effort has been made to cover sand mining locations, areas and overviews of mining activity in the district with all the relevant features pertaining to geology and mineral wealth in replenish-able and non-replenish-able areas of rivers, stream and other sources. The mineral potential is calculated based on field investigation taking coordinates of the area and gather all relevant information and geology of the catchment area of the river or stream. Also gather all data for bricks mining, taking area coordinates with local soil quality, availability of soil etc. Also as per the site condition and location depth of mineable mineral is defined. The area of removal of mineral in the river and stream is decided on geomorphology and other factors, it can be 50% to 60% of the area of a particular river or stream. Similarly for bricks and soil mining all data will be gathered. Other constituents like clay and slit are excluded as waste while calculating the mineral potential of particular river or stream. This District Survey Report shall form the basis of application for environmental, preparation of reports and appraisal of projects. The report shall be updated once every 5 years.

1.1 Historical Perspective:

The district of Sheohar was carved out of Sitamarhi district on October 6, 1994 by the efforts of Sri. Raghunath Jha, a popular leader from this region. The district headquarters are located at Sheohar, and the district is a part of Tirhut Division. The district occupies an area of 443 km² with a population of 656,916 (as of 2011). Eminent Hindi Novelist, Dr. Bhagwati Sharan Mishra was the first District magistrate of Sheohar. Sheohar is the smallest district of the state of Bihar in terms of its geographical area (443 Sq. km.). As per census of 2011, it is the second least populous district of Bihar after Sheikhpura. The district is located in the northwestern part of North Bihar plains, with highly fertile land and abundant groundwater repositories. The economy of the district is mainly agricultural in nature. It is one of the most flood affected districts of Bihar. Dekuli is a holy place popular for ancient temple of lord Shiva.

1.2 Geography: Map

The district of Sheohar lies between N 26º 20' 50" and 26º 39' 45" and E 85º 10' 50" and 85º 23' 20" covering an area of 443 Sq. Km. It has an average elevation of 53 metres. The area falls in the Survey of India degree sheets 72F and toposheet nos. 72F/2, 3, 6 and 7. Sheohar is around 150 km in the north and east from Patna. Sheohar is very well connected to the other parts of the state by all-weather roads. The district of Sheohar is approachable by NH 77 which starts from Muzaffarpur and ends at Sheohar via. Sitamarhi district. Nearest railway station is at Sitamarhi district which is about 26 kms from Sheohar. The nearest airport is Lok Nayak Jai Prakash Narayan International Airport at Patna (174 km)

1.3 Basin/sub-basin, Drainage

The river Bagmati is the main river flowing through the district of Sheohar. The area falls under the catchment areas of Bagmati River. Bagmati is a perennial river originating in Shivpur range of hills in Nepal. In India, the river comes into existence at 2.5 km north of Dheng railway station in Sitamarhi district thereby entering into Sheohar district at Khoripakar and is joined by Lalbakeya river. The river Bagmati has changed its course several times in past. Other streams present in the district are Kola Nadi, Balsundar Nala and Purani Dhar which are considered to be avulsed channels of the river Bagmati. The drainage pattern is sub-parallel in the district. On its

left bank, the river merges with Kola Nadi. The river from this point upto confluence of Manusmara river downwards, flows along the course of Kola Nadi. The district is exposed to floods every year, especially during the monsoon season, thereby causing damages to the standing crops.

The area of Sheohar is underlain by thick sequence of unconsolidated sediments deposited during Quaternary period. These unconsolidated sediments mostly comprised of sands of various grades with occasional pebble beds.

1.4 Irrigation Practices

Ground water is the main source of irrigation of the crops in the rabi season as rainfall in non-monsoon period is very low and water in the Bagmati river also decreases. Tube wells up to a depth of 60 to 80 m are considered sufficient for exploiting water in the district. The dynamic ground water resource in the district has been found to be 58% and there is further immense scope for ground water development. The agriculture is severely affected by floods occurring during monsoon period. Most of the land area becomes flooded in the swelling of Bagmati river during heavy rains in terai belt of Nepal. The entire district gets cut off from the state due to flooding of roads in the monsoon season. The surface water irrigation system cannot be said to have good future as in the river Bagmati water decreases very much during non-monsoon periods. Therefore, ground water has proved to be the most reliable and sustainable source of water for irrigation, domestic and industrial uses. It can be said that the ground water use should be enhanced for irrigation purpose in the district

The main occupation of the people of this district is agriculture. All types of crops are produced. Varieties of rice, wheat, and a number of rabi crops are produced. Main crop of the district is paddy. There is absence of canal irrigation system in the district. The total gross irrigated area reported from the district is 12000 hectares and net irrigated area is 12000 hectares. The net sown area is 22656 hectares and total cropped area is 38691hectares. The area sown more than once is 16035 hectares. Irrigation from tube wells/wells is 12000 and from other sources is found to be 8000 hectares.

1.4 Connectivity:

Sheohar is well connected to the rest of the state and India by rail, road and air connections.

By Air: Patna is the capital city of Bihar is the nearest Airport from Sheohar. Patna is linked by regular flights to important cities like: Delhi, Kolkata Varanasi, Lucknow and so on. One can also reach Patna from Katmandu.

By Road: A convenient road network covers Bhagalpur connecting it to a number of important cities in Bihar, such as: Patna (160 km), Muzaffarpur (80 km), which are in turn linked to rest of the country. Other important destinations in Bihar, namely; Bodhgaya (310kms), Rajgir (295kms), Nalanda (292kms) lie close by.

By Rail: There is no railway station in Shohar district of Bihar. Adjacent districts it Amarhi is well connected with railway network.

