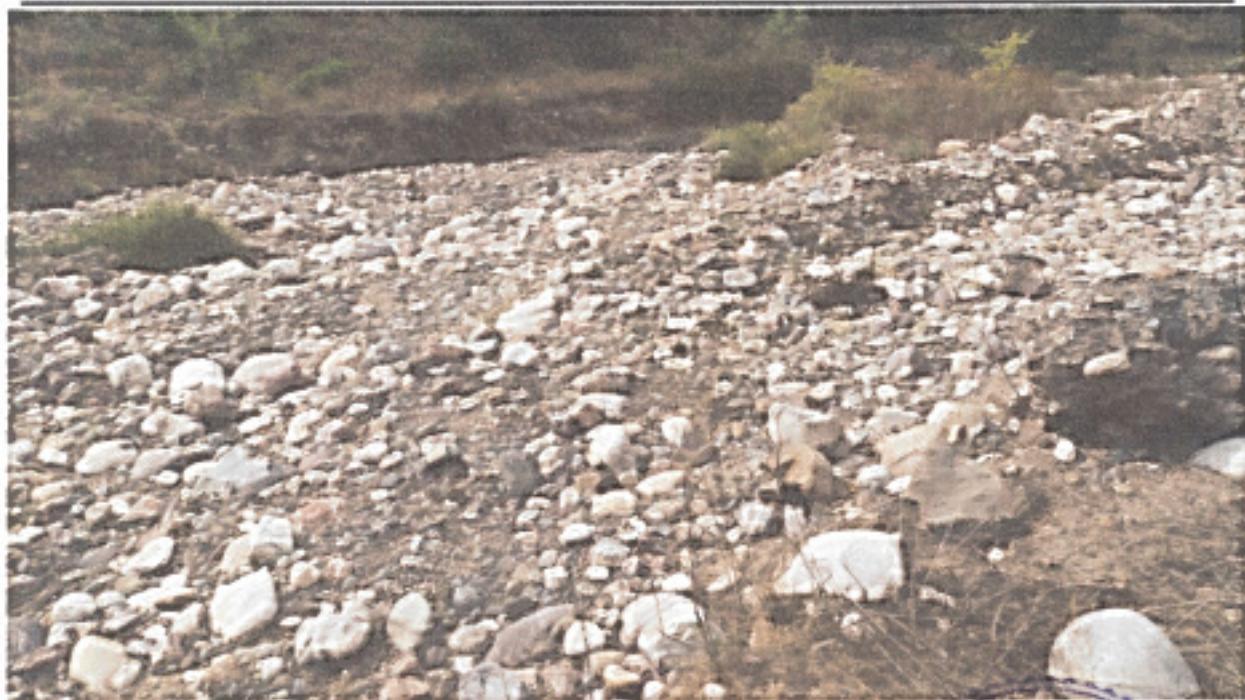


MINING PLAN
OF MINOR MINERAL LEASE
FOR SAND, STONE & BAJRI
KHASRA NOs.1/1, 1/2, 5748/5595/1 &
5748/5595/2, MEASURING 9.5030 HECTARE
MAUZA TATOLI PARDANA & SIDHPUR,
TEHSIL -DHARAMPUR, DISTT - MANDI (H.P.)



**LETTER OF INTENT ISSUED IN FAVOUR
of THE GENERAL MANAGER,
APPROVED
TRIVENI MAHADEV & THANA PLAUN HEPs,
M/s H.P. POWER CORPORATION Ltd,
TEHSIL KOTLI, DISTRICT MANDI,
HIMACHAL PRADESH**



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*Declaration
Certificate of RQP*



गामकाय शास्त्र
इंद्रांग विभाग विभाग
Geological Wing
Dept. of Industries
Shimla

APPROVED

With Condition

गति व स्थान अनुमति

Side Letter No. Udyog-Bhu (Cham-4) Log No. 54117-1626

dated

25/5/23



Geologist (Zone-IV)
Geological Wing
Dept. of Industries Shimla-1

27/05/23

Gm/AGM/DM (Em)

**MINING PLAN
OF MINOR MINERAL LEASE FOR SAND, STONE & BAJRI
SITUATED IN KHASRA NO. 1/1, 1 /2, 5748/5595/1 &
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MAUZA TATOLI PRADHANA & SIDHPUR,
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**LETTER OF INTENT ISSUED IN FAVOUR OF
THE GENERAL MANAGER,
TRIVENI MAHADEV & THANA PLAUN HEPs,
M/s H.P. POWER CORPORATION Ltd, TEHSIL KOTLI,
DISTRICT MANDI, HIMACHAL PRADESH**

INTRODUCTION:

The General Manager, Treveni Mahadev & Thana Plaun Hydro-Electric Projects, Himachal Pradesh Power Corporation, Tehsil Kotli, District Mandi, Himachal Pradesh, have been issued a "Letter of Intent" valid for one year for grant of mining lease for mining sand, stone and bajri vide letter No. Udyog-Bhu(Khani-4) Laghu-541/2017-6599 dated 21/12/2021.

Himachal Pradesh Power Corporation Limited (HPPCL), was incorporated in December 2006 under the Companies Act 1956, with the objective to plan, promote and organize the development of all aspects of hydroelectric power on behalf of Himachal Pradesh State Government (GoHP) and Himachal Pradesh State Electricity Board (HPSEB) in Himachal Pradesh. The GoHP has a 60% and HPSEB a 40% shareholding in HPPCL. Special Purpose Vehicles namely Pabber Valley Power Corporation (PVPC) and Kinner Kailash Power Corporation (KKPC), earlier owned by HPSEB, have been merged with HPPCL with the objective of developing new hydro projects in their respective river basins with effect from 31.07.2007.

Thana Plaun Hydro Electric Project is located between latitude 76° 15'E to 77° 45'E and longitude 31° 30'N to 32° 30' N in district Mandi. The project has been planned as a runoff river cum storage scheme on the right bank of river Beas with its Dam across the river Beas and underground Powerhouse located on right bank Of the river near village Thana. The Stone, Bajri and sand quarried from lease area will be used in the construction of the Project and its infrastructure.

In accordance with Rule 35 of the 'Himachal Pradesh Minor Minerals (Concession) and Minerals (Prevention of Illegal Mining, Transportation, and Storage) Rules 2019' the lessee must submit 'Mining Plan' of the area granted or applied for mining lease for a period of five years. Accordingly, this 'Mining Plan' is prepared in accordance with the 'FORM 'M' annexed with the said Rules

MINING PLAN

GM, TM & TP Projects, HPPCL, Tehsil Kotli, Mandi.

Thodu Khad Quarry

Thodu khad lease area is situated in Dharmpur Tahsil of Mandi District, Himachal Pradesh. The climate of the area is tropical with well-marked summer, winter, and rainy season. The material available in the lease area shall be mined (raised) by opencast method of mining.

The quarry lease area is located at about 5.4 Km. from Dharmpur on Dharmpur Seoh Road.

General:

1.1 Name and address of the applicant

1.1. A. Name of the applicant --

The General Manager

1.1. B. Address of the applicant --

The General Manager

Triveni Mahadev & Thana Plaun HEP's,
Himachal Pradesh Power Corp.Ltd.,
Tehsil Kotli, Distt. Mandi.

1.2 Status of the applicant

Government undertaking.

1.3 Minerals which the Applicant intends to mine.

The applicants intend to mine stone, Sand and Bajri. The stones, sand and bajri will be used in construction activities of the Projects.

1.4 Period for which the mining lease is granted.

Five years effective from the date of execution of lease deed agreement.

1.5 Name and address of the RQP preparing the Mining Plan:

Jhumpa C. Jamwal

Cottage No. 21, Type IV, HP Government Officers Residences,
CPWD Colony, Bemloe, Himachal Pradesh

RQP Registration No. HP/RQP/21/1/2016

Mobile No. 9418909890.

1.6. Name and address of the prospecting agency

The base contour map of the leased area was prepared by Shri C.P.Negi, Retired Senior Surveyor, Geological Wing, Department of Industries, resident of Negi Lodge (West), Indernager, Dalli Shimla, for the RQP.

The detailed prospecting of the area was carried out by the R Q P for preparation of this report. The Secondary data is collected from various Geological reports of the Geological Survey of India, Satluj Jal Vidyut Nigam Ltd., Indian Metrological Department, Department of Economic and Statistics, Himachal Pradesh, and various publications of Government of Himachal Pradesh. The detailed prospecting of the area was carried out by the R Q P for preparation of this report.



2. Location and Approach of the area

2.1 Topo-sheet Details.

Surveyed by
Surveyed in
Sheet No.
Scale
Edition

Survey of India
1989-90, upgraded 2005.
H43E9
1:50,000
First



Figure 1: Location of the Mining Lease area

The area lies between the latitude and longitude given below in table 1 and shown in the Figure 2.

MINING PLAN

GM, TM & TP Projects, HPPCL, Tehsil Kotli, Mandi.

Thodu Khad Quarry

Table 1 Showing latitude and longitude of the boundary pillars (calculated).

Pillar	Latitude North	Longitude East
A	31° 50' 29.35"	76° 44' 08.73"
B	31° 50' 48.64"	76° 44' 14.70"
C	31° 50' 51.40"	76° 44' 17.92"
D	31° 50' 54.27"	76° 44' 25.79"
E	31° 50' 54.44"	76° 44' 30.50"
F	31° 50' 49.92"	76° 44' 38.88"
G	31° 50' 49.16"	76° 44' 38.17"
H	31° 50' 47.97"	76° 44' 39.42"
I	31° 50' 47.88"	76° 44' 38.86"
J	31° 50' 49.81"	76° 44' 34.41"
K	31° 50' 50.74"	76° 44' 32.30"
L	31° 50' 52.81"	76° 44' 27.84"
M	31° 50' 49.55"	76° 44' 19.43"
N	31° 50' 47.63"	76° 44' 16.91"
O	31° 50' 44.39"	76° 44' 16.73"
P	31° 50' 29.15"	76° 44' 11.37"

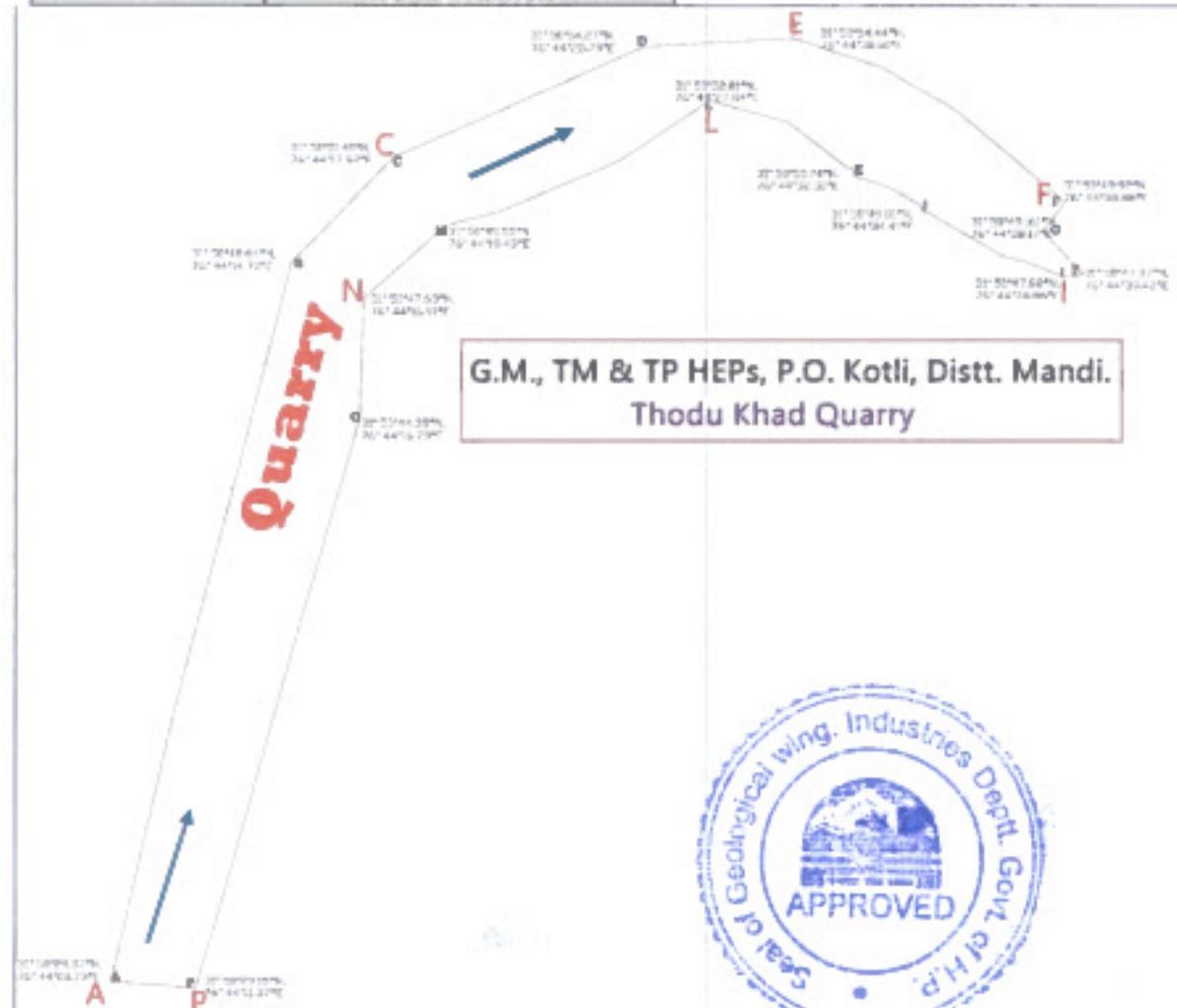


Figure 2: Calculated Coordinates of Boundary Pillars

MINING PLAN

GM, TM & TP Projects, HPPCL, Tehsil Kotli, Mandi.

Thodu Khad Quarry

2.2 Location of area of lease

2.2a Details of area

The Revenue details of the area are given below in table 2

Table 2: The detail of the lease area

2.3 Address & Detail of Lease

S. No	Khasra Number	Area Hectares	Owner of Land	Kism	Mauza/moha
1	1/1	1.4911	Government	Gair mumkin khad	Tatoli
2	1/2	3.4787			Pardhana
3	5748/55 95/1	1.4911			Sidhpur
4	5748/55 95/1	3.0421			

9.5030 HECTARES

Village: -	Tatoli Pardhana & Sidhpur
Patwar circle:	Sidhpur
Post Office: -	Sidhpur
Tahsil: -	Dharampur
District: -	Mandi
Sub-Divisional Office (Civil): -	Dharampur
Divisional Office (Forest): -	Jogindernagar
Range Office (Forest): -	Sarkaghat
Assistant Engineer (IPH): -	Dharampur
Assistant Engineer (PWD): -	Dharampur
State :	Himachal Pradesh

2.4 Distance from Important Places to Quarry site.

Distances from the Quarry site			
S. No.	From	To	Distance (in Km.)
1	Quarry Roadside	Roadside	0.400
2		Dharampur	9
3		Kotli	53
4		Mandi (District Offices)	73
5		Shimla (State capital)	162
6		Airport	165
		Bunter (Airport)	128

7	Jogindernagar	56
8	Metre gauge Rly Stn.	
9	Sarkaghat	26
	Dharamsala	92
	Gaggal Airport	103

2.5 Approach to the Area.

The leased site is part of Riverbed and is at 9 km from Dharampur via Dharampur- Seoh Road, which is approx. 400 m from the quarry site by a link road. Figure below shows the approach map of the area.

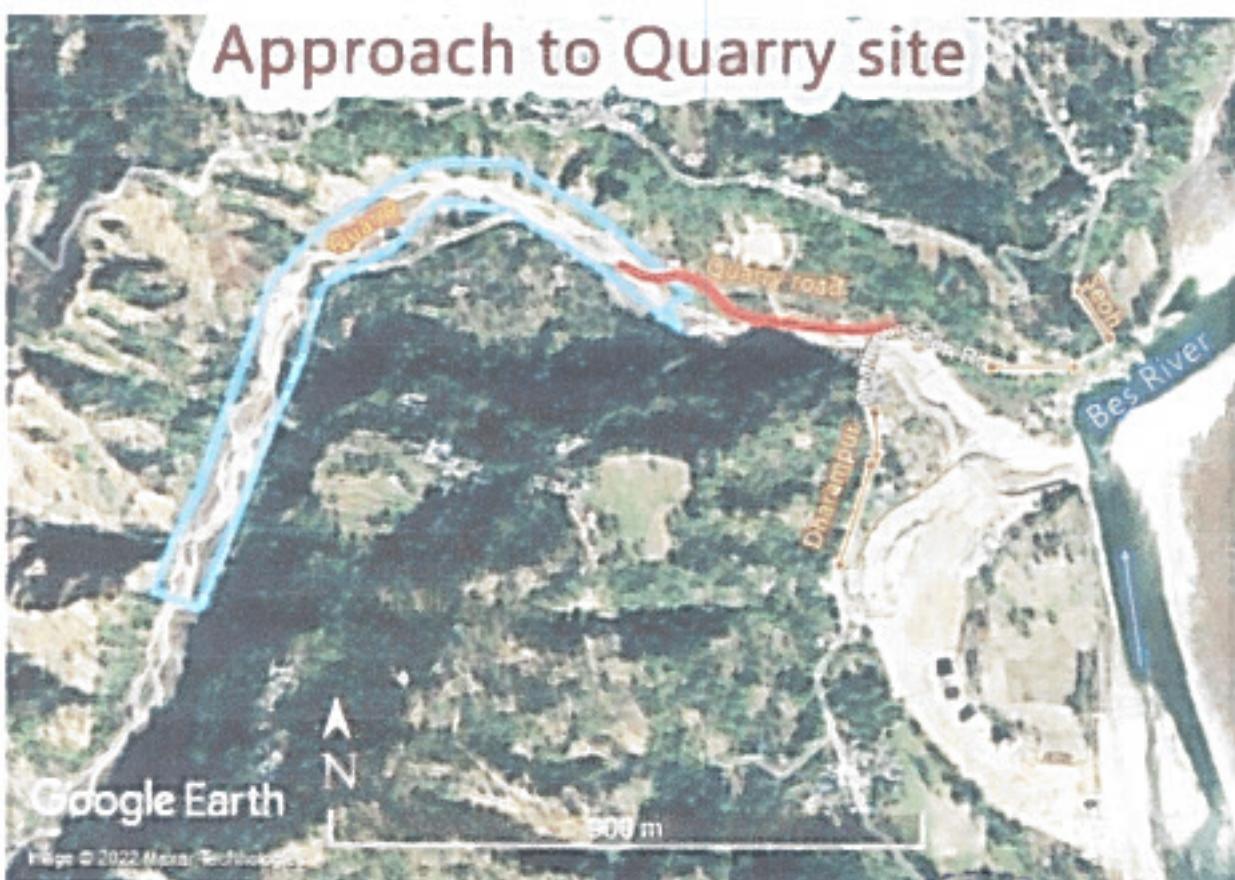


Figure 3: Approach to the Centre of Quarry site

3. Physiographical Aspect of the Area

3. 1 General

The area in general is a part of the Lesser Himalaya. The Lesser Himalayas, located in north-western India in the states of Himachal Pradesh and Uttar Pradesh,



in north-central India in the state of Sikkim, and in north-eastern India in the state of Arunachal Pradesh, range from 1,500 to 5,000 meters in height.

The general relief of the Thodu Khad region is as given below in the figure: -4: -



Figure 4: The terrain map of the Thodu Khad region.

The Satellite photograph was taken from the Google is given Figure: -4 to depict the general physiography of the area showing that the major ridges/water divides are generally running NE-SW and all spurs are running parallel to the NE-SW line.

3.2 Altitude of the area

- The highest contour of leased out area in Thodu Khad is 721 Meters above MSL,

- The lowest contour of the leased-out area in Thodu Khad is 630 Meters above MSL.

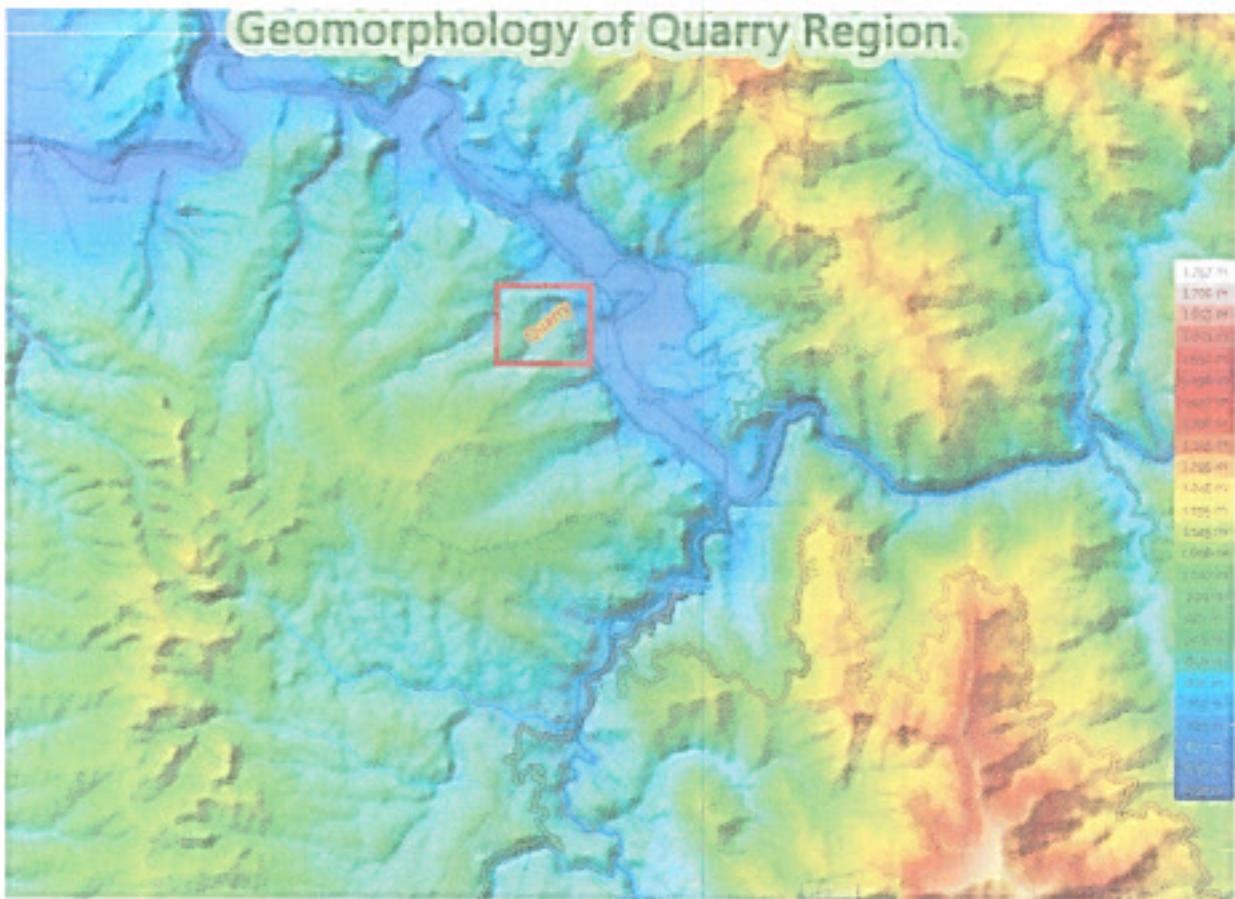


Figure 5: Terrain Map of the Area.

3.3 Climate of Area

The climate of district is hot in summer as it is situated in valley at lower altitude while surrounding mountains top experience pleasant weather and cold in winters. Monsoon brings plenty of rain from July to September. October to November is pleasant weather, during this time Lake is completely full. Hottest months are May and June when temperature usually hover around 37-38 degree Celsius and sometimes for few days jumping to above 40 degrees Celsius, the nights are comparatively cooler, and month wise temperature is given in figure 7.



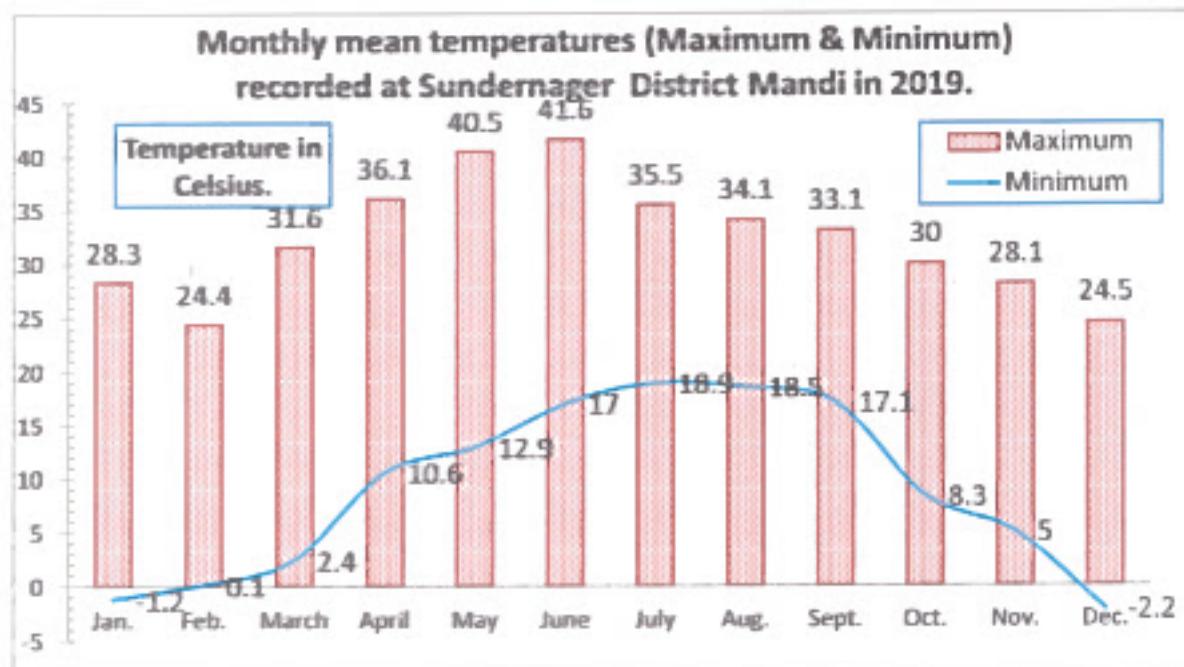


Figure 6: Mean monthly maximum and minimum temperature recorded at IMD station at Sundernager.

3.4 Rainfall

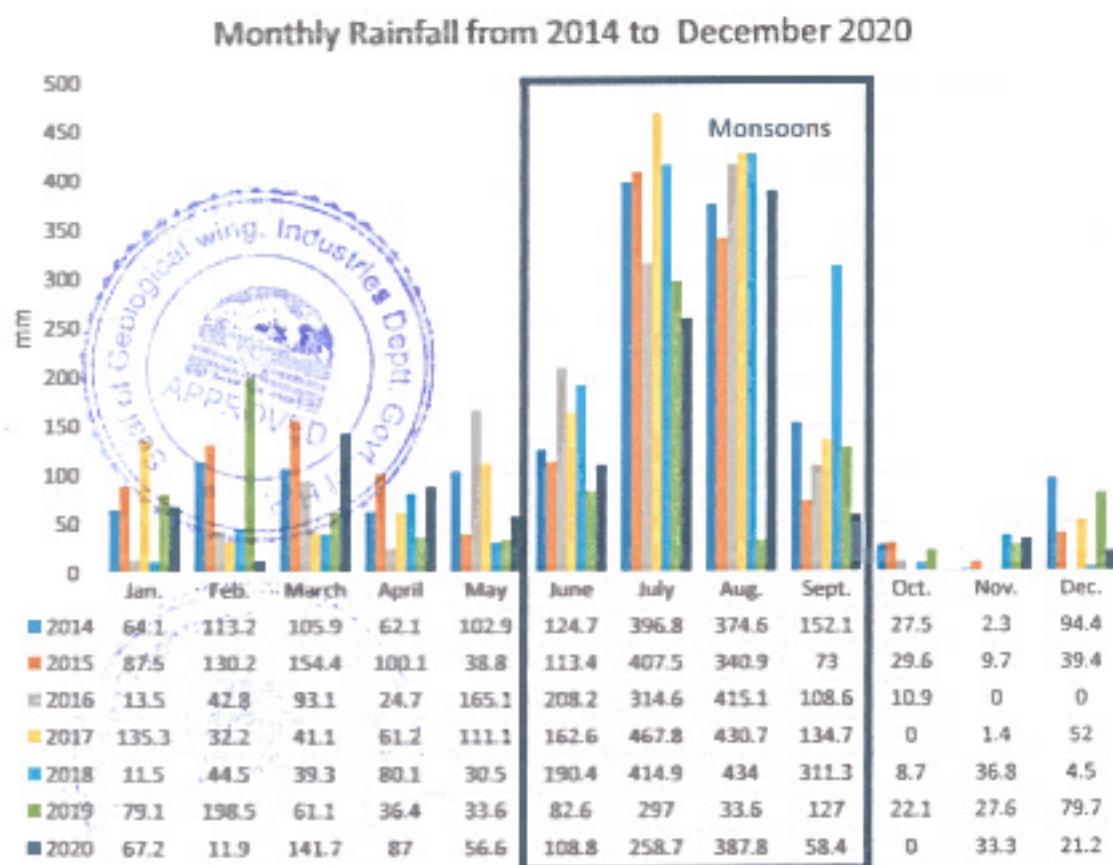


Figure 7: Rainfall of the District.

MINING PLAN

GM, TM & TP Projects, HPPCL, Tehsil Kotli, Mandi.

Thodu Khad Quarry

3.5 Any other important feature

The mining leased area falls in bed of Thodu Khad tributary of Beas River and accessibility to the quarry site is through a linkroad from Dharmpur- Sandhol Road.



PART I

1. DESCRIPTION OF RIVER/STREAM BED IN WHICH THE LEASED IS SITUATED

4.1 General

The leased area is situated in the Thodu Khad, a primary tributary of Beas River. Thodu Khad originates at a height of 1172 meter above mean sea level, from a peak east of Parijal village (origin lies in the Survey of India, topo-sheet NoH43E9). The general flow is SW to NE.

The attitude at confluence with Beas River is 609 Metres above MSL (lies in the Survey of India, toposheet No H43E13). The total length is about 5.32 Km. (The catchment of the Thodu Khad lies on survey of India Topo-sheet Nos H43E9.