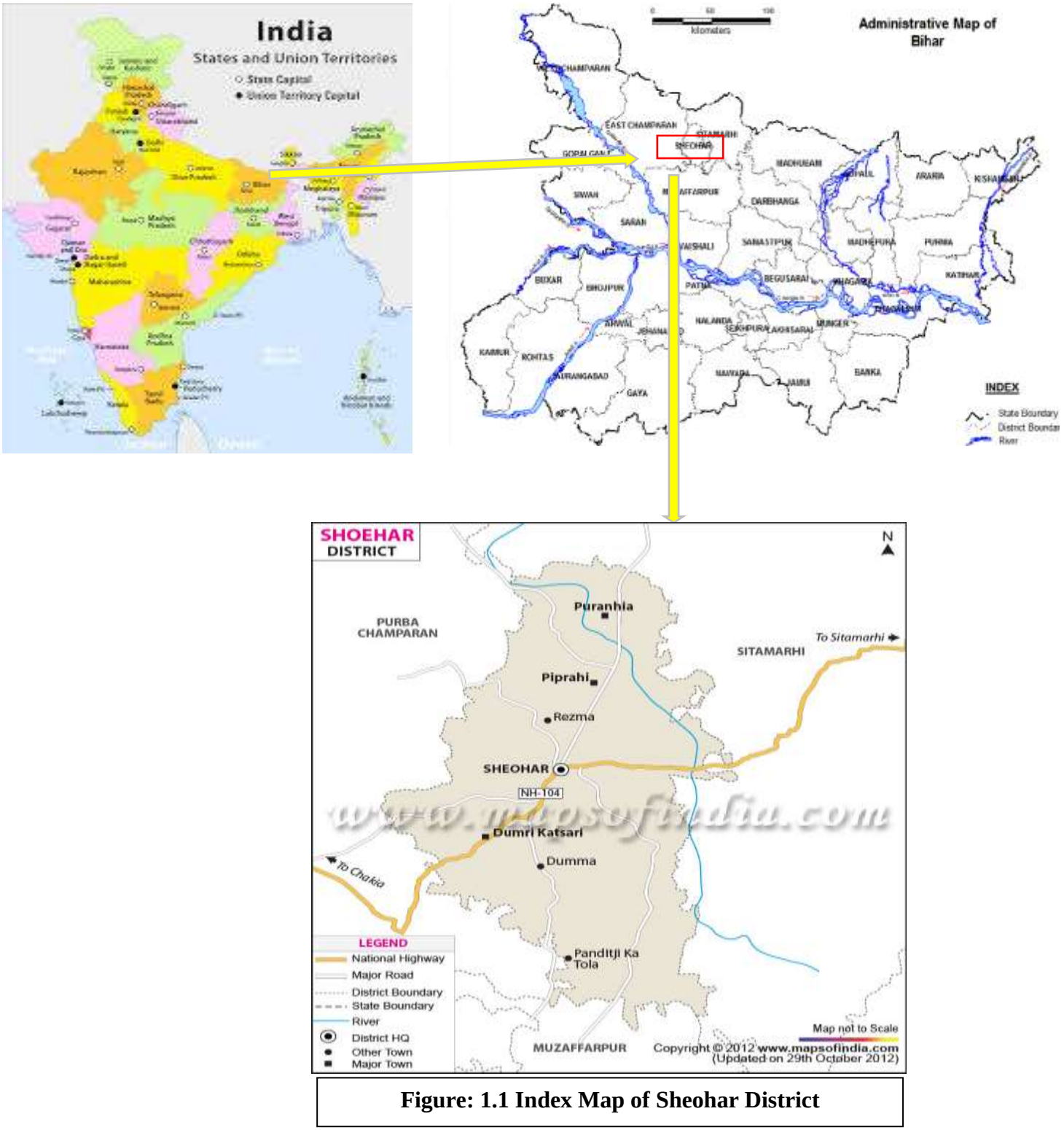


Figure: 1.1 Index Map of Sheohar District

Figure: 1.1 Presents Location / Subdivision / Block wise Map of Sheohar District

Headquarter of Sheohar: Sheohar

Rivers in Sheohar: 4

Area of Sheohar: 444 Sq. km

Latitude of Sheohar: 25° to 30° North

Longitude of Sheohar: 84° to 85° East

Administrative Details of Sheohar district		
Number of blocks	**5 Blocks**	**1. Piprah**
		2. Purnahiya
		3. Sheohar
		4. Taryani
		5. Dumri Katsari
No. of Circles	**5**	
No. of Police Stations	**5**	
No. of Panchayats	**53**	
No. of Revenue Villages	**207**	

Important administrative details of Sheohar are given as below in table

1.6 Demography of Sheohar District

Sheohar is the smallest district of the state of Bihar in terms of its geographical area (443 Sq. km.). As per census of 2011, it is the second least populous district of Bihar after Sheikhpura

As per the Census 2011, the district Sheohar has –

Population	**656916**
No. of Males	347613
No. of Females	309303
Population density	1882 per sq. km.
Decadal Growth rate	27.32

1.7 Rivers

The river Bagmati is the main river flowing through the district of Sheohar. The area falls under the catchment areas of Bagmati River. Bagmati is a perennial river originating in Shivpur range of hills in Nepal. In India, the river comes into existence at 2.5 km north of Dheng railway station in Sitamarhi district thereby entering into Sheohar district at Khoripakar and is joined by Lalbakeya River. Other streams present in the district are Kola Nadi, Balsundar Nala and Purani Dhar which are considered to be avulsed channels of the river Bagmati.

1.8 Climatic conditions

The climate in the district is hot sub-humid. As per the climatic data, the area is categorized under agro-climatic zones of hot sub-humid with deposits of alluvial origin.

The maximum temperatures (25 – 40ºC) are noticed from May to July and lowest temperatures (12 - 26º C) from December to January months. The relative humidity is reported to be very high in the district i.e. 44% in April to 81% in August. For the rest six months, the average relative humidity remains more than 70%.

Month wise rainfall in the district is given in fig. 2 showing maximum rainfall in the months of June to September. Scanty rainfall is observed in winter

CHAPTER - 2

Overview of Mining Activity of District

Topography and General Geology:

The area has flat monotonous topography having regional slope (varying from 0.2 m/km to 0.08 m/km) towards South-East. The landform relief varies from 43.2 m amsl, near Bausi in north, to 35.1 m, near Hardi in south. Regionally, the area is flat with series of undulations present in the area. These minor undulations present in the area are outcomes of shifting of river Bagmati towards west along with the natural processes of degradation and aggradation. Some relief features such as paleo-channels, natural levees, back-swamps/flood plains of varying shape and sizes can be found in the area. The area of Sheohar falls under the catchment area of Bagmati River which is known for its flood every year in her catchments. Other streams passing through the district are Kola Nadi, Balsunda rNala and Purani Dhar which are mainly avulsed channels of the river Bagmati. The drainage pattern is sub-parallel in the district. The area of Sheohar is underlain by thick sequence of unconsolidated sediments deposited during Quaternary period. These unconsolidated sediments mostly comprised of sands of various grades with occasional pebble beds. In the exploratory drilling done by CGWB, in the Sitamarhi district where the same morphostratigraphic unit is extending (as described above), many clay and sand sequences have been observed which may be due to multi-cyclic nature of deposition.

Main soil type in the area is Udifluvent. Soil in the district has been grouped as soil of:

a. Active alluvial plain- soils in this group are very deep, coarse to fine loamy, calcareous at places and with slight to moderate erosion. Taxonomically, this type of soil comes under Udifluvent soil and they occupy the central part of the district.

b. Recent flood plain- soils in this group are very deep, fine loamy, calcareous, with slight erosion and severe flooding and surface texture is loamy. This soil is present in eastern and southern part of the district.

Geomorphological details along with geological units and lithology has been given in brief in table no. 4.

Table no. 4. Geological succession of the Quaternary deposit of Sheohar district

Geological Unit	Geomorphic Unit	Lithology
Kamala / Jaynagar formation	Present active flood and Older flood plains	Unoxidised to feebly oxidized sediments, no soil cover, sand and silt with clay in flood basin.

Approach to Sand Mining:

River sand mining is a common practice as habitation concentrates along the rivers and the mining locations are preferred near the markets or along the transportation route, for reducing the transportation cost. River sand mining can damage private and public properties as well as aquatic habitats. Excessive removal of sand may significantly distort the natural equilibrium of a stream channel.

Main objectives of Sustainable Sand Mining:

- To ensure that sand and gravel mining is done in environmentally sustainable and socially responsible manner.
- To ensure availability of adequate quantity of aggregate in sustainable manner.
- To improve the effectiveness of monitoring of mining and transportation of mined out material:
- Ensure conservation of the river equilibrium and its natural environment by protection and restoration of the ecological system.
- Avoid aggradations at the downstream reach especially those with hydraulic structures such as jetties, water intakes etc.
- Ensure that the rivers are protected from bank and bed erosion beyond its stable profile.
- No obstruction to the river flow, water transport and restoring the riparian rights and in stream habitats.
- Avoid pollution of river water leading to water quality deterioration.

- To prevent depletion of ground water reserves due to excessive draining out of ground water.
- To prevent ground water pollution by prohibiting sand mining on fissures where it works as filter prior to ground water recharge.
- To maintain the river equilibrium with the application of sediment transport principles in determining the locations, period and quantity to be extracted
- Streamlining and simplifying the process for grant of environmental clearance (EC) for sustainable mining.

Mode of grant of mineral concession

i) Before giving details of actual sites/number of sites or mineral concessions it would be appropriate to explain that the mineral concession respect of minor minerals area granted as per provisions of the state rules, Framed by the respective state Government in Exercise of power under section 15 of the Mines and Minerals (D&R) Act,1957

ii) The state of Bihar at the time of bifurcation opted Prevailing Rule Namely "Bihar Minor Minerals Concession Rules 1972" and amended by 2014.These Rule were amended form time to time as per policy of the state government for minor minerals. The Hon'ble Supreme Court vide its order dated 27.02.2012 directed all state Government to revise their state rule making provisions in accordance with various recommendations contained in the report of the group of MOEF&CC, on mining of minor and the model draft guidelines issued by Ministry of Mines, Gol

iii) Accordingly, the state of Bihar Comprehensively revised its State Rules namely the "Bihar Minors Minerals Concession, Stocking, Transportation of Minerals and Prevention of illegal Mining Rule, 2014" repealing the Prevailing Rules namely Bihar Minors Minerals concession Rules 1972".

iv) The Mineral concession in the Bihar are being Granted in the form of "Mining Contract" or Mining Lease" through competitive bidding process. The Mining contract are granted for period of 05 years generally. In district minerals Concessions are/were granted in the form of mining contract for the period for 05 years. The contracts are been granted through open auction mode. The Mineral concession are being granted subject to condition that actual mining operation shall be allowed only after Environment Clearance

is/are obtained from the competent authority as per requirement of EIA Notification dated 14.09.2206 of the MoEF&CCGoI.

v) The Mineral concession holder are required to prepare detailed " **Mining Plan"** for their specific project through Registered Qualified Person and get in approved from authorized officer of Mines and Geology Department of the State Government. The exhaustive mining plan are prepared by RQP giving details of minerals reserves, method of mining, Progressive closure plan, extent of proposed mining and other related details. These are the project specific details are based on these details itself the project proponents/minerals concession holder obtains environmental clearances.

Method of Mining and Condition in Which Mining in River Bed Areas is to be allowed

i. The river bed area apart from other related condition for mining are allowed to excavate minerals (sand) to ensure safety of river bed structures and the adjoining area on the following specific conditions:

a. No mining would be permissible in a river bed up to a distance of five times of the span of a bridge on up stream side and ten times the span of such bridge on down-stream side, subject to a minimum of 250 meters on the down stream side:

b. There shall be maintained an un-mined block of 150 meter width after every block of 1000 meters over which mining in undertaken or at such distance as may be directed by the Director or any officer authorized by him.

c. The Maximum depth of mining in the river-bed shall not exceed three meters measured form the un-mined bed level at any point in time with proper bench formation.

d. Mining shall be restricted within the central 3/4th width of the river rivulet:

e. Note: The above said conditions have been decided after detailed discussions and recommendations of the concerned Department, Government of Bihar.

ii. As the mining river bed remains restricted in the in the central 3/4th part of the river bed, the area left on both on side of the river bank not only ensures the safety of banks (bank cutting due to water stream) but also ensures that in the central part of river, water stream flows smoothly during rains and process of river and process of river meandering does not occur.

iii. The light weight excavator/JCBs are being deployed to remove mineral form river bed up to maximum depth of 03 meter layer form general level of the bed. The mining in the river bed are undertaken in mechanized manner. At times the RQPs do refers the excavation in river bed mining through excavators as "Semi Mechanized Mining".

iv. The mineral excavated is directly loaded in the vehicles/dumpers and the vehicles owners and driver take away the minerals directly to the stone crushers or screening plants or consumers. In certain cases minerals concession holder stacks mineral on the river bank in case are not able to sell the material on actual mining itself.

Method of Mining in Areas outside River Bed Areas:

i. As the mineral (sand) are around river beds area also to ensure that mining from outside do not effect river. No mining is being permitted in an area up to a width of 500 meters form the active edges of embankments in case of river 250 meter in case of bridge and 100 meter on either side of all other rivers/rivulets.

ii. The mineral from outside area river bed is being permitted subject to condition a safety margin of two meter (2m) shall be maintained above the ground water table while undertaking mining operation shall be permissible below this level unless a specific permission is obtained from the competent authority in this behalf further the depth of excavation of minerals shall not exceed nine meter (9m) at any point of time.

iii. The method of excavation is such that the mining contractors deploys earth moving machineries and after removing the top layer of original soil, varying between 1 to 1.5 meter stacks the same separately. Thereafter removes the minor minerals deposits. After undertaking the mining i.e removing of minerals layer up to a maximum depth of 09 meter, the top stacked soil is again spread back into the pit. The mined out area/land in put to reuse for cultivation after spreading the top soil. The landowners/famers give their land to the contractors for mining after getting compensation, mutually settled between the landowner and the mining contractor.

Method of Mining in river bed area (semi mechanized/or manual)

i. The Hon'ble NGT with regards to rivers bed mining has specifically desired to examine the mode of mining- shall the same be semi mechanized/mechanized or manual.

ii. There is no specific definition of Semi- Mechanized Mining. The team Semi-mechanized mining in general is used were method of working in general are undertaken mechanically. However, some operation is also undertaken manually. Therefore the Sami mechanized mining or mechanized mining is the method of working sometime mechanized mining with light machines are also referred as semi –mechanized mining. The term semi mechanized mining is being used in general parlance where in the very same mining area in part area as per requirement manual mining is also under taken along with mechanized mining of sand/river bed mining.

iii. Where Manual mining operation are undertaken using conventional hand tools only like chisel, hammer and crowbar etc. and operation are only labour intensive. As per requirement manual lifting of sand and directly loading intensive, as per requirement manual lifting of sand and directly loading the sand in tractor trolleys etc. through labours itself.

iv. The Mechanized mining operation in respect of sand mining are undertaken with help of excavator-cum–loaders. In this process sand is lifted/excavated from the river bed through excavator-cum loader and directly loaded in dumpers or other mode of transport. The vehicles carrying the minerals form mines to site of use/site of construction or sale stocks outside lease hold area (an independent business than that of mining).

v. In the current scenario it is impractical to undertake manual mining because:-

i. The labours are not easily available.

ii. Manual mining cannot be under taken in systematic and scientific manner as compared to mechanical mining which can be undertaken systematic/scientific and controlled mining.

iii. In case of manual mining to achieve desired level of production more number of manpower would be required meaning thereby human interface within river bed area would increase and more ecological damage would be caused.

vi. The method of mining even otherwise can be uniform even for same area and all the methods have their own pros and cons, however, considering the current scenario wherever feasible mechanized (semi-Mechanized or mechanized is same thing) mining should be preferred over manual method.

General Regulation relating to Mining

I. As per prevailing state rules the mineral concession holder are required to get a mining plan for the area prepared form a "Registered Qualified Person'. The mining plan includes the area specific details along with the mine closure plan (progressive & Final) taking into consideration the details of the geology and lithology of the area including the estimated mineral reserve of the area. Proposed method of mining/development of mines, use of explosives and blasting operation. If any stacking and disposal of minerals, mine-drainage pattern, handing of the overburden, location of weight bridge, and minerals processing ,if any .The extant of manual mining or mining with the use of machinery and mechanical device along level of production (production form year-to year for a period of five years), Mechanization, Type of Machinery to be used, nature and extent of the minerals body/spot or spots where the mining operation area proposed to be undertaken, natural water occurs, limits of minerals reserve and other forest area and density of trees, if any assessment of impact of mining activity on land environment management plans, In addition to this mining plan also suggests the details of area of restoration/ rehabilitation of the area through afforestation, land reclamation, use of pollution control devices and such other measure as may be directed by the state Government from time to time.

II. The Mining plan area to be got approved form the authorized officer of the state Government, Based on mining plan prior environment clearance from the competent authority as per provisions of EIA Notification dated 14.09.2006 of MoEF& CC Gol.

III. After obtaining the Environment clearance as Further, to comply with requirement of Air Act, 1981, the consent to establish and consent to operate, from State pollution Control Board are also obtained before actual mining.

The above said provision mainly related to mineral conservation and environmental protection with regard to provisions related to safety in mines and welfare of labours provisions under mines acts 1952 are ensured by the Directorate General Mines Safety De Ministry of Labour**.**