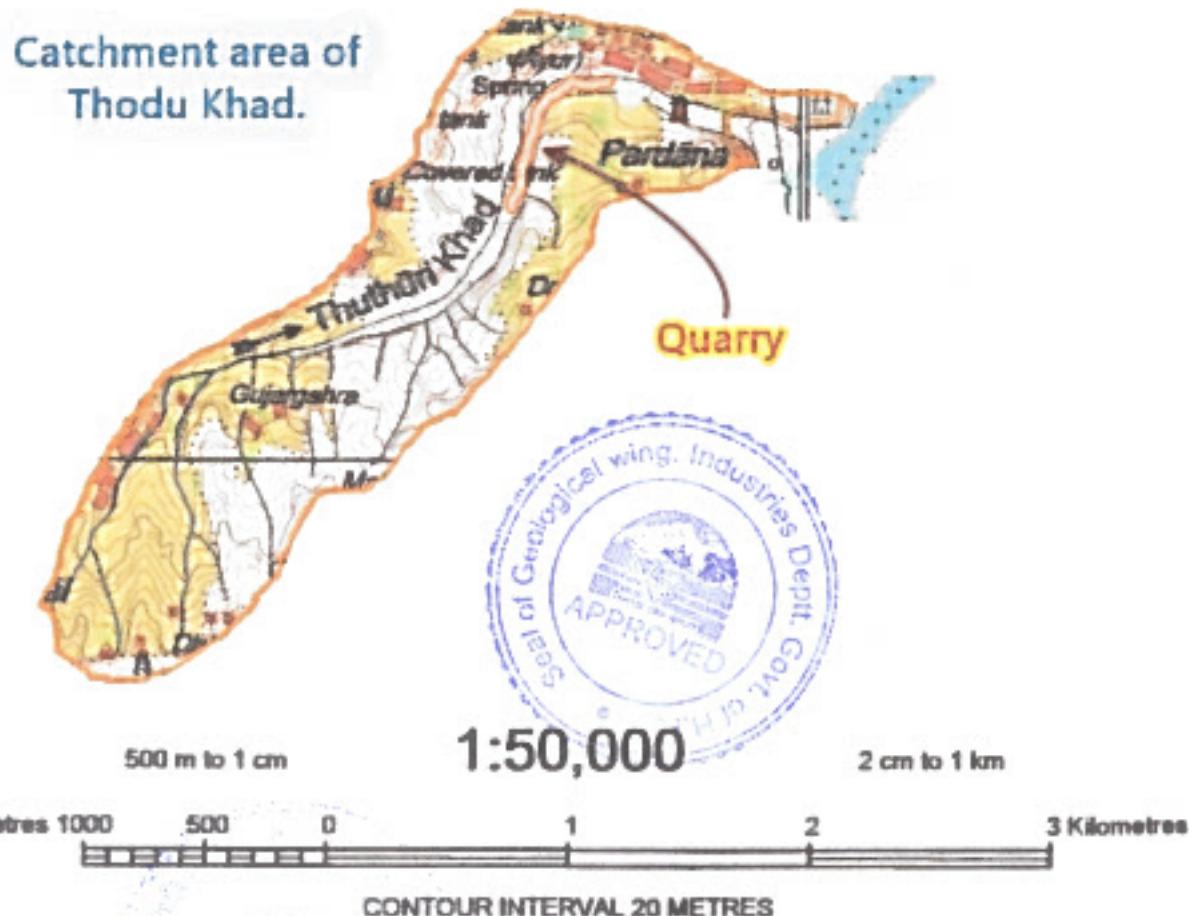


Figure 8: Catchment of Thodu Khad.

There is no uniformity/ equational order of average length in each order suggesting that river has not attained proper age and valley is in process of expansion i.e erosion in upper reach will be unavoidable. Bifurcation ratio also suggest that it has not attained maturity particularly 1st, and 2nd order hence regular erosion in the upper reaches. The low bifurcation ratio of the 3rd order stream is indicative that the valley is

in the stage of further expansion. The average length of 2nd order is less than 1st order is indicative of structural control of the valley.

The general analysis of the drainage system of Thodu Khad is given below in (as per 1: 50000 scale)

Basic Geometry of the catchment is as: -

Area of the Catchment = 3.24 Square kilometres

Effective catchment = 3.20 Square kilometres.

Perimeter of the Catchment = 9.86 Km

Effective periphery = 9.5 km

Length of the river 5.16 Km

Average width of valley 765 Km

Width of the catchment at maximum 0.970 km

From various analysis of the drainage the Thodu Khad can be divided into two parts

- From origin to the 750 meter above mean sea level
The zone of active erosion—Young stage
- From 750-meter contour to confluence with Beas River
The zone of erosion during very high flood otherwise deposition – Maturity stage.

The leased area is situated in the zone of Maturity.

1.2 Name of River/ Stream in which the leased is situated

Thodu Khad – Primary tributary of Beas River.

1.3 Drainage System

Beas River

The effective catchment of the Thodu Khad is given below in the figure 8.





Figure 9 Effective Catchment area of Thodu Khad.

1.4 Type of Drainage

Dendritic (Figure 8)

1.5 Origin of River/Stream

Thodu Khad originates at a height of 1172 meter above mean sea level, near Parial village (origin lies in the Survey of India, toposheet No H43E9). The general flow is SW to NE.

The altitude at confluence with Beas River is 609 Metres above MSL (lies in the Survey of India, toposheet No H43E13).

1.6 Attitude at Origin

1172 metres above MSL.

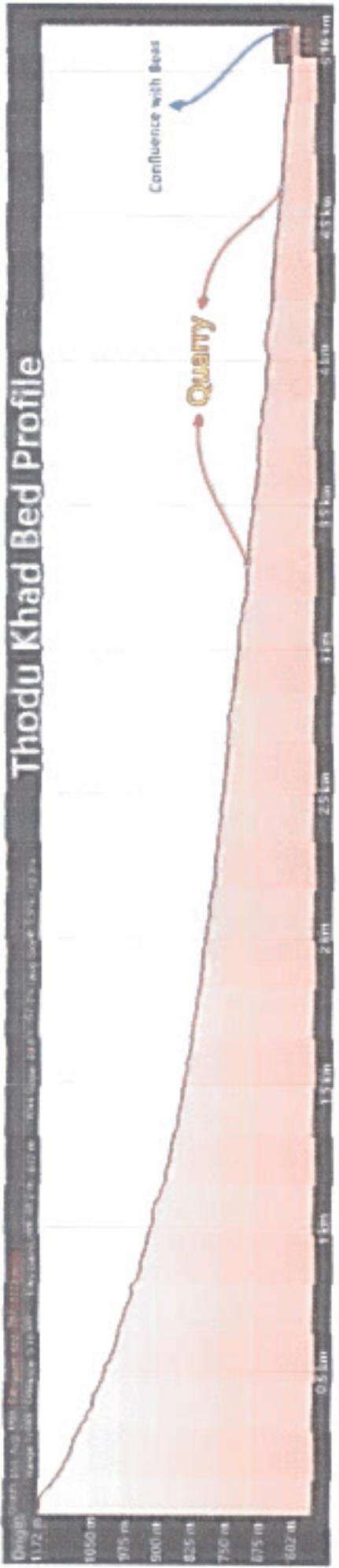


Figure 10 Khad bed profile.

1.7 Width of River at the place of Mining

44 to 115 Metres.

1.8 The annual deposition at the place of mining

4 to 6 Cm, at different location, in the Thodu Khad.

1.9 The Comparative Geology of the River/ Stream at the mining site

The general composition of the mining area is 6 to 10 Kg approx. The largest boulder varies 20 to 34 cm X 16 to 34 cm X 18 to 30 cm (length X breath X height).





Photo 1: Showing the competency of river in leased area

1.10 The level of HFL

During monsoon floods the water level rises by about one metre, at times for short spells.

1.11 The level of LFL

Khad is seasonal.

1.12 The thread of deepest water in meandering.

The landform being depositional the meandering thread is constantly changing during the rains depending upon the water level.

1.13 Groundwater table.

The depth of groundwater level varies in the area according to season and distance from water current. It lowest in the pre monsoon period and highest in the post monsoon period. Thus, depth of groundwater table may vary from few centimetres in post monsoon period and more than a metre in the pre-monsoon period depending upon distance from flow.

2. Geology

2.1 Regional Geology

GEOLOGICALLY Himachal Pradesh can be broadly divided into two major geo-tectonic zones viz. the Lesser Himalayan tectogen in the south and the

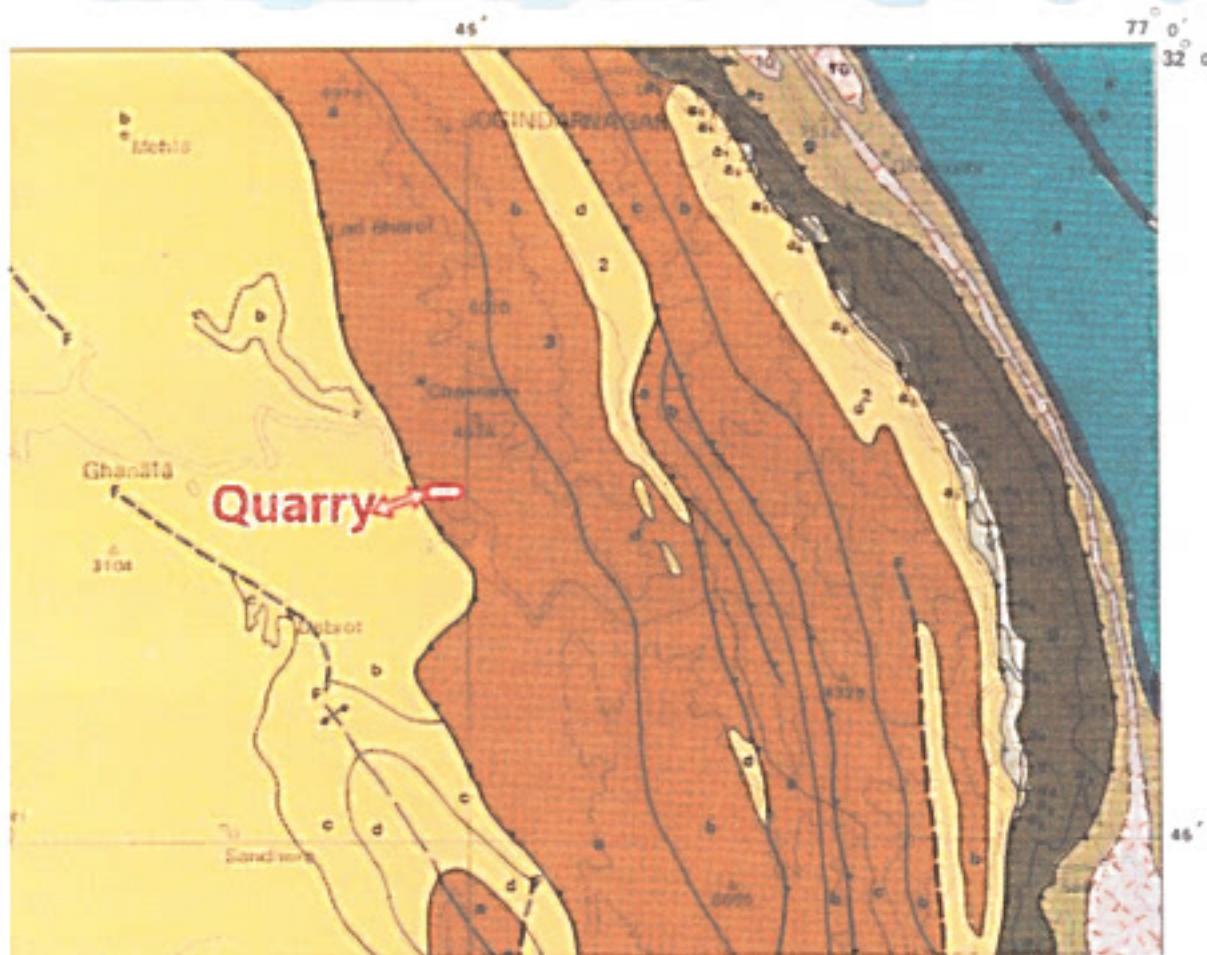
Tethys Himalayan Tectogen in the north. These two tectonic zones are juxtaposed with each other along a major tectonic break collectively designated as Main Central Thrust in the sense defined by Srivastava (1988). Mandi District lying within the Lesser Himalaya and the Shiwalik Foothill comprises rocks ranging in age from Proterozoic to Quaternary. The oldest rocks are of undifferentiated Proterozoic age, comprising carbonaceous phyllite, schist, gneiss, quartzite and marble. The Ghoghar Dhar (Undifferentiated Proterozoic age) occurs as an intrusive body within the Chail Group of rock. This granite body is well foliated and composed of gneisses, granite with minor aplite and basic veinlets. The Sundernagar Group of Rocks of Meso- Proterozoic age is represented by quartzite with basic flows. The Shali Group of Rocks (Meso- Proterozoic) Comprising limestone, dolomite, (at places stromatolytic) slate, & quartzite. The Subathu consists mainly, of olive-green shales and grey shales. At the top, a band of white quartzite is exposed; this band of white quartzite has been taken as the marker, defining the top of the Subathu sequence. The thick sequence of brackish and freshwater sediments immediately succeeding the fossiliferous marine Subathu are classified as Dharamshala Formation. The Dharamshala Formation are widely exposed in the Mandi parautochthon, further west in the autochthon, these rocks are exposed, in the core of the Sarkaghat anticline. The Shiwalik Group of Middle Miocene of Early Pleistocene age comprises coarse clastic fluvial deposits of sandstone, clay and conglomerates. The Quaternary sediments (Older Alluvium and Newer Alluvium) along prominent channels consisting of sand, silt, clay, pebbles and cobbles occurring along present channels of Middle to Late Pleistocene and Holocene age.

5.2 Local Geology

The local geological sequence in the area is given in the figure WP-7 and stratigraphy of the area is given in the table WP-5



Geological Map of the Region (GSI)



LEGEND

1	Alluvium and other recent deposits	Quaternary
2	a. Undifferentiated b. Upper Siwalik: soft sandstone, arkoses, brownish clay, poorly sorted and crudely bedded conglomerate and boulder bed c. Middle Siwalik: grey sandstone, orange clay d. Lower Siwalik: red and purple sandstone and shale	Siwalik System Middle Miocene - Pliocene
3	a. Undifferentiated: b. Upper Dharmsala/ Kessaui Formation: grey sandstone, shale, clay c. Lower Dharmsala/ Dagshai Formation: red nodular clay, grey / green sandstone d. Subethu/Kakara Series: grey / green splintery shale, sandstone and limestone bands	Subethu Group Oligocene - Lower Miocene

Figure 11:Geological Map of the Area

MINING PLAN

GM, TM & TP Projects, HPPCL, Tehsil Kotli, Mandi,

Thodu Khad Quarry

Table: Stratigraphy of the Thodu Khad and surrounding region Area

Sr. No	Formation	Rocks
1	Newer Alluvium Channel Alluvium	Grey micaceous, fine to coarse grained sand, silt, clay, boulders, cobbles and pebbles of sandstone and quartzite
2	Upper Siwalik	Predominantly massive conglomerate with red and orange clay as matrix and minor sandstone and earthy buff and brown claystone
3	Middle Siwalik	Massive Sandstone with minor conglomerate and local variegated claystone
4	Lower Siwalik	Alternation of fine to medium- grained sporadically pebbly sandstone, calcareous cement and prominent chocolate and medium maroon claystone in the middle part
5	Upper Dharamshala	Medium to fine grained, hard, bluish grey and massive Sandstone, green clay and siltstone
6	Lower Dharamshala	Hard, grey, well bedded, and high mica content sandstone

2.2.1 Dharamshala Group

The thick sequence of brackish and freshwater sediments succeeding the fossiliferous marine Subathu Formation is the Dharamshala Formation. The Dharamshala Formation are widely exposed in the Mandi parautochthon, further west in the autochthon, these rocks are exposed, in the core of the Sarkaghat anticline.

This highly folded and faulted sequence of Dharamshala aggregating to about 4000 meter displays a contrasting topography with that of younger and softer Siwalik rocks. The thick, hard, and highly competent Dharamshala rocks stand out as prominent ridges with higher relief.

Dharamshala Group is divided into two Formations:

Upper Dharamshala



Lower Dharamshala

2.2.1. a: Upper Dharamshala Formation

Upper Dharamshala consists of thick sequence of sandstones, siltstones, and clays. The Sandstones are medium to fine grained, hard, bluish grey and massive while the clays and siltstone are usually green.