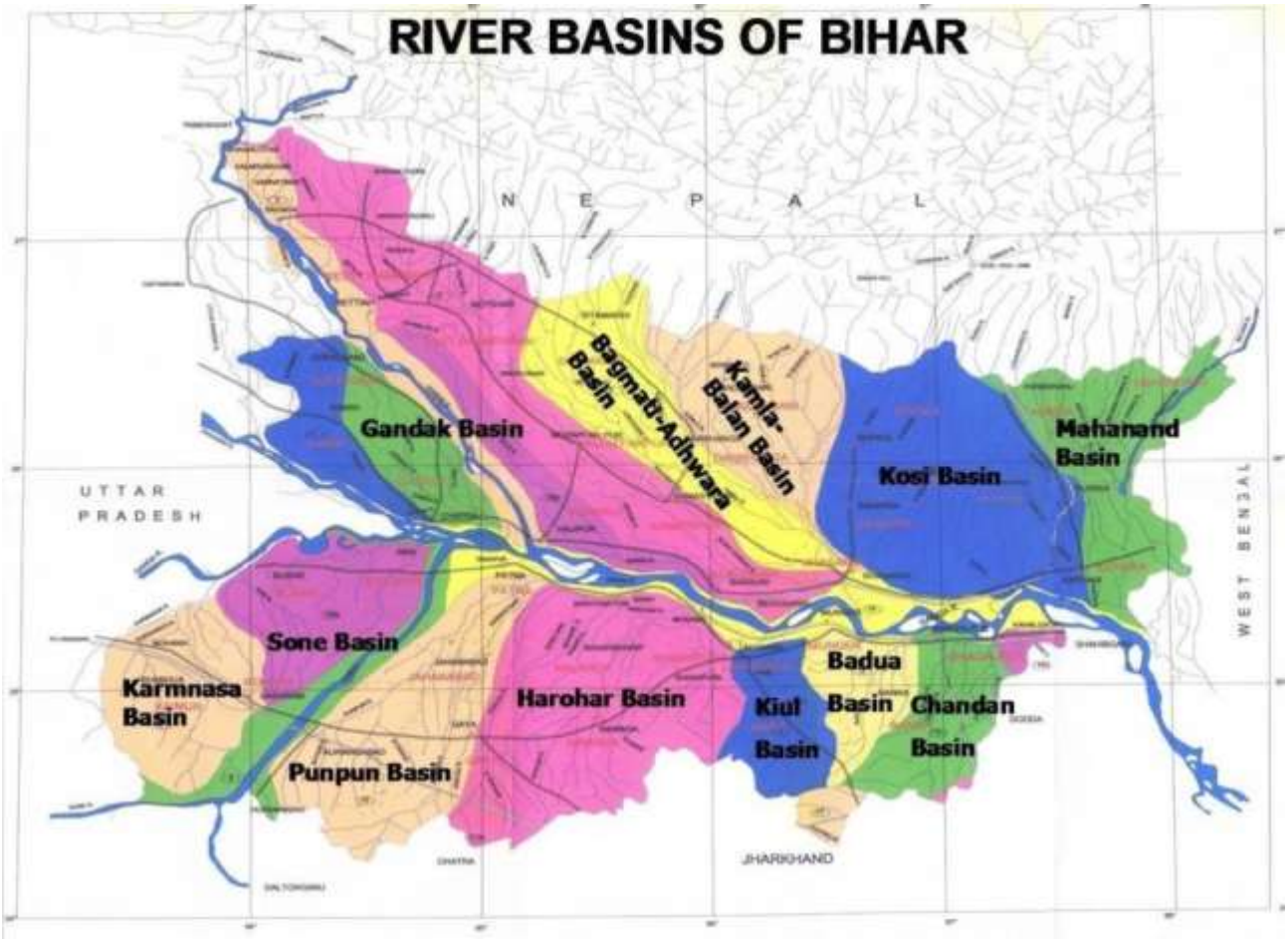


Figure 2.1 River Basin Map of Bihar

Sl. No.	Name of the River	Area drained (sq. Km.)
1	Kareha	4.08
2	Bagmati River	0.60
3	LalBakeyaNadi	0.20
4	PuraniDhar	0.15
Total		5.03

Area Selected for Mining in District: Sheohar

i. The EIA notification dated 14.09.2006 became applicable for fresh contacts/ leases and in the year 2008 for grant of mineral concessions in respect of other area in the state fresh auction was notified subject to condition that will be allowed to be undertaken only after prior environment clearance to obtained as per requirement of EIA notification dated 14.09.2006 of MoEFCC,Gol. However, said condition was challenged by some prospective bidders on the plea that the notification date 14.09.2006 was not applicable for mining minerals.

CHAPTER - 3

List of Mining Leases in the District with location, area and period of validity

List of Mining Leases in the District with location, area and period of validity is attached as Annexure-1

Sl. No.	Mining Unit Block Location	Area(In Hect.)	Period (In Yrs)	Name of Minor Minerals	Name of Granted of Minerals Concession	Annual Capacity as per E.C./Mining Plants/T or in MT.	Present Status

There is no EC approved sand ghat in Sheohar.

CHAPTER - 4

Details of Royalty or Revenue received in last three years

Sr.	Year	Revenue (In Lakh Rs.)
1	2014-15	Included in Sitamardhi district
2	2015-16	-
3	2016-17	-

CHAPTER - 5

Detail of Production of Sand or minor mineral in last three years

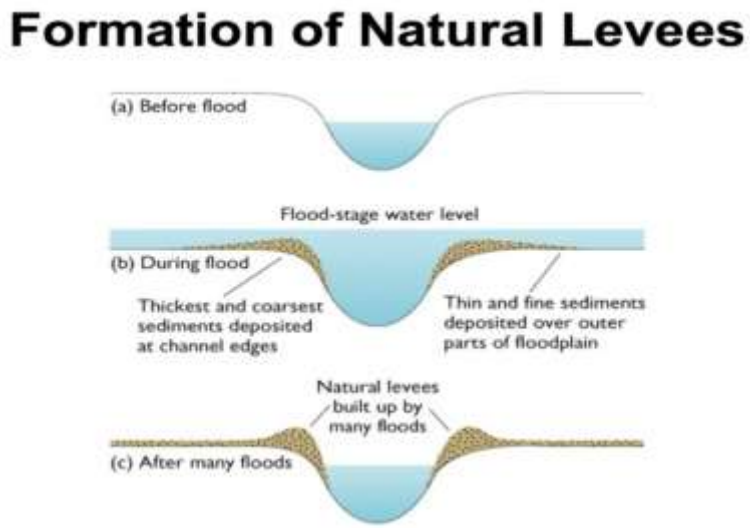
Sr.	Year	Production
1	2014-15	-
2	2015-16	-
3	2016-17	-

CHAPTER - 6

Replenishment Report /Process of Deposition of Sediments in the rivers of the District

Process- Sediment is a naturally occurring material that is broken down by processes of weathering and erosion, and is subsequently transported by the action of wind, water and/or by the force of gravity acting on the particles. Sediments are most often transported by water. Sediment is transported based on the strength of the flow that carries it and its own size, volume, density, and shape. Stronger flows will increase the lift and drag on the particle, causing it to rise, while larger or denser particles will be more likely to fall through the flow.

Deposition is the processes where sediment being transported by a river is deposited. Deposition occurs when a river loses energy. This can be when a river enters a shallow area (this could be when it floods and comes into contact with the flood plain) or towards its mouth where it meets another body of water.



Rivers flood on a regular basis. The area over which they flood is known as the flood plain and this often coincides with regions where meanders form. Meanders support the formation of flood plains through lateral erosion.

When rivers flood the velocity of water slows. As the result of this the river's capacity to transport material is reduced and deposition occurs. This deposition leaves a layer of sediment across the whole floodplain. After a series of floods layers of sediment form along the flood plain.

Larger material and the majority of deposition occurs next to the river channel. This is the result of increased friction (with the flood plain) causing the velocity of the river to slow and therefore rapidly reduce its ability to transport material. This leaves a ridge of higher material next to the river channel on both banks of the river known as a levee.

If the upwards velocity approximately equal to the settling velocity, sediment will be transported Downstream entirely as suspended load. If the upwards velocity is much less than the settling velocity, but still high enough for the sediment to move, it will move along the bed as bed load by rolling, sliding, and saltating (jumping up into the flow, being transported a short distance then settling again). If the upwards velocity is higher than the settling velocity, the sediment will be transported high in the flow as wash load.

As there are generally a range of different particle sizes in the flow, it is common for material of different sizes to move through all areas of the flow for given stream conditions.

The various factors governing the occurrence and deposition of sand is country rock i.e. geological disposition, climate, and rainfall, water load physical parameters of river and velocity of water current. Rivers have a lot of energy and because they have energy, they do stuff. The obvious things rivers do with their energy is flow but, besides this, they also transport load, erode load and erode the channel through which they flow. Erosion is the breaking down of material by an agent. In the case of a river, the agent is water. The water can erode the river's channel and the river's load. A river's load is bits of eroded material, generally rocks, which the river transports until it deposits its load.

Capacity & Competence Rivers can only carry so many loads depending on their energy. The maximum volume of load that a river can carry at a specific point in its course is called the age river's capacity. The biggest sized particle that a river could carry at a specific point is called the river's competence. Deposition to transport load a river needs to have energy so when a river loses energy it is forced to deposit its load. There are several reasons why a river could lose energy. If the river's discharge is reduced then the river will lose energy because it isn't flowing

as quickly anymore. This could happen because of a lack of precipitation or an increase in evaporation. Increased human use (abstraction) of a river could also reduce its discharge forcing it deposit its load. If the gradient of the river's course flattens out, the river will deposit its load because it will be travelling a lot slower. When a river meets the sea a river will deposit its load because the gradient is generally reduced at sea level and the sea will absorb a lot of energy. As rivers get nearer to their mouths they flow in increasingly wide, gentle sided valleys. The channel increases in size to hold the extra water which the river has to receive from its tributaries. As the river gets bigger it can carry larger amounts of material. This material will be small in size, as larger rocks will have broken up on their way from the mountains. Much of the material will be carried in suspension and will erode the river banks by abrasion. When rivers flow over flatter land, they develop large bends called meanders. As a river goes around a bend most of the water is pushed towards the outside causing increased erosion. The river is now eroding sideways into its banks rather than downwards into its bed, a process called lateral erosion. On the inside of the bend, in contrast, there is much less water. The river will therefore be shallow and slow-flowing. It cannot carry as much material and so sand and shingle will be deposited.