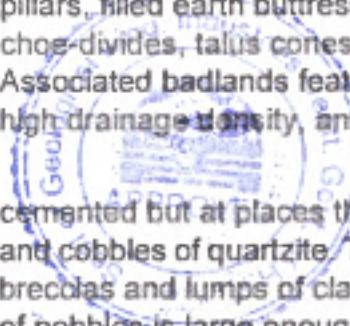
2.2.1. B: Lower Dharamshala Formation

Lower Dharamshala formation consists of very bright and red and mauve coloured clay and shales with thin bands of sandstone which are steel grey in colour, highly micaceous and well bedded.

2. 2.2 Siwalik Group

The Siwalik deposits are one of the most comprehensively studied fluvial sequences in the world. They comprise mudstones, sandstones, and coarsely bedded conglomerates laid down when the region was a vast basin during Middle Miocene, to Upper Pleistocene times. The sediments were deposited by rivers flowing southwards from the Greater Himalayas, resulting in extensive multi-ordered drainage systems. Following this deposition, the sediments were uplifted through intense tectonic regimes (commencing in Upper Miocene times), subsequently resulting in a unique topographical entity - the Siwalik Hills. The Siwaliks are divided stratigraphically into three major Subgroups - Lower, Middle, and Upper. These Subgroups are further divided into individual Formations that are all laterally and vertically exposed today in varying linear and random patterns.

Ongoing erosion and tectonic activity have greatly affected the topography of the Siwaliks. Their present-day morphology is comprised of hogback ridges, consequent, subsequent, obsequent, and resquent valleys of various orders, gullies, choes (seasonal streams), and earth-pillars, filled earth buttresses of conglomerate formations, semi-circular chose-divides, talus cones, colluvial cones, water-gaps, and Choe terraces. Associated badlands features include the lack of vegetation, steep slopes, high drainage density, and rapid erosion rates.


The conglomerates in general are poorly cemented but at places they are very hard. These consist mainly of pebbles and cobbles of quartzite. The stray pebbles of granite, limestone, sandstone, breccias and lumps of claystone are also observed at places. Often the size of pebbles is large enough to be called as Boulders. The conglomerates not only occur as regular band but also as lenticular bands alternative with micaceous sandstone and clay-beds. The sediments were brought down 2 to 25 million years ago by the numerous fast flowing rivers issuing forth from rapidly Rising Mountain mass of the Himalaya, in the north.

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The Siwalik Group is divisible into three sub-groups respectively the Lower, Middle and Upper on the basis of the litho-stratigraphy as given in the table (Table -4)

2. 2.2.a: Lower Siwalik: - The lower Siwalik consists essentially of a sandstone-clay alternation. In district Kangra the lower sequence of the lower Siwalik consists of medium grained sub-graywacke interbedded with thick red clay, but higher up in sequence, sandstones are coarser, and clasts become more frequent while the clays are less developed. The uppermost horizon consists of conglomerate with well-rounded clasts of grey quartzite possible derived from the Shali. The total thickness is 1600 metres.

2. 2.2.b: Middle Siwalik: - The Middle Siwalik Subgroup comprises of large thickness of coarse micaceous sandstone along with some inter-beds of earthy clay and conglomerate. It normally succeeds the Lower Siwalik along a gradational contact. The sandstone is less sorted than those in Lower Siwalik. Clay bands are dull coloured and silty. The general thickness is 1400 to 2000 metres

2. 2.2.c: Upper Siwalik: - The Upper Siwalik is mainly represented by sandstone inter-bedded with silt and conglomerate. The lower portion of the Upper Siwalik mainly consists of soft, massive, pebbly sandstone with intercalations of conglomerates. In the upper portion the conglomerate intercalation is replaced by the clay's intercalations. The general thickness in the district is 2300 metres.

2.2.3 Newer Alluvium

Newer Alluvium is composed of cyclic sequence of grey, micaceous, fine to coarse grained sand, silt, boulders, cobble, pebble and clays. Newer alluvium exposed as point bar/channel bars within the active channels.

2.3 Geology of the leased area

The quarry out area forms a part of the stream bed covered with boulders, cobbles, pebbles, river born bajri, and sand and clay deposit of Channel alluvium. The rocks in the catchments of Thodu Khad is of Upper Siwalik Formation. The area is comprising predominantly the quartzite Boulders, Sand and river born bajri of Sandstone. The boulders are white, spotted white, greenish white-pink, purple and dark green in colour.

2.4 Nature of the Boulder/ Cobble/ Sand

The area lies with in the regular course of the Thodu Khad, gets flooded in the rainy season

All the deposit comprises quartzite, sand and fraction of granite, limestone and breccias- fragments. The boulders are white, spotted white, greenish white,



pink, purple and dark green in colour. Quartzite fragments are rounded, sub-rounded and discoidal in shape having smooth surface. Their size varies from gravel to boulder.

Thickness of the deposit varies from one to three meter.

During the monsoon this bed replenishes to a large extend from the Upper Siwalik Formation rocks due to erosion by heavy flow from higher reaches. Due to sudden decrease in the carrying capacity and competency of the river the annual deposition of one to three cm is received.



Photo 2; Showing the nature of the Lease area in the Thodu Khad.

2.5 The Nature of the rock along the bank

The rocks along the left bank belong to Terrace Deposition of the Quaternary Formation consisting of boulders, cobbles, pebbles, river born bajri, and sand and clay deposits and tertiary formations consisting of sandstone, claystone, and boulder beds.



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Photo 3:Nature of Banks.



2.6 Estimate Annual Deposition of Mineral

The area being part of the river/Khad which receives annual rainfall, the mining pits will get replenished during the rainy (monsoons) season. As abundant precaution, keeping in view the variation in rainfall particularly highest per day rainfall, which generally causes floods, the factor of five cm annual replenishment is taken into consideration. The annual replenishment of the material also depends on the discharge, grade of river and geology of catchment area. The rocks of the catchment area are formed of tertiary boulder bed formations are very much prone to weathering as the rains easily erode the cementing clay, thus loosening the boulders, which are carried down during the floods. Thus, it is generally observed that replenishment of more than five cm occurs in a year as all the old pits get filled with RBM during the very few early floods of the monsoon. Hence mined out area of the pre- monsoon will be filled with mineral during monsoon and even during winter rains. Mining area being



3. RESERVE ESTIMATE

3.1 General Consideration

The basic requirement of the lessee will be stone, bajri and sand for construction of Project.

3.2 Percentage wise distribution of Mineral:

The table below shows the percentage wise distribution of minerals and figure 12 depicts the pie chart for the same.

Table shows the percentage wise distribution of minor minerals:

Percentage of Minerals/Material in the Mining Lease Area

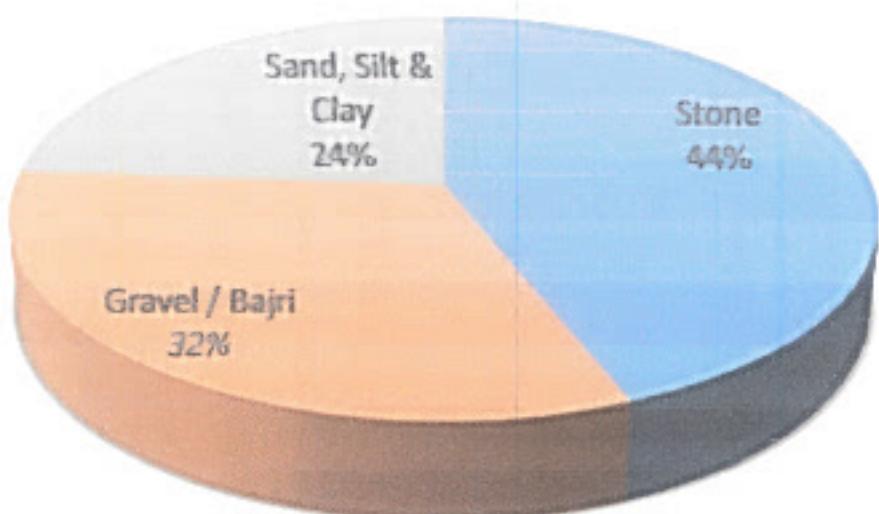
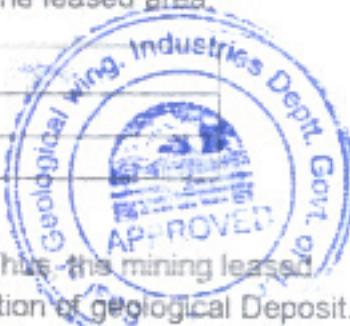


Figure 12: Percentage of each category of mineral present in the leased area.

1	Stone	44%
2	Gravel / Bajri	32%
3	Sand, silt & clay	24%

3.3 Estimate of Geological Reserve

The entire block falls within the river corridor/khad trace. Thus, the mining leased area of 95030 square metres can be considered for estimation of geological Deposit. The estimated thickness of deposit is more than 5 metres. However, considering its depth for purpose of estimation of Geological reserves to a depth five metres and



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specific gravity to be 2.25, the proven Geological deposits in the area are to a tune of about 1069087, metric tons as shown in the chart.

Geological Reserves	Thickness, in metres	Lease Area (Square Metres)	Reserves Rounded off (In tonnes)
PROVED	5	95030	1069000
PROBABLE	10	95030	2138175
INFERRED	20	95030	4276350
Specific Gravity 2.25			
Formula = Surface area X thickness/depth X specific gravity = Reserves			

3.4 Estimate of Mineable reserves of boulders, Bajri and Sand

The basic requirement of the leased or is sand, stone and bajri. As per the policy guidelines issued by the State Government for Mining of River / Riverbed and to calculate the mineable reserve the following points are taken into consideration: Adequate safe distance has been provided from the points of utilities as per Rules and guidelines.

As per the policy guidelines issued by the State Government for Mining of River / Riverbed,

- ✓ In this case only one-meter area is proposed as safety zone as the depth of mining is constrained to one metre.
- ✓ Mining is not permitted within 1/10th of riverbed or 5 meters from the banks (HFL) of the river / River whichever is higher. The width of the river in leased area is 44 to 115 meters; thus, no mining is proposed in the area up to 5 to 12 meters from the banks/HFL.
- ✓ The water table level will go down as the water recedes after the monsoons.
- ✓ The depth of water table will be at lowest in the pre-monsoon season
- ✓ A geological map on 1:2000 scale is prepared and main litho units were marked on the plan to know the surface spread of each unit.
- ✓ The entire width of the river gets flooded during heavy rains in monsoons. The mined area gets replenished in the very early floods in the beginning of the monsoon season.

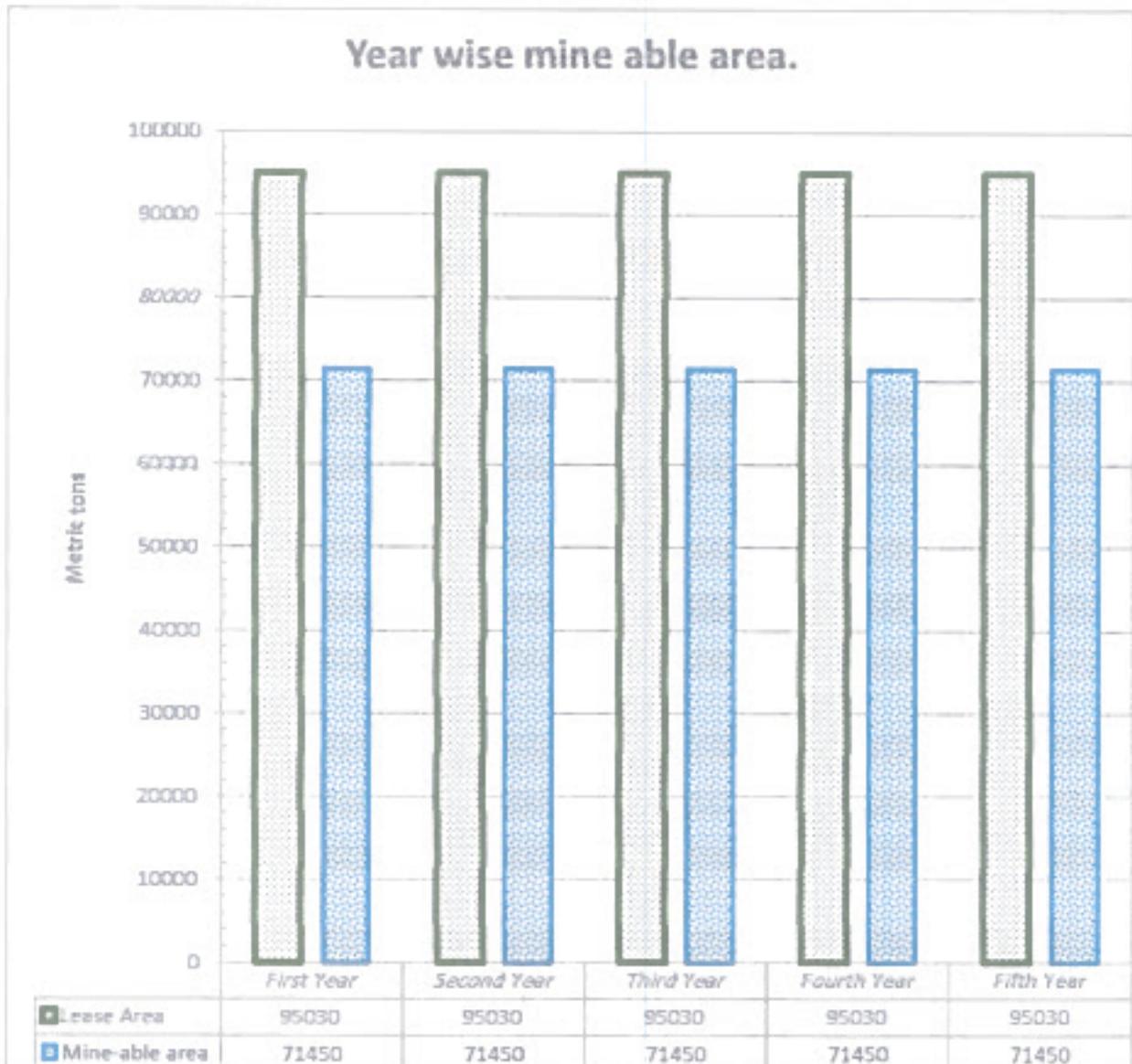
The total mineable area and deposit is shown in figure 13, table 3 and figures 14.

- *The part of the area, i.e., 71450 square metres of lease area, is mineable as it falls within the river corridor, leaving out the safety zone provided along the banks/HFL.*

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Year wise mine able area.**Figure 13: Mineable area.****Table 3 Mineable reserves in the block**

Leased Area Sq. metres	Mineable Area Sq. Metres	Stone	Gravel / Bajri	Sand, Silt & Clay	Total
95030	71450	70735	51444	38583	160762



Total Mineable Reserves in the Block upto one metre depth.