This is called a point bar or slip off slope Due to erosion on the outside of a bend and deposition on the inside, the shape of a meander will change over a period of time. Notice how erosion narrows the neck of the land within the meander. In time, and usually during a flood, the river will cut right through the neck. The river will then take the new, shorter route. The fastest current, called the thalweg, will now tend to be in the centre of the river, and so deposition is likely to occur in gentler water next to the banks. Eventually deposition will block off the old meander to leave an oxbow lake. The oxbow lake will slowly dry up, only refilling after heavy rain or during a flood. Streams lose velocity and make deposits when their gradient decreases, when the volume of water decreases, when there is an increase in cross section, when they encounter obstructions, or when they enter still water. They deposit alluvial fans, alluvial cones, piedmont alluvial plains, channel fill, bars, flood plains and deltas.

Rivers in the Gangetic plains have a habit of meandering, i.e., changing course. In India this is a prominent feature of rivers which swell in the monsoon, occasionally suddenly, and the torrential

movement carves out a new course in the soft alluvial plain. The Ganga River, in Patna, has meandered and migrated northwards in the Patliputra area. This migration has resulted in deposition of earth on the south [right] bank of the river and created a massive space of a few hundred hectares between the urban development line and the active river channel.

A river system can be divided into three subsystems:

- ✓ **Collecting system** (branches) -- consisting of a network of tributaries in the headwater region, collects and funnels water and sediment to the main stream.
- ✓ **Transporting system** (trunk) -- the main trunk stream, which functions as a channel way through which water and sediment move from the collecting area toward the ocean. (Erosion and deposition also occur in a river's transporting system)
- ✓ **Dispersing system** (roots) -- consists of a network of distributaries at the mouth of a river (delta), where sediment and water are dispersed into an ocean, a lake, or a dry basin

Removal of washed in Silt Load

Geologically, the district froms part of the vast Indo-Gangetic alluvial tract. The origin of the Indo Gangetic tract as a whole is now attributed to the sag in the earth crust formed in the upper Eocene times between Gondwana land and the raising of Himalaya belt. The economic minerals found in the district are Sand, Soil and Kankar.

The sand deposits being an integral part of the dynamic river system to which it belongs. Therefore, as a part of natural cycle, the monsoon flow of every river carries with it replenishment of silt and washed out soil and clay from upstream areas in the catchment. This silt shall be removed during the sieving of sand before it is loaded into truck/tipper/trailer to carry to the consumers.

Sand mining is critical to infrastructure development around the globe. Sand is an essential minor mineral used extensively across the country as a useful construction constituent and variety of other uses in sports, agriculture, glass making (a form of sand with high silica content)

etc. The rivers are the most important source of Sand. It acts as source of transportation and deposition of sand etc.

Local Geology of the Area

The area has flat monotonous topography having regional slope (varying from 0.2 m/km to 0.08 m/km) towards South-East. The landform relief varies from 43.2 m amsl, near Bausi in north, to 35.1 m, near Hardi in south. Regionally, the area is flat with series of undulations present in the area. These minor undulations present in the area are outcomes of shifting of river Bagmati towards west along with the natural processes of degradation and aggradation. Some relief features such as paleo-channels, natural levees, back-swamps/flood plains of varying shape and sizes can be found in the area.

The area of Sheohar falls under the catchment area of Bagmatiriver which is known for its flood every year in her catchments. Other streams passing through the district are Kola Nadi, BalsundarNala and PuraniDhar which are mainly avulsed channels of the river Bagmati. The drainage pattern is sub-parallel in the district. The area of Sheohar is underlain by thick sequence of unconsolidated sediments deposited during Quaternary period. These unconsolidated sediments mostly comprised of sands of various grades with occasional pebble beds.

Origin & Control of Mineralization (Annual Replenishment of Mineral In River Bed Area/Sedimentation)

Sedimentation, in the geological sciences, is a process of deposition of a solid material from a state of suspension or solution in a fluid (usually air or water). Broadly defined it also includes deposits from glacial ice and those materials collected under the impetus of gravity alone, as in talus deposits, or accumulations of rock debris at the base of cliffs. The term is commonly used as a synonym for sedimentary petrology and sedimentology.

Sedimentation is generally considered by geologists in terms of the textures, structures, and fossil content of the deposits lay down in different geographic and geomorphic environments. The factors which affects the “Computation of Sediment”:

a) Geomorphology & Drainage Pattern: The following geomorphic units plays important role:

- Structural Plain
- Structural Hill
- Structural Ridge
- Denudation Ridge & Valley
- Plain & Plateau of Gangetic plain
- Highly Dissected pediment
- Undissected pediment

b) Distribution of Basin Area River wise

c) Drainage System/Pattern of the area, Rainfall & Climate: Year wise Rainfall data for previous 10 years of Gangetic Basin/River

e) As per Dandy & Bolton study "Sediment Yield" can be related to

- Catchment Area and
- Mean Annual Run-off

Sand is an essential minor mineral used extensively across the country as a useful construction constituent and variety of other uses in sports, agriculture, glass making (a form of sand with high silica content) etc. It is common knowledge that minerals are non-renewable but this form of mineral naturally gets replenished from time to time in a given river system and is very much interrelated to the hydrological cycle in a river basin.

Sand mining has become a widely spread activity and does not require a huge set up or technology, the number of ventures has increased extensively and it has become a footloose industry in itself but the backward-forward linkages are becoming stronger as many are getting employed as well as the construction activity / industry requires this mineral at consistent rates. Riverine environmental systems are unique in themselves and provide environmental services, natural resources to meet variety of needs of urban and rural communities. The Rivers originating from the Himalayas bring with them lots of aggregate materials whereas as they move downstream, only finer elements / minerals like sand are found in abundance.

CHPATER-7

General Profile of the District

1	**GENERAL INFORMATION**	Sheohar
	Geographical Area (Sq. Km.)	443
Sl. No.	**ITEMS**	**Statistics**
	Administrative Divisions	1
	No. of Panchayats/Villages	53/207
	Number of Tehsil/Block	5
	Population (as per 2011 Census)	Rural: 628130
		Urban: 28116
	Average Annual Rainfall (mm)	1357.8
2	**GEOMORPHOLOGY**	
	Major Physiographic Units	Gangetic Alluvium
	Major Drainages	Baghmati
3	**LAND USE**	
	Forest Area	Nil
	Net Area Sown	221.61 sq.km
	Cultivable Area	411.95 sq. km
4	**MAJOR SOIL TYPES**	Udifluvents
5	**PRINCIPAL CROPS**	
6	**IRRIGATION BY DIFFERENT SOURCES**	
	(area in hectares)	
	Tubewells/Wells	12000
	Tanks	Nil
	Canals	Nil
	Other Sources	8000
	Total Cropped area	38691
	Net Sown area	22656
7	**NUMBER OF GROUND WATER MONITERING**	
	WELLS OF CGWB (2011)	
	No. of Dugwells	1
	No. of Piezometers	Nil
8	**PREDOMINANT GEOLOGICAL FORMATIONS**	Alluvium
9	**HYDROGEOLOGY**	
	Major water bearing formations	Alluvium
	Pre-monsoon Depth to water level during 2011	2.2 – 2.2 m bgl
	Post-monsoon Depth to water level during 2011	1.2 – 1.2 m bgl

	Long term water level trend in last 10 yrs(2002 –2011)	No significant decline
	in m/yr	
10	**GROUND WATER EXPLORATION BY CGWB** (as on	
	31-03-2013)	
	No. of well drilled (EW, OW, PZ, SH, Total)	Nil
	Depth Range (m)	-
	Discharge (m^3/hr)	-
	Storativity (s)	-
11.	**MINING SCENARIO**	**MINING SCENARIO**
	Total No. Mining Leases (Major Minerals)	
	Total Area of Mining Leases (Major Minerals)	
	Total Number of Quarry Lease (Minor Minerals)	
	Total area of Quarry Lease	Total area of Quarry Lease
	Total Royalty or Revenue Received from Minor Minerals in 2015-2016	Total Royalty or Revenue Received from Minor Minerals in 2015-2016
	Total No. Notified Sand Lease	Total No. Notified Sand Lease
	Total Area of sand Lease	Total Area of sand Lease
	MINING SCENARIO	**MINING SCENARIO**
	Total No. Mining Leases (Major Minerals)	Total No. Mining Leases (Major Minerals)
	Total Area of Mining Leases (Major Minerals)	Total Area of Mining Leases (Major Minerals)
12.	Total No of Brick Klins	

Source: Centre for Ground Water Board (CGWB)

CHPATER-8

Land Utilization Pattern in the district: Forest, Agriculture, Horticulture, Mining

The agriculture is severely affected by floods occurring during monsoon period.