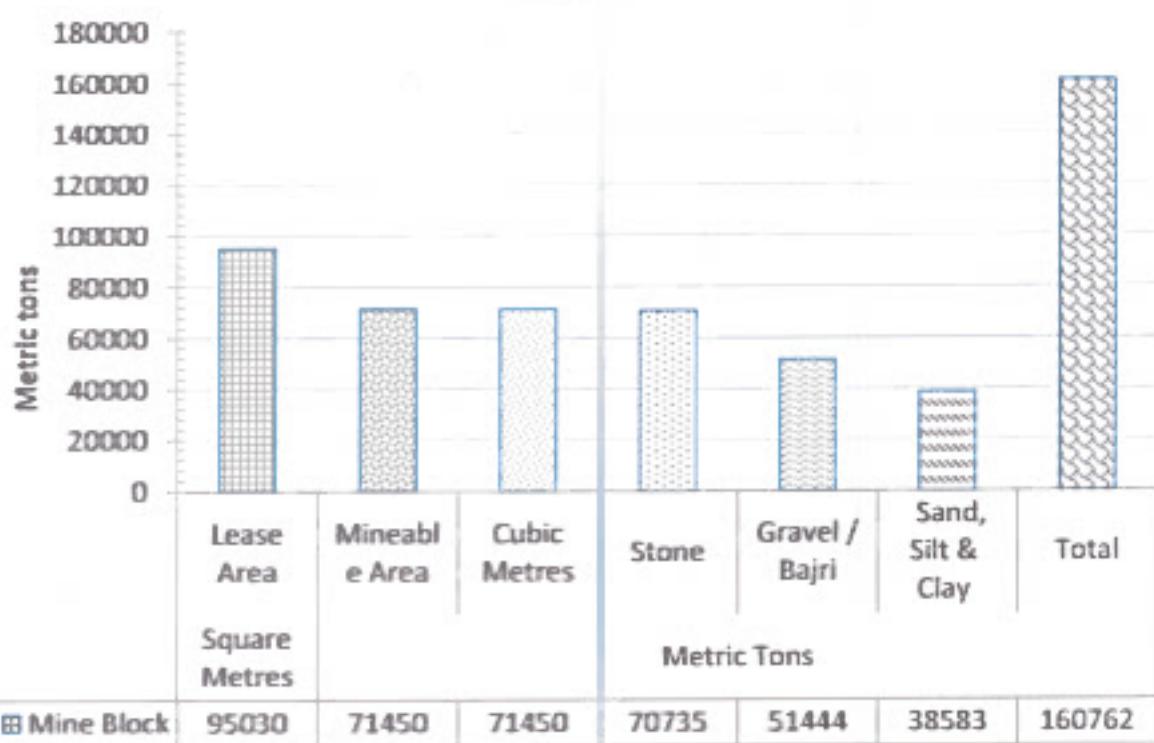


Figure 14: Mineable Reserve up to One Metre depth

Thus, the safe mine-able block of 71450 square metres contains 160762 tonnes of mineable material. The entire mine able block will be mined every year.

3.4a Depth of mining

The Rule 34 (IV) of Rules stipulates 'the depth of mining in the riverbed shall not exceed one metre or water level whichever is less'.

One metre maximum depth from the surface is considered for mining of the reserve.

3.4b. Specific Gravity

The specific gravity of Quartzite is 2.65 and of sand is 1.85. Hence average specific gravity of 2.25 is taken for calculation of the deposit.

3.5. Estimate of Annual deposition

The reserves of all the constituents of leased block have been calculated for the safe mineable area to be 71450 tonnes, considering the specific gravity as 2.25 as shown in para 3.6. The reserves have been calculated for year of mining, computing mine-able deposit up to maximum permissible quarry depth of one metre are depicted in figure13. Depending upon normal rainfall from year to year causing erosion in the catchments and flooding of

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Riverbed, the minerals are inexhaustible, but presently these deposits are part of Geological Formations of catchments.

Figure 15 shows the proposed production of materials in five years.

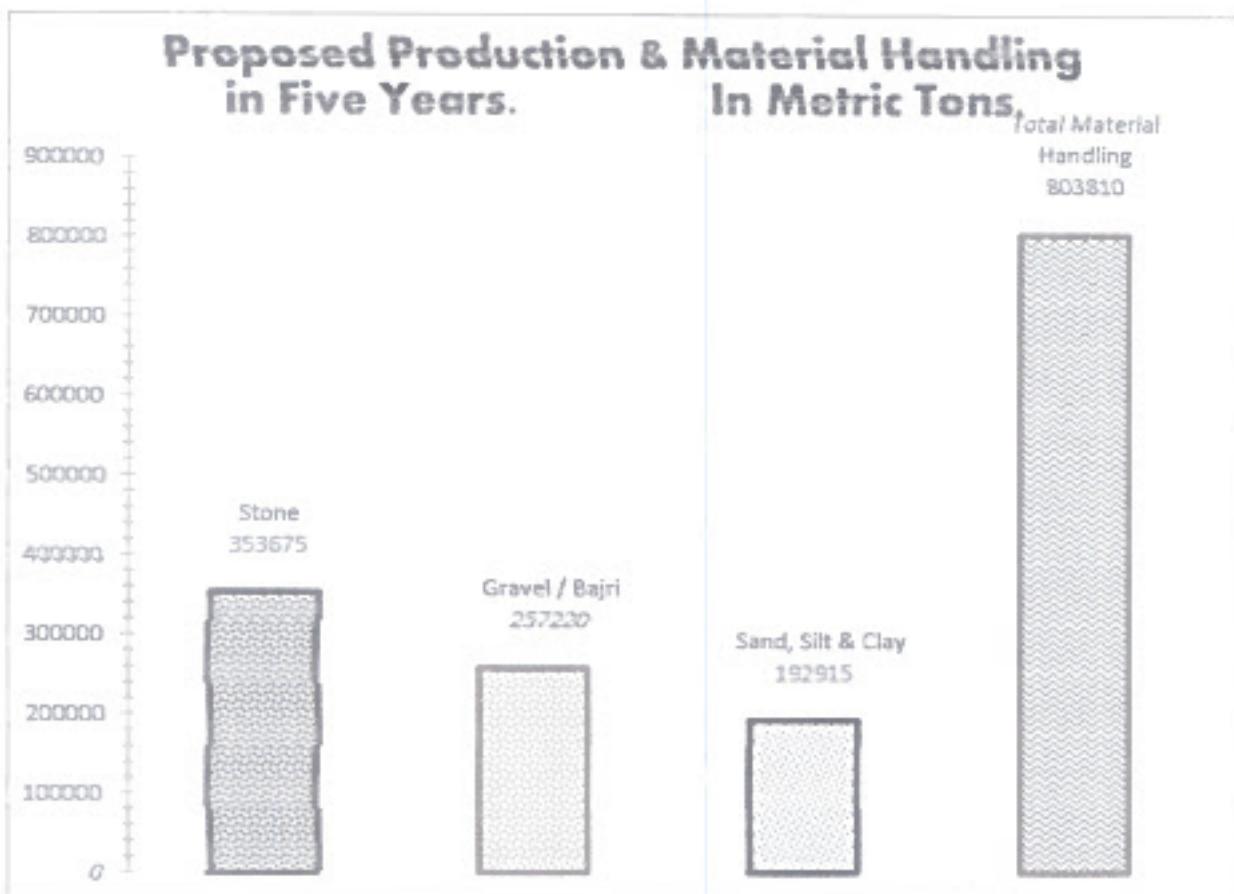


Figure 15:Proposed production of total material in five years

4 MINE DEVELOPMENT AND PLAN OF PROGRESSIVE MINING

The mining activity will be manual and to some extent mechanical with excavators, with permission from competent authority. Normally it has been observed that a worker can mine/excavate about three to four tonnes of material in a day. To excavate an average 595 tonnes of material in a day 150 to 175 workers would be required. Working of so many persons in a small area would cause congestion and crowding effecting in their efficiency of working. Therefore, mining shall be resorted to by both manual as well as mechanical methods. Workers are mainly deployed in riverbed mining for extraction and for loading of extracted material into tipper truck and tractor trolleys in addition loader/ JCB will be deployed. Drivers/ Operators for loaders, tippers and tractors will be another category of workers.

Considerations

- No blasting is required.



- Only manual/semi mechanically extraction of RBM (River Borne Material) will be undertaken.
- Trenches and pits for the mining purposes shall be made in such a way so that these are not deeper than one metre and follow the general / normal channel direction of the river and bottom is above the water table.
- With the replenishment of the pits and trenches during the floods, the process of controlled mining can continue year after year. The erosion and weathering of rocks in the catchments have inexhaustible supply of required minerals.
- Mining activity will be undertaken only during the dry seasons and dry parts of the river.

4.1 Development and Production Programme for 5 years

The proposed production for the first five year is as given in the figure 16 and Table 5 show the production of Minerals in five years.

4.1a Year wise Production

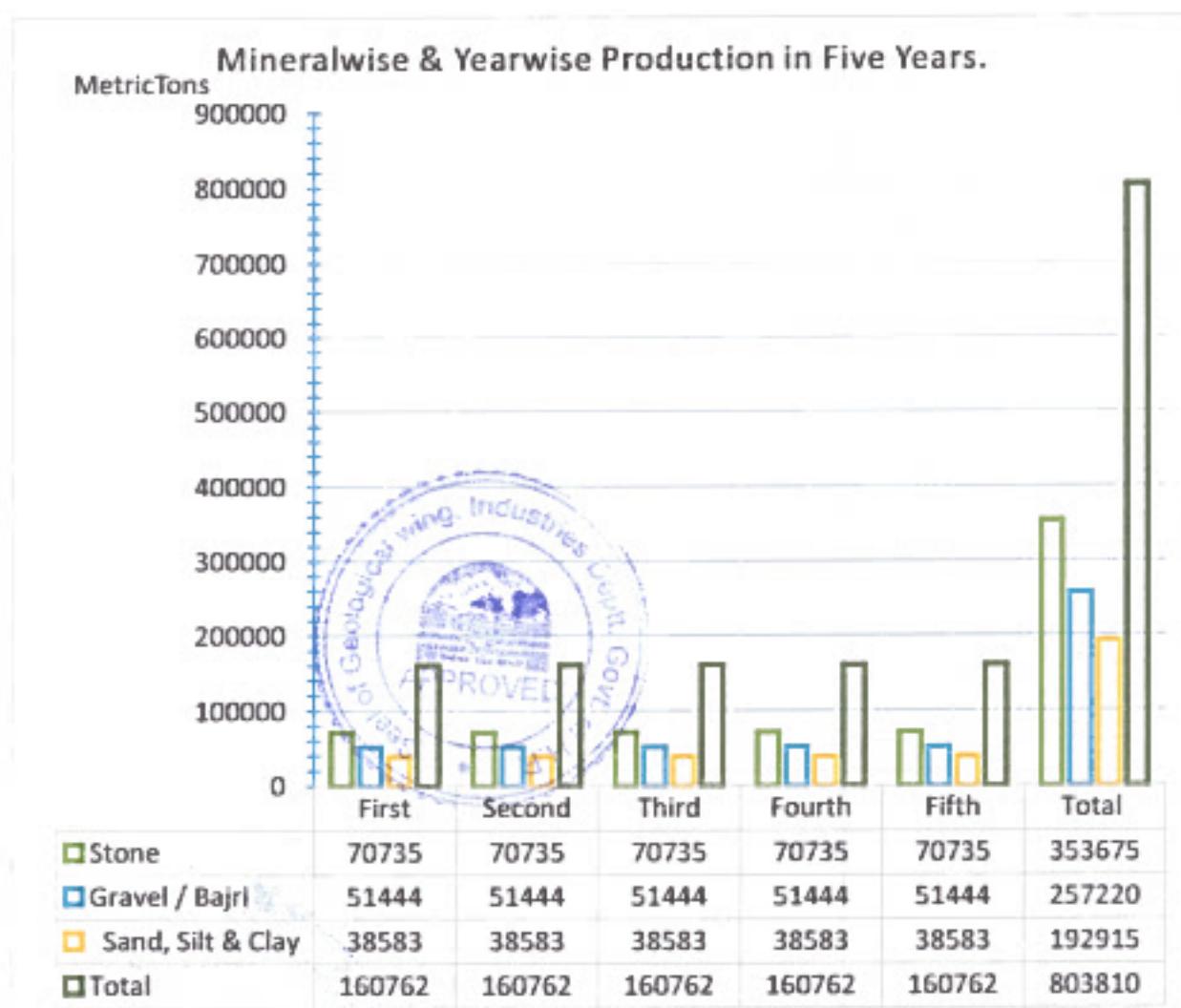


Figure 16: Year wise Availability of Materials (in Metric tons).

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Table 4 Year wise production of materials.

Year	Stone	Gravel / Bajri	Sand, Silt & Clay	Total
First	70735	51444	38583	160762
Second	70735	51444	38583	160762
Third	70735	51444	38583	160762
Fourth	70735	51444	38583	160762
Fifth	70735	51444	38583	160762
Total	353675	257220	192915	803810

The proposed production is sufficient to for sustaining a viable mining project. The year wise mine working planned for the Quarry is presented in the map 3. Year wise production of River Borne Material, sand, stone and bajri is given in figures 17, 18, 19, 20 & 21.



4.2.a Development and Production at end of first Year.

- ✓ Mining of 160762 tonnes of material is proposed to be mined from 71450 square meters of safe mining area out of 95030 square metres of leased block.
 - 70735 tonnes of stone and 51444 metric tons of bajri will be produced and dispatched to dedicated stone crushers.
 - 38583 tonnes of sand with inseparable silt & clay will be produced and dispatched to construction sites of the project.
 - About 16 percent of the leased Area falls outside the river corridor hence plantation can be undertaken in the 1st year at P1.
 - More than 84 percent of the leased Area falls within the river corridor, *in situ* rocks form the both the banks, therefore only at some vulnerable stretches retaining walls are proposed for its protection. Moreover, a rural road runs along the mining lease block for some distance, therefore, retaining walls for its protection will be erected at vulnerable places. During first year retaining wall will be erected at C-1 as shown in plate 3.

Projected Total Material Handling and Production of Mineral, in Metric tons during First year.

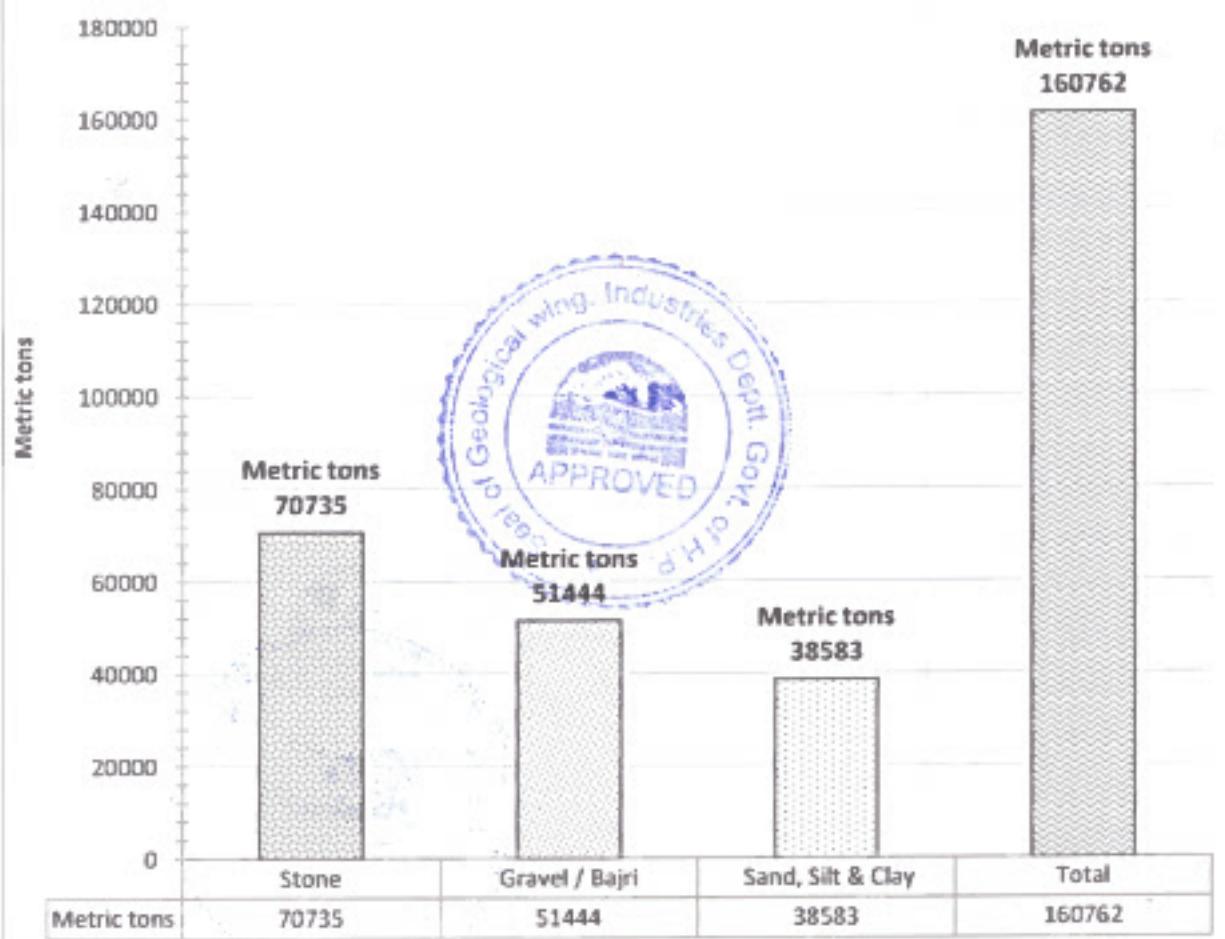


Figure 17- Proposed Production and Material Handling in the First Year of Mining.