Most of the land area becomes flooded in the swelling of Bagmati river during heavy rains in terai belt of Nepal. The entire district gets cut off from the state due to flooding of roads in the monsoon season. The surface water irrigation system cannot be said to have good future as in the river Bagmati water decreases very much during non-monsoon periods. Therefore, ground water has proved to be the most reliable and sustainable source of water for irrigation, domestic and industrial uses. It can be said that the ground water use should be enhanced for irrigation purpose in the district.

Ground water is the main source of irrigation of the crops in the rabi season as rainfall in non-monsoon period is very low and water in the Bagmati river also decreases.

Tubewellsupto a depth of 60 to 80 m are considered sufficient for exploiting water in the district.

The dynamic ground water resource in the district has been found to be 58% and there is further immense scope for ground water development.

The main occupation of the people of this district is agriculture. All types of crops are produced. Varieties of rice, wheat, and a number of rabi crops are produced. Main crop of the district is paddy. There is absence of canal irrigation system in the district. The total gross irrigated area reported from the district is 12000 hectares and net irrigated area is 12000 hectares. The net sown area is 22656 hectares and total cropped area is 38691hectares. The area sown more than once is 16035 hectares. Irrigation from tubewells/wells is 12000 and from other sources is found to be 8000 hectares.

01	LAND USE (ha)	
	Total Geographical area	443Sq.Km
	a) Forest area:	Nil
	b) Net area sown:	22656Hactares
	c) Total Cropped area:	38691Hactares
02	**AREA UNDER PRINCIPAL CROPS**	38691Hactares

	IRRIGATION BY DIFFERENT SOURCES (Area in ha, Govt. of Bihar 2008-09)	
	Dug wells and Tube wells	12000Hactares
	Canal	Nil
	Other sources	8000Hactares
	Non-agricultural land	20819 Sq.Km
	Land under water (Perennial) 1269	1269 Sq.Km

Land use / Land cover Map of Patna District are given below in Figure 8.1

Type of Land Use

Type of Land use	Area (in Sq. km.)
Total Geographical area	443
Non-agricultural land	20819
Land under water (Perennial)	1269
Barren Unculturable area	409
Net Sown area	22656
Total Cropped area	38691

CHPATER-9

Physiography of the District

Hydrogeology

The Kosi-Gandak interfluves region of North Bihar plains has been divided into three distinct units namely:

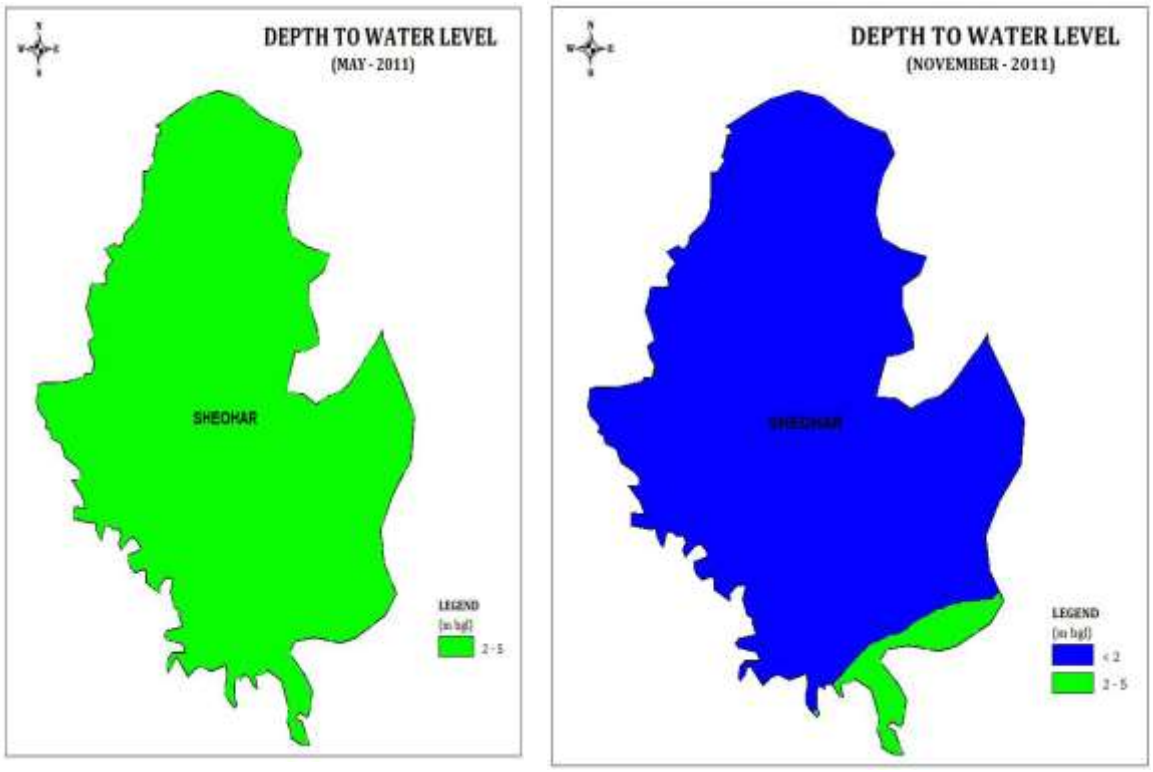
- Kosi – Burhi Gandak belt
- Bagmati belt and
- BurhiGandak – Gandak doab

The Sheohar falls within the Bagmati belt. Generalized, geological succession of the quaternary deposit of the area can be shown as below in table no. 4:

Geological Unit	Geomorphic Unit	Lithology
Kamala / Jaynagar formation	Present active flood and Older flood plains	Unoxidised to feebly oxidized sediments, no soil cover, sand and silt with clay in flood basin
Geological Unit	**Geomorphic Unit**	**Lithology**

The district of Sheohar is one of the prolific aquifer systems in the Gangetic alluvium of north Bihar plains. Quaternary unconsolidated sediments of the area consist of sand, gravel, pebbles constituting potential aquifer. The aquifer is found to be extensive regionally and occurs in the form of layers down below. Rainfall is the main source of ground water recharge. The sandy layer at the top acts as a unconfined aquifer upto a depth of 100m whereas the deeper aquifers are confined aquifers. The aquifers from the area are of very high potential. The regional slope of the water table is towards south-east In the Sheohar, most of the wells have a depth range of 2 - 5m. The pre-monsoon (May 2011) depth to water level generally ranges upto 2.20 m bgl (Fig. 4.). The post-monsoon water level for the month of November 2011 is generally found upto 1.20 mbgl (Fig. 5) and in January 2012 upto 2.25 mbgl. It can be said, that during pre monsoon water level is found upto 4 mbgl in major part of the Sheohar district whereas during post monsoon period, the depth to water level is found upto 3 mbgl. The northern parts of the district is having 0 – 2 mbgl of dept to grond water level.

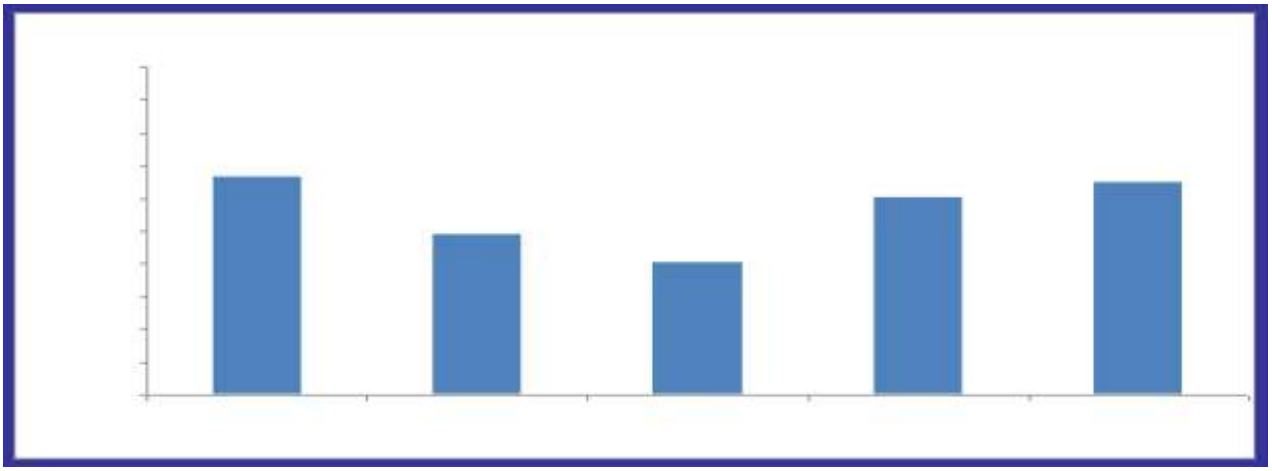
On compaing the water level fluctuation of May 2011 and November 2011, there is rise of water level upto 1 m. This rise in water level varies from 1 to 4 mbgl. In most parts of the north Sheohar, the water level fluctuation is found to be within 2 to 3 mbgl whereas in southern parts of the district it varies between 1 -2 mbgl. Taking into consideration, the long-term decadal (2001-2011) water level fluctuation for pre monsoon, there is a variation in water level upto 0.95 m and for post monsoon; it shows variation in water level upto 0.53 to 0.28 m. On an average, the fluctuation of water level between pre and post monsoon varies between 1 – 3 m bgl. In northern part of the district, the fluctuation is between 2 – 3 mbgl and in southern parts it varies between 1 – 2 mbgl.



Ground Water Resources:

As per the dynamic ground water resources calculated for the districts, as on 31st March 2009, the net annual replenishable ground water resource works out to be 16774 ha.m. The net annual replenishable ground water resource as on 31st March 2009 works out to be 16774 ha.m. The gross annual draft for all uses works out to be 9721 ha.m. Allocation of ground water for domestic and industrial use for 25 years works out to be 1910 ha.m. The stage of ground water development is 58%. The stage of ground water development is highest in Dumri Katsari

(66.5%) and lowest in Pumahia (40.4%). As stages of ground water development in all the blocks are less than 70% and there is no long-term decline in water levels, all the blocks are under safe category. The stage of ground water development is depicted in Fig. 6. The block-wise ground water resource is given in Table no. 5.



Geomorphology and soils

The area has flat monotonous topography having regional slope (varying from 0.2 m/km to 0.08 m/km) towards South-East. The landform relief varies from 43.2 m amsl, near Bausi in north, to 35.1 m, near Hardi in south. Regionally, the area is flat with series of undulations present in the area. These minor undulations present in the area are outcomes of shifting of river Bagmati towards west along with the natural processes of degradation and aggradation. Some relief features such as paleo-channels, natural levees, back-swamps/flood plains of varying shape and sizes can be found in the area.

The area of Sheohar falls under the catchment area of Bagmati river which is known for its flood every year in her catchments. Other streams passing through the district are Kola Nadi, Balsundar Nala and Purani Dhar which are mainly avulsed channels of the river Bagmati. The drainage pattern is sub-parallel in the district. The area of Sheohar is underlain by thick sequence of unconsolidated sediments deposited during Quaternary period. These unconsolidated sediments mostly comprised of sands of various grades with occasional pebble beds.

In the exploratory drilling done by CGWB, in the Sitamarhi district where the same morphostratigraphic unit is extending (as described above), many clay and sand sequences have been observed which may be due to multi-cyclic nature of deposition.

Main soil type in the area is Udifluvent. Soil in the district has been grouped as soil of:

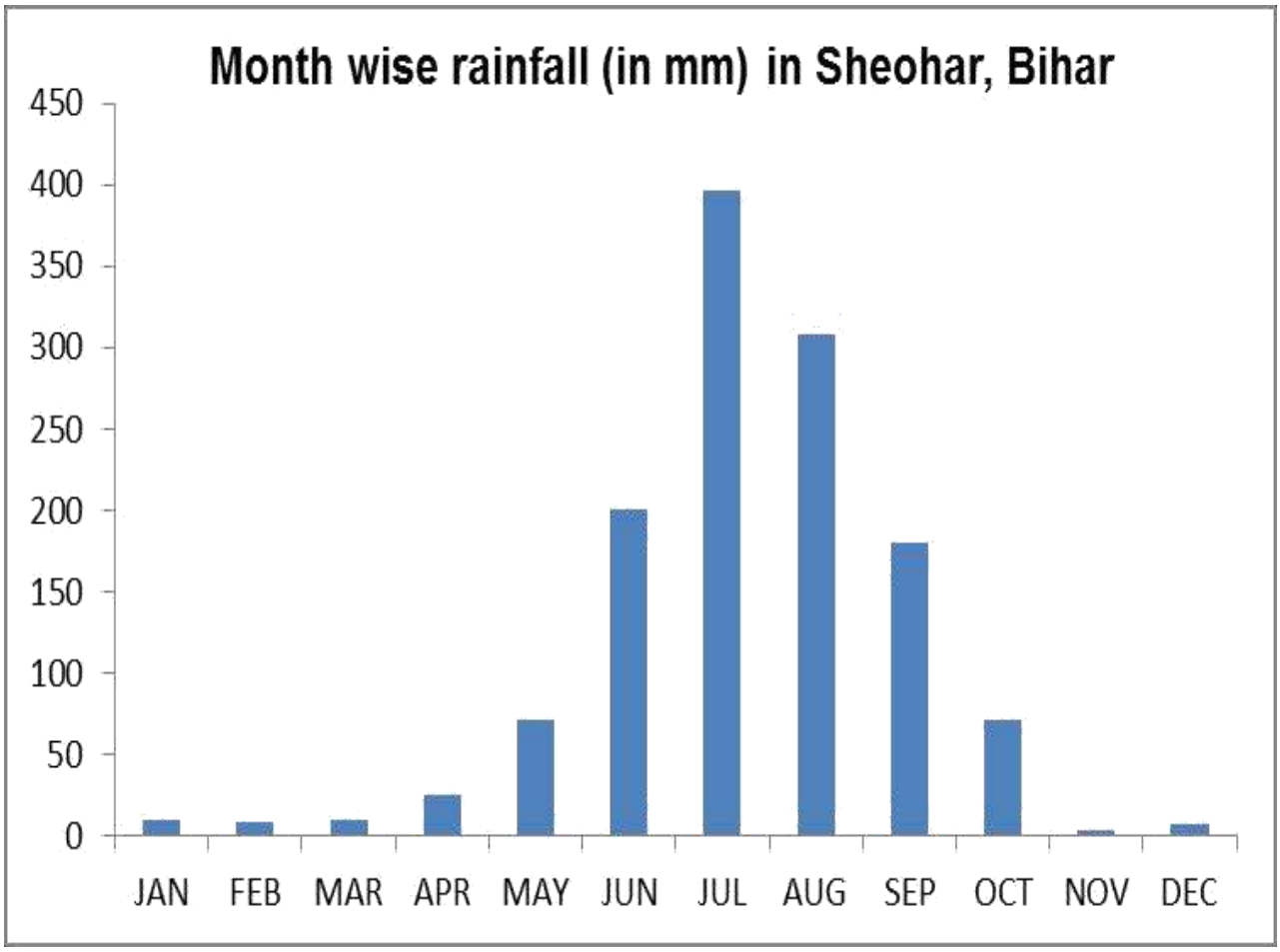
a. Active alluvial plain- soils in this group are very deep, coarse to fine loamy, calcareous at places and with slight to moderate erosion. Taxonomically, this type of soil comes under Udifluvent soil and they occupy the central part of the district.

b. Recent flood plain- soils in this group are very deep, fine loamy, calcareous, with slight erosion and severe flooding and surface texture is loamy. This soil is present in eastern and southern part of the district.