4.2. b Development and Production at end of second Year.

During 2nd year of development and production programme:

- ✓ Mining of 160762 tonnes of material is proposed to be mined from 71450 square meters of safe mining area out of 95030 square metres of leased block.
 - 70735 tonnes of stone and 51444 metric tons of bajri will be produced and dispatched to dedicated stone crushers.
 - 38583 tonnes of sand with inseparable silt & clay will be produced and dispatched to construction sites of the project.
 - About 16 percent of the leased Area falls outside the river corridor hence plantation can be undertaken in the 2nd year at P2.
 - More than 84 percent of the leased Area falls within the river corridor, *in situ* rocks form the both the banks, therefore only at some vulnerable stretches retaining walls are proposed for its protection. Moreover, a rural road runs along the mining lease block for some distance, therefore, retaining walls for its protection will be erected at vulnerable places. During second year retaining wall will be erected at C-2 as shown in plate 3.

Projected Total Material Handling and Production of Mineral, in Metric tons during Second year.

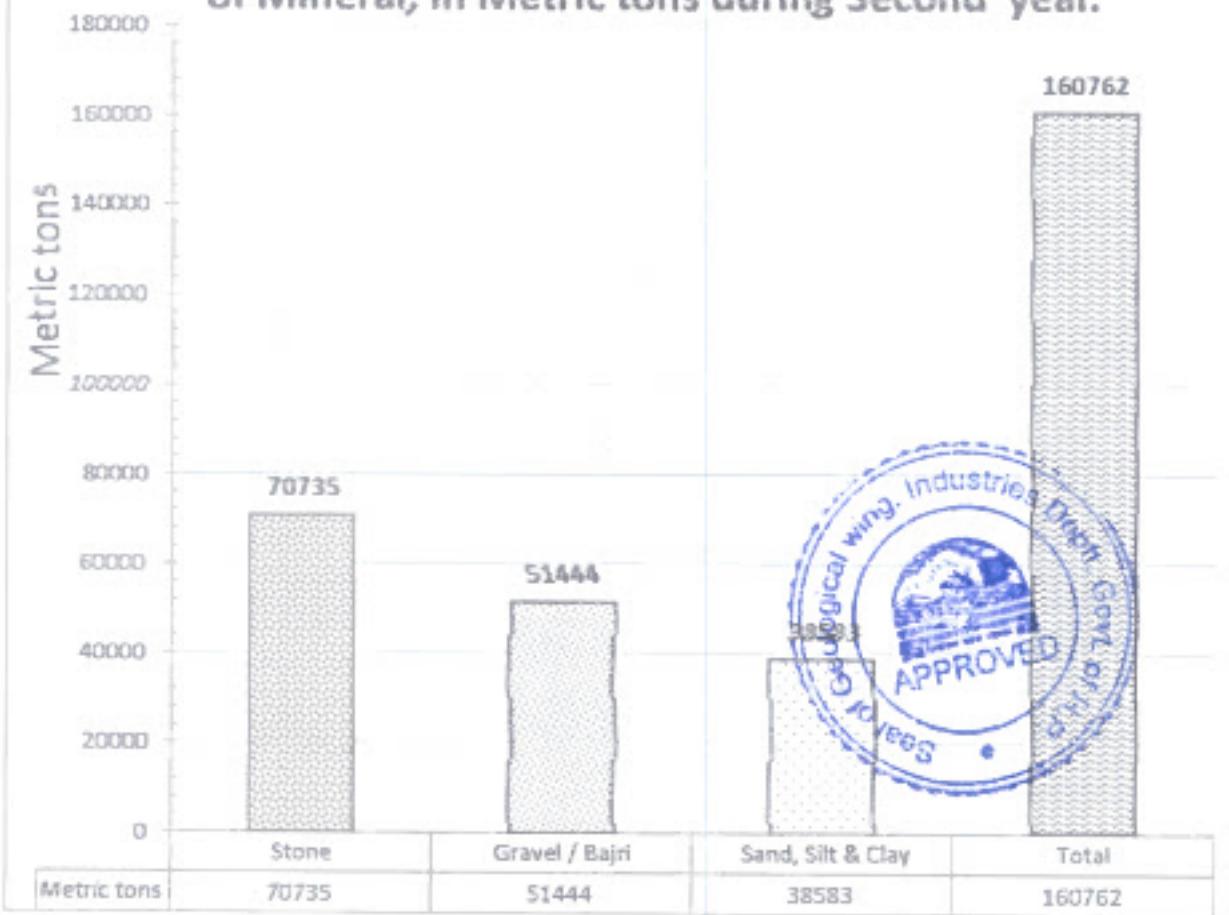


Figure 18- Proposed Production and Material Handling in the second Year of Mining.

4.2 c Development and Production at end of third Year.

During 3rd year of development and production programme:

- ✓ Mining of 160762 tonnes of material is proposed to be mined from 71450 square meters of safe mining area out of 95030 square metres of leased block.
 - 70735 tonnes of stone and 51444 metric tons of bajri will be produced and dispatched to dedicated stone crushers.
 - 38583 tonnes of sand with inseparable silt & clay will be produced and dispatched to construction sites of the project.
 - About 16 percent of the leased Area falls outside the river corridor hence plantation can be undertaken in the 3rd year at P3.
 - More than 84 percent of the leased Area falls within the river corridor, *in situ* rocks form the both the banks, therefore only at some vulnerable stretches retaining walls are proposed for its protection. Moreover, a rural road runs along the mining lease block for some distance, therefore, retaining walls for its protection will be erected at vulnerable places. During third year retaining wall will be erected at C-3 as shown in plate 3.

Projected Total Material Handling and Production of Mineral, in Metric tons, during Third year.

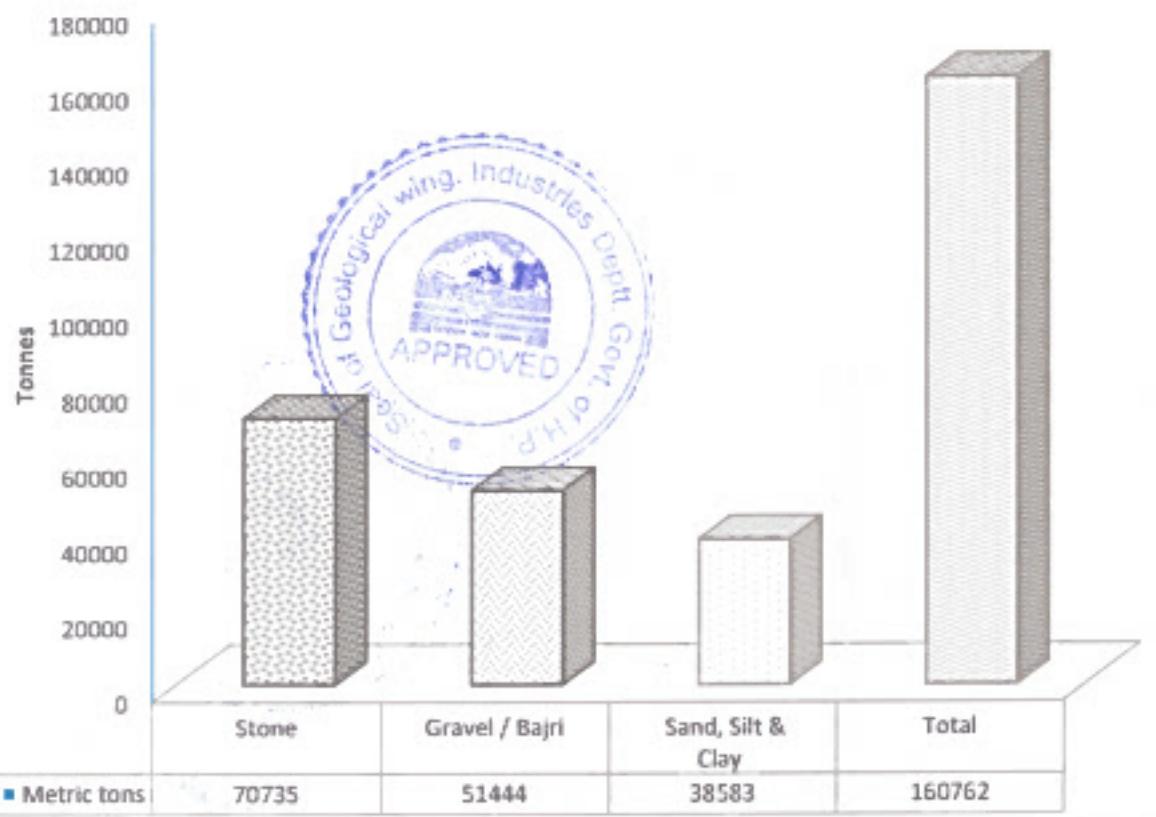


Figure 19- Proposed Production and Material Handling in the Third Year of Mining.

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4.2 d Development and Production at end of fourth Year.

During 4th year of development and production programme:

- ✓ Mining of 160762 tonnes of material is proposed to be mined from 71450 square meters of safe mining area out of 95030 square metres of leased block.
 - 70735 tonnes of stone and 51444 metric tons of bajri will be produced and dispatched to dedicated stone crushers.
 - 38583 tonnes of sand with inseparable silt & clay will be produced and dispatched to construction sites of the project.
 - About 16 percent of the leased Area falls outside the river corridor hence plantation can be undertaken in the 4th year at P4.
 - More than 84 percent of the leased Area falls within the river corridor, *in situ* rocks form the both the banks, therefore only at some vulnerable stretches retaining walls are proposed for its protection. Moreover, a rural road runs along the mining lease block for some distance, therefore, retaining walls for its protection will be erected at vulnerable places. During fourth year retaining wall will be erected at C-4 as shown in plate 3.

Projected Total Material Handling and Production of Mineral, in Metric tons during Fourth year.

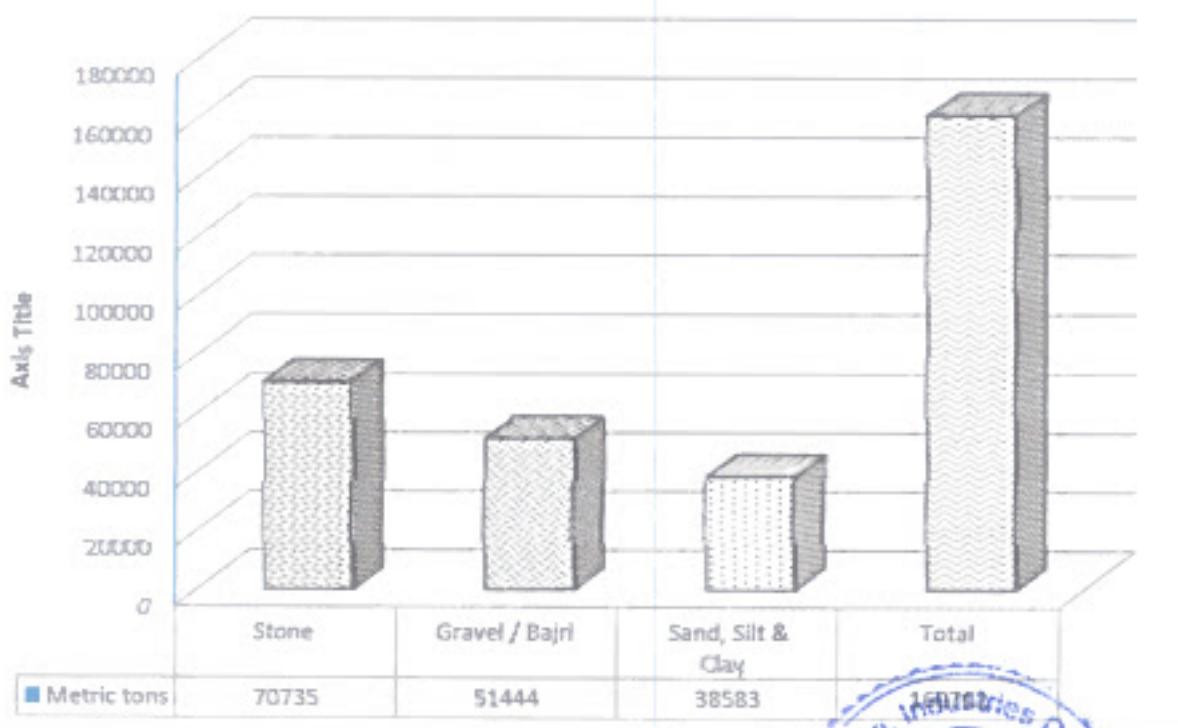


Figure 20- Proposed Production and Material Handling in the Fourth Year of Mining.

4.2 e Development and Production at end of fifth Year.



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During 5th year of development and production programme:

- ✓ Mining of 160762 tonnes of material is proposed to be mined from 71450 square meters of safe mining area out of 95030 square metres of leased block.
 - 70735 tonnes of stone and 51444 metric tons of bajri will be produced and dispatched to dedicated stone crushers.
 - 38583 tonnes of sand with inseparable silt & clay will be produced and dispatched to construction sites of the project.
 - About 16 percent of the leased Area falls outside the river corridor hence plantation can be undertaken in the 5th year at P5.
 - More than 84 percent of the leased Area falls within the river corridor, *in situ* rocks form the both the banks, therefore only at some vulnerable stretches retaining walls are proposed for its protection. Moreover, a rural road runs along the mining lease block for some distance, therefore, retaining walls for its protection will be erected at vulnerable places. During fifth year retaining wall will be erected at C-5 as shown in plate 3.

Projected Total Material Handling and Production of Mineral, in Metric tons during Fifth year.

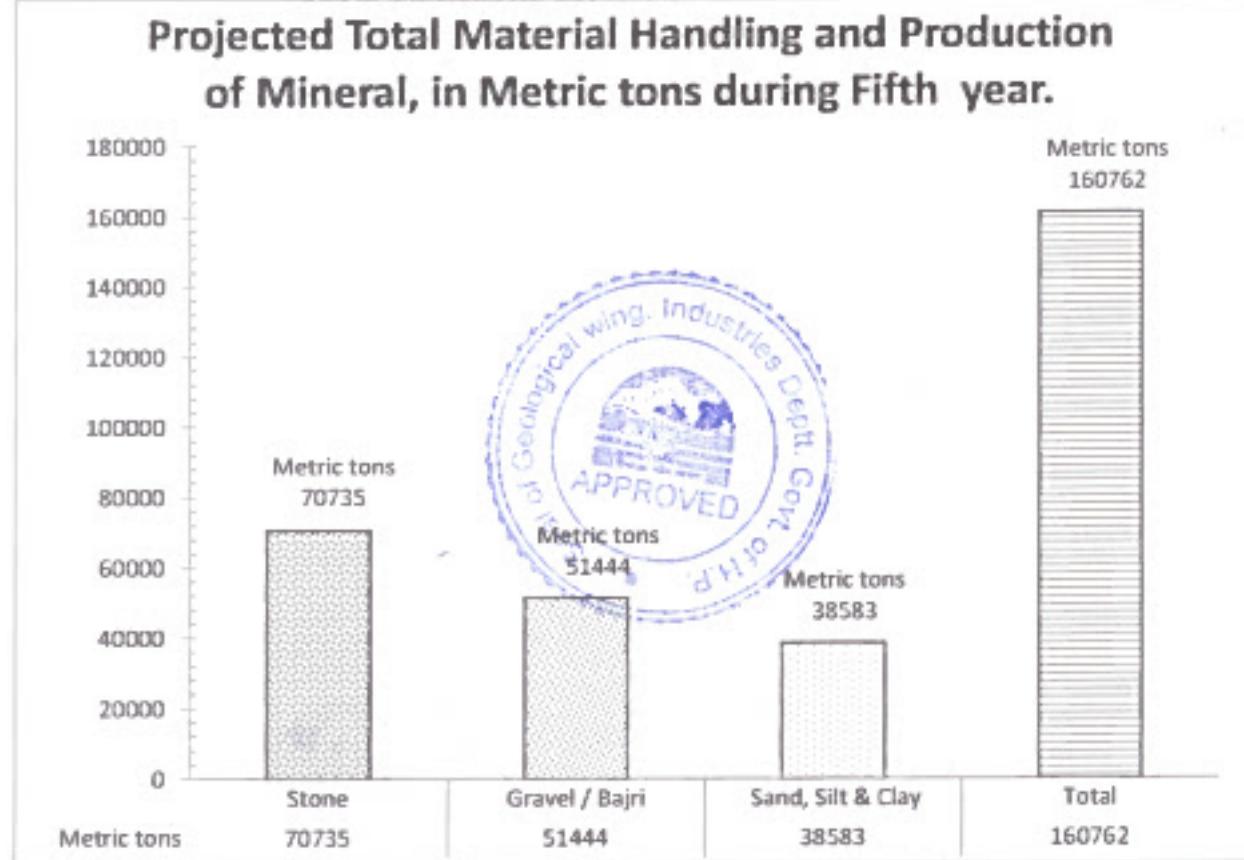


Figure 21- Proposed Production and Material Handling in the Fifth Year of Mining.

4.3 End Use of Mineral

The extracted mineral stone, sand and Bajri will consumed in the Project construction activities. Annual production of stone, bajri and sand is shown in figures 22, 23, & 24.

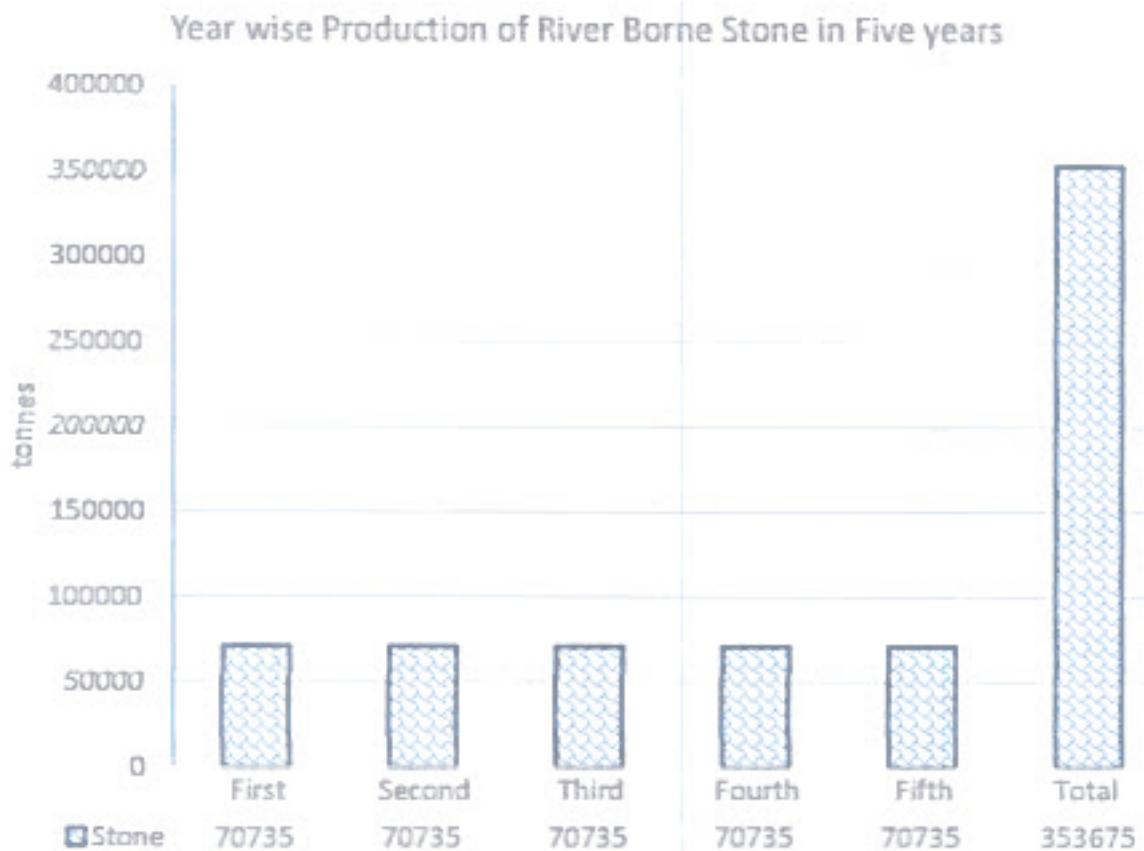


Figure 22: Year wise production of Stone.

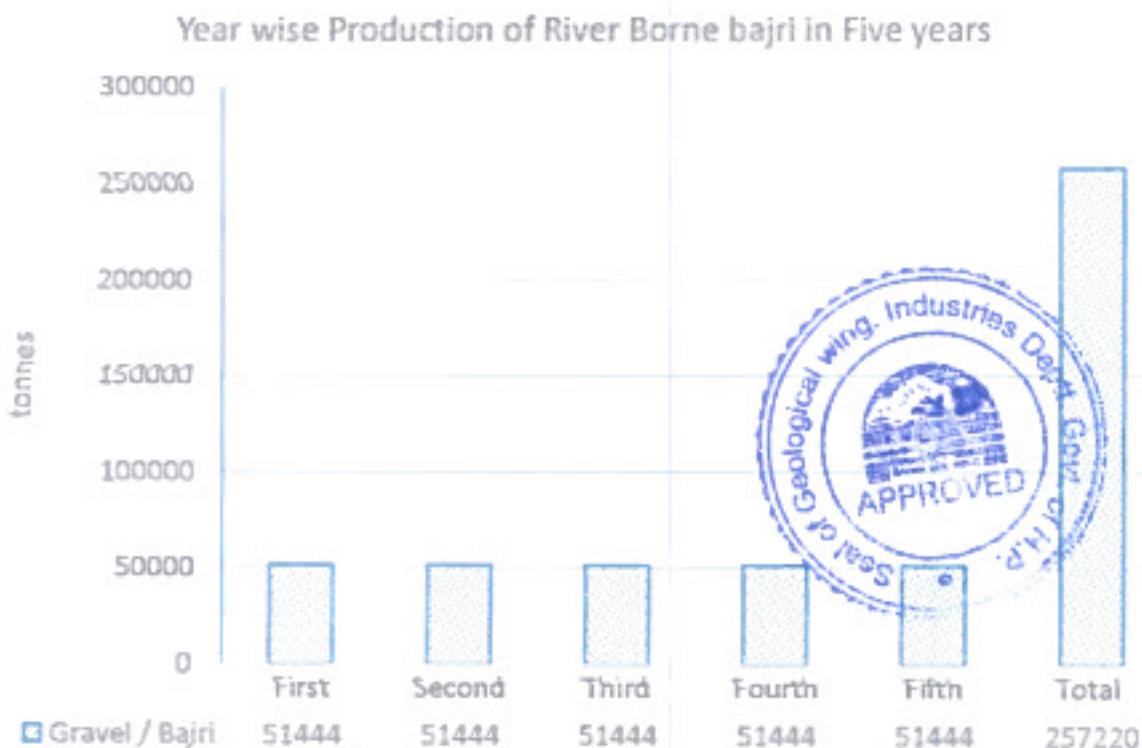


Figure 23: Annual Production of Bajri.

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Year wise Production of River Borne sand with clay & silt in Five years

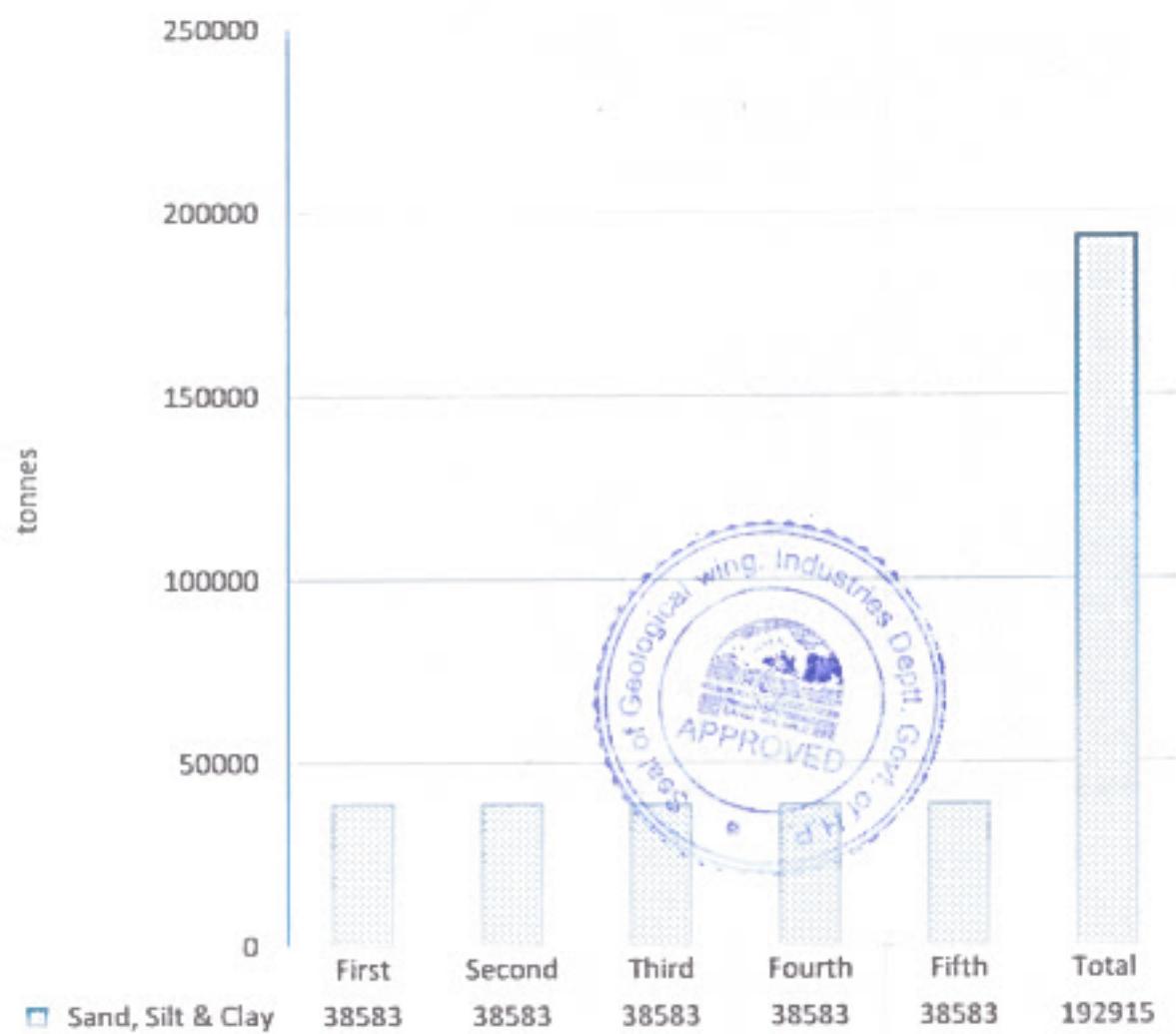


Figure 24: Annual production of sand along with silt & clay.

4.4 Detail of road Transport

The maximum total extraction of minerals stone, sand and bajri for use in the Project would be 160762 tonnes or 595 metric tonnes per day, considering 270 working dry days. Thus, about 66 tipper truck trips would be required to move the material from quarry to crusher / construction sites. The track through River is about 200 metres along the leased area to rural roadside. The evacuation route is shown in figure 25.

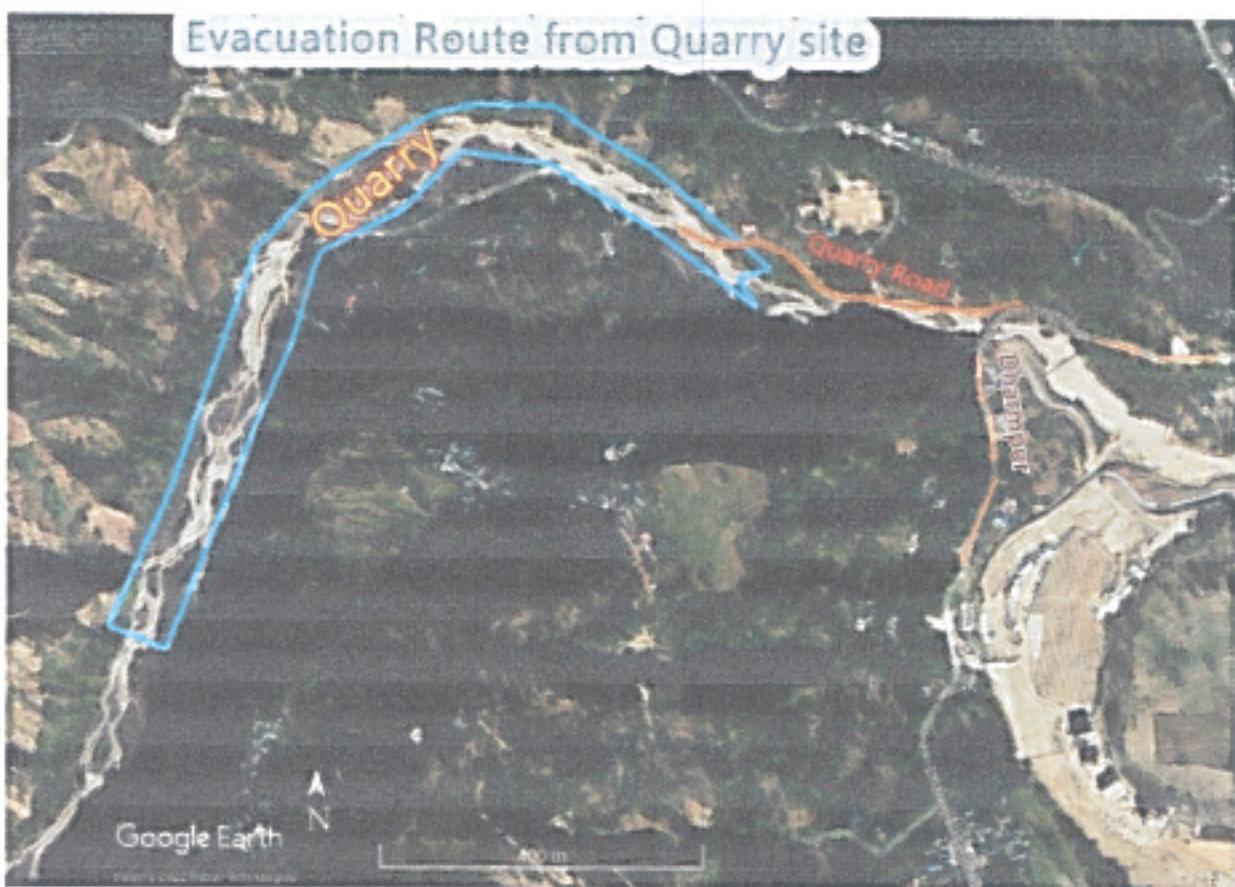


Figure 25. Evacuation route Map



PART II

Environment Management Plan

1.0 Base Line Data

Any development activity, including mining, is likely to have adverse or beneficial impact on existing environment. The various environmental parameters generally impacted are as given below: -

- Change in Topography & land use pattern.
- Effect on Flora & Fauna
- Ground Vibrations and Fly Rocks.
- Effect on Hydrology
- Effect on Climate
 - Temperature
 - Rainfall
 - Wind Speed
- Air Quality
- Noise level
- Visual Impact
- Socio- economic Impact

Accumulation of Scree - Mine Waste.