CHPATER-10

Climate and Rainfall

The climate in the district is hot sub-humid. As per the climatic data, the area is categorized under agro-climatic zones of hot sub-humid with deposits of alluvial origin. The maximum temperatures (25 – 40ºC) are noticed from May to July and lowest temperatures (12 - 26º C) from December to January months. The relative humidity is reported to be very high in the district i.e. 44% in April to 81% in August. For the rest six months, the average relative humidity remains more than 70%.Month wise rainfall in the district is given in fig. 2 showing maximum rainfall in the months of June to September. Scanty rainfall is observed in winters



CHPATER-11

Geology and Mineral Wealth

Geology

(i) Regional Geology

Geologically, it represents nearly two third of Bihar is under cover of Ganga basin composed of alluvium and masks the nature of basement rocks.

Table 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
Vindhyans	Sandstones,Shales,Limestones, etc.	Parts of Bahbhua and Rohtas dist
Satpura	Schist, Phyllite, Quartzite	Part of Aurangabad, Jahanabad, Nawada, Nalanda,Sheikhpura and Munger District
Proterozoic	Mica Schist, amphibolites, quartzite, granite, dolerite and pegmatite Nawada, Jamui and Banka	Nawada, Jamui and Banka
Archaean	Gneisses, Granites, Schists, Phyllites, quartzite, amphibolites& intrusive all metamorphosed sedimentary and igneous rocks	Part of Aurangabad, Jahanabad, Nawada, Jamui, Banka and Bhagalpur

(ii) Local Geology of the area

The area has flat monotonous topography having regional slope (varying from 0.2 m/km to 0.08 m/km) towards South-East. The landform relief varies from 43.2 m amsl, near Bausi in north, to 35.1 m, near Hardi in south. Regionally, the area is flat with series of undulations present in the area. These minor undulations present in the area are outcomes of shifting of river Bagmati towards west along with the natural processes of degradation and aggradation. Some relief features such as paleo-channels, natural levees, back-swamps/flood plains of varying shape and sizes can be found in the area.

The area of Sheohar falls under the catchment area of Bagmatiriver which is known for its flood every year in her catchments. Other streams passing through the district are Kola Nadi, BalsundarNala and PuraniDhar which are mainly avulsed channels of the river Bagmati. The drainage pattern is sub-parallel in the district. The area of Sheohar is underlain by thick sequence of unconsolidated sediments deposited during Quaternary period. These unconsolidated ediments mostly comprised of sands of various grades with occasional pebble beds.

Mineral Resources:

Details of river or stream and other sand source of the district

The river Bagmati is the main river flowing through the district of Sheohar. The area falls under the catchment areas of Bagmatiriver. Bagmati is a perennial river originating in Shivpur range of hills in Nepal. In India, the river comes into existence at 2.5 km north of Dheng railway station in Sitamarhi district thereby entering into Sheohar district at Khoripakar and is joined by Lalbakeya river. The river Bagmati has changed its course several times in past. Other streams present in the district are Kola Nadi, BalsundarNala and Purani Dhar which are considered to be avulsed channels of the river Bagmati. The drainage pattern is sub-parallel in the district. On its left bank, the river merges with Kola Nadi. The river from this point upto confluence of Manusmara river downwards, flows along the course of Kola Nadi. The district is exposed to floods every year, especially during the monsoon season, thereby causing damages to the standing crops. The area of Sheohar is underlain by thick sequence of unconsolidated sediments deposited during Quaternary period. These unconsolidated sediments mostly comprised o sands of various grades with occasional pebble beds.

CHAPTER-12

Drainage System with description of main rivers.

Drainage Pattern and Sand Source of the Study Area of Sheohar district

Sl. No.	Name of the River	Area drained (sq. Km.)	% Area drained in the District
1	Kareha River	4.08	1.14%
2	Bagmati River	0.60	0.14%
3	Lal Bakeya Nadi	0.20	0.05%
4	Purani Dhar	0.15	0.03%
Total		5.03	1.36%

CHAPTER-13

Salient Features of Important Rivers and Streams

Total Area of Rivers in Sheohar : 5.03 Sq.Km.

Sl. No.	Name of the River of Stream	Total Length in the District (in Km)	Place of Origin	Altitude at Origin
1	Kareha	33 Km	Bakhar Chandiha	73 Meters
2	Bagmati River	30 Km	Amwa Kalan	70 Meters
3	LalBakeyaNadi	3 Km	Adauri	74 Meters
4	PuraniDhar	9 km	Mohanpur	66 Meters

CHAPTER -14

Methodology Adopted for Calculating of Mineral Potential

The mineral potential is calculated based on field investigation and geology of the catchment area of the river/ streams. As per the policy of the State and location, depth of minable mineral is defined. The area for removal of mineral in a river or stream can be decided depending on geo-morphology and other factors, it can be 50% to 60% of the area of a particular river/stream, e.g. in river mineral constituents like sand up to a depth of threee meter are considered as resource mineral. Other constituents like clay and silt are excluded as waste while calculating the mineral potential of particular river/ stream.

The specific gravity of each mineral constituent is different. While calculating the mineral potential, the average specific gravity is taken as 2.25. The percent of mineral constituent like boulder, river bajari, sand also varies for different river and streams. While calculating the mineral potential the percentage of each mineral constituent is taken as, Sand 25- 30% and 5-10% for silt and clay.

The quantum of deposition varies from stream to stream depending upon factors like catchment lithology, discharge, river profile and geomorphology of the river course. There are certain geo-morphological features developed in the river beds such as channel bar, point bar etc. where annual deposition is more even two to three meters.

The details are given below:

Name of the River	Portion of the River or stream Recommended for Mineral Concession(in sq.km)	Length of area recommended for mineral concession in Kilometer	Average width of area recommended for mineral concession in meter	Area recommended for mineral concession (in Square meter)	Mineable minerals potential (in metric tone (60% of total minerals potential)
Kareha	**4.08**	**33 Km**	**124 m**	**40.92 Lakh m^2**	**112.69 Lakh MT**
Bagmati	**0.60**	**30 Km**	**20 m**	**6.00 Lakh m^2**	**16.52 Lakh MT**

LalBakeyaNadi	**0.20**	**3 Km**	**67m**	**2.01 Lakh m^2**	**5.54 Lakh MT**
PuraniDhar	**0.15**	**9 km**	**16 m**	**1.44 Lakh m^2**	**3.97 Lakh MT**
Total	**5.03 KM^2**	**75 KM**	**56.75 M (Average)**	**50.37 Lakh m^2**	**138.72 Lakh MT**

Mineral Potential

Sand (MT)	Total Mineable Mineral Potential(MT)
138.72 Lakh MT	**138.72 Lakh MT**
Annual Deposition (30%)	
41.6 Lakh MT	**41.6 Lakh MT**

From the above it is clear that about 138.72 **Lakh** metric tonnes of mineral is available up to depth of three meters in the river bed in Sheohar District.

The annual deposition is **41.6 Lakh MT**.

List of Ghats in Sheohar District: Annexure-I

Chapter- 15

Brick Earth in Bhagalpur

The state of Bihar is developing rapidly. In the five year period from 2004 to 2009 Bihar's Gross Domestic Product (GDP) has grown by 11.03% and between 2001 and 2011 there has been a significant increase in urbanization with the number of towns increasing from 120 to 213 according to the latest census. This has been possible through investment in various sectors, especially the construction sector. If this growth rate needs to be sustained, the demand for quality building materials will increase manifold. In rural areas too, Bihar faces challenges with the need for over 7.5 billion bricks over the next five years to meet the rural housing gap. A field study was conducted in 5 districts on Bihar to understand the present scenario of the brick industry and to assess the market potential and barriers for introducing energy efficient technologies for walling materials. The major brick producing districts of Bihar is Patna, Nalanda, Siwan, Muzaffarpur, Sitamarhi, East and West Champaran, Darbhanga, Samastipur and Madhubani. With over 5,700 authorized brick kilns the state produces around 17 billion bricks per year. The brick sector in Bihar is growing at a rate of 9%, however it continues to be dominated by traditional technology - the Fixed Chimney Bulls Trench Kiln (FCBTK). Unlike the rest of India (except Punjab, Haryana, Uttar Pradesh and West Bengal) the state of Bihar is the only state which has transformed the brick firing technology from movable to fixed chimney.

As per survey, we have listed no 29 bricks earth mining in sheohar districts. The status of bricks earth mining are attached in **Annexure-II**.

Status of Brick Earth in Sheohar District

S No	No of operational Units of Brick Earth in Sheohar districts during Financial Year (2016-17)	No of Units of Brick Earth in Bhagalpur Identified by IEED
1	**6**	**29**

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