The base line information of the existing environment was collected from various sources such as

- ✓ Census Department, Government of India.
- ✓ Department of Economics and Statistics, Government of Himachal Pradesh.
- ✓ Directorate of Land Records, Government of Himachal Pradesh
- ✓ Directorate of Horticulture, Government of Himachal Pradesh
- ✓ Fishery Department, Government of Himachal Pradesh
- ✓ Forest Department Government of Himachal Pradesh
- ✓ Animal Husbandry Department, Government of Himachal Pradesh
- ✓ Survey of India, Government of India
- ✓ Metrological Department Government of India

to have in depth understanding of the existing environment and to assess the likely impact of mining activity in the Area

1.1. Demography of the area

The total population of the surrounding area, as per the 2011 Census is given below in the figure 26. Education wise and employment wise break of population in surrounding villages is given in figure 27. The population details of Mandi District and sub tehsil Dharampur is given in figure 28.



POPULATION OF VILLAGES AROUND THE MINING LEASE AREA (2011).

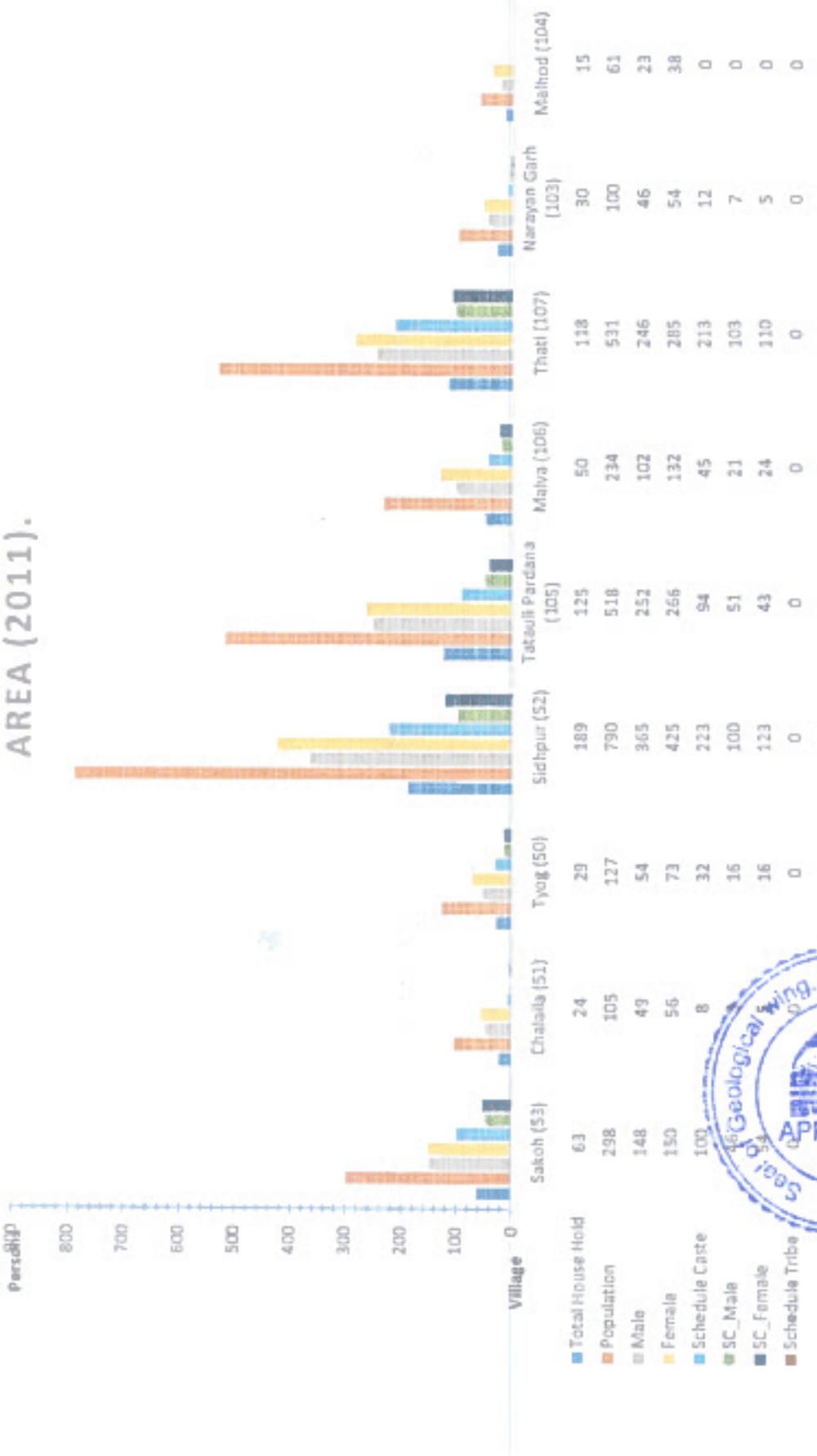


Figure 26, Population of the villages of the zone of influence.



Working Categorisation of Population of surrounding villages of lease area, Tehsil Dharampur, District Mandi - (Census 2011).

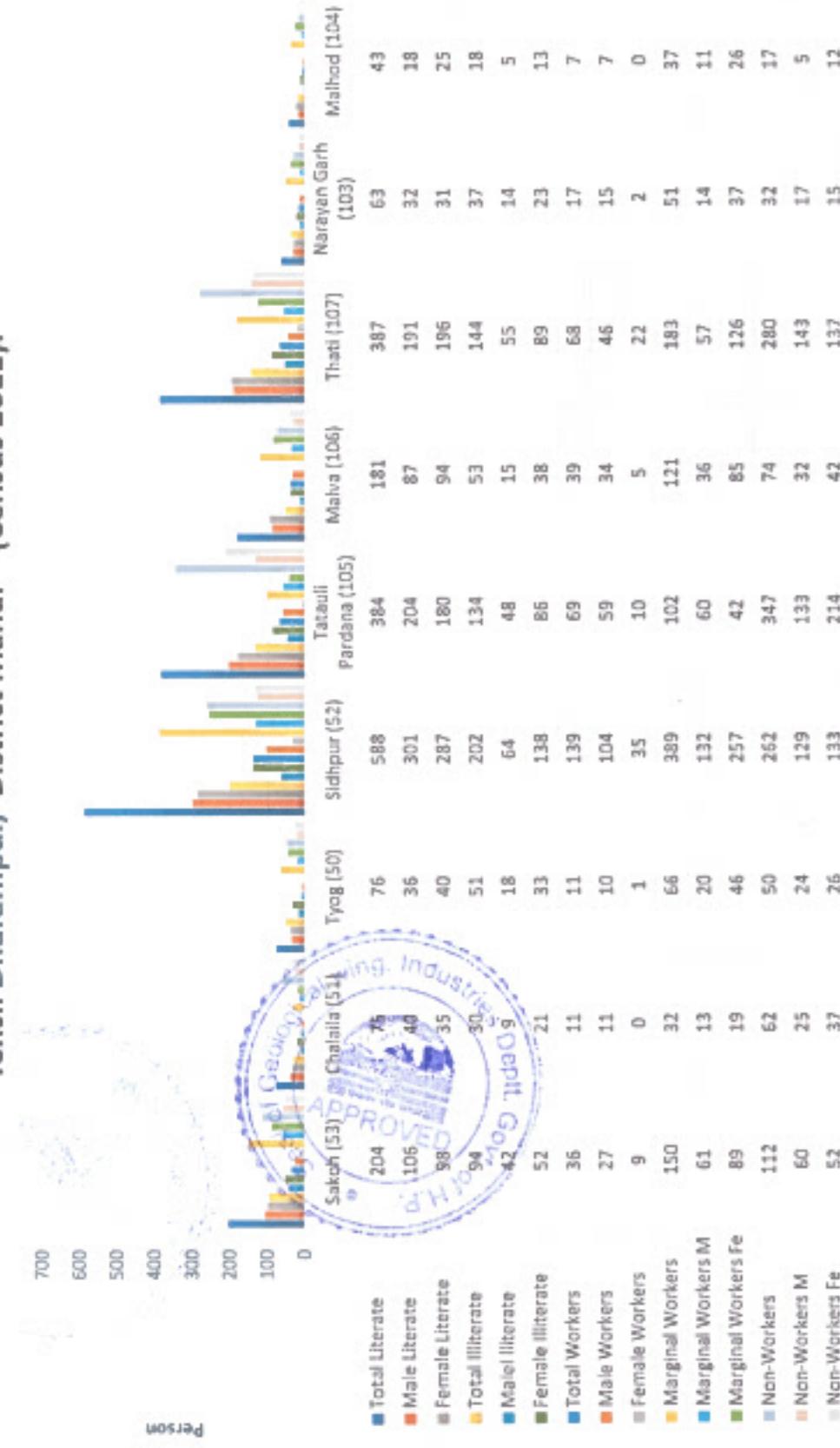


Figure 27: Break up of literacy and employment of Population in Surrounding Villages (Census 2011).

**Population Break up of Tahsil Dharampur & District
Mandi - (Census 2011).**



Figure 28: Population break up of District Mandi & Tehsil Dharampur.

1.2 Socio Economy of the Village/Population.

No adverse impact on the socio-economic condition of the area is envisaged.

The induction of mining sector development in and around predominantly agricultural areas is bound to create its impact on the socio-economic life of the local inhabitants. The impact is generally positive. As can be seen in figure 29 there is moderately high percentage of unemployed (44.71%) and underemployed (40.919%) people in the area despite moderately high level of literacy, (72.40% literates, figure 30) of literacy.



Pie Chart showing Workers, Marginal Workers and Non-workers(unemployed) in the villages surrounding the Mining Lese Area.

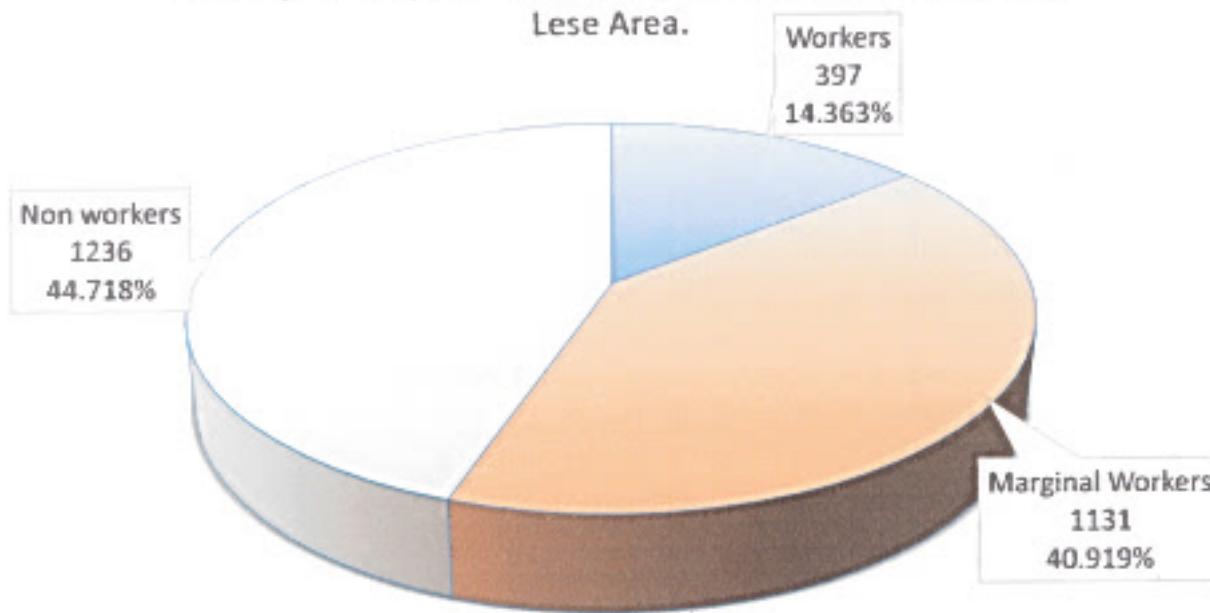


Figure 29: Employment percentage in adjoining villages.

PIE CHART SHOWING PERCENTAGE OF LITERATE AND ILLITERATE POPULATION IN THE AREA SURROUNDING MINE AREA.

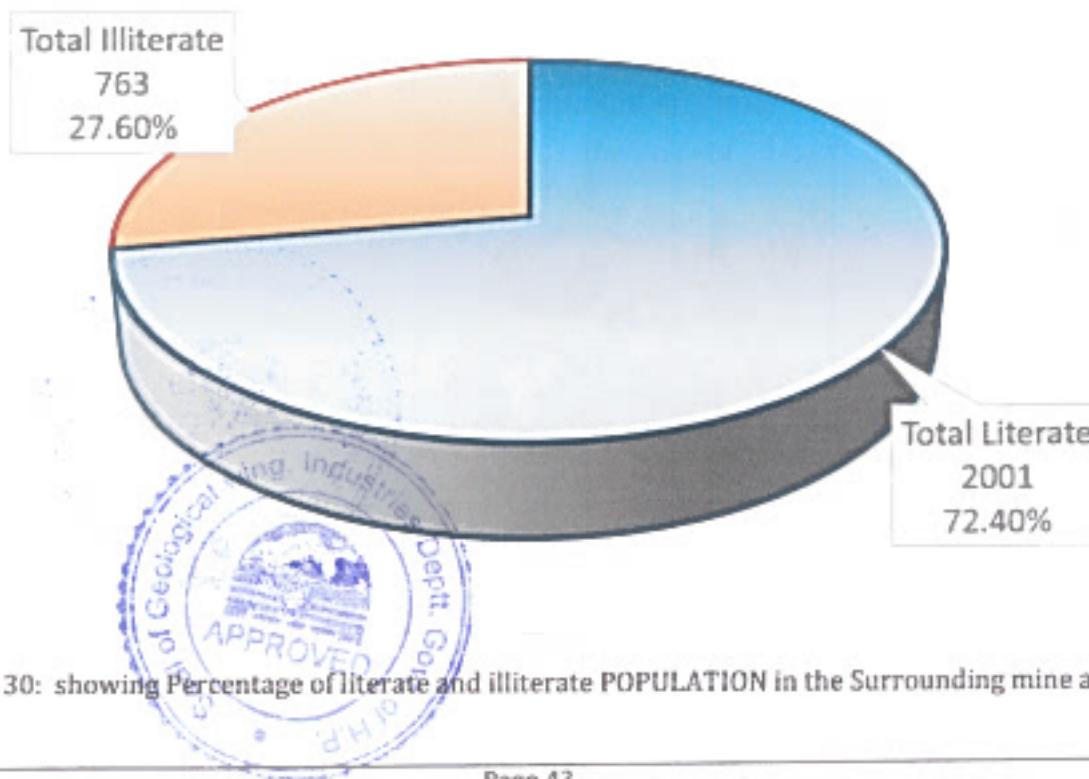


Figure 30: showing Percentage of literate and illiterate POPULATION in the Surrounding mine area

1.3. Land Use Pattern

Primarily the land of the district can be classified in following 6 categories as shown in figure 31.

- i. Forest
- ii. Grass and Scrub Land (partially agriculture)
- iii. Water Bodies (Stream and corridor)
- iv. Agriculture land
- v. Waste land
- vi. Urban Settlement

The District Census 2011 classified the land available in surrounding villages into following nine categories

1. Land under Miscellaneous tree crops
2. Culturable waste land
3. Fallows Land other than Current Fallows
4. Current Fallows – net area sown
5. Area under non-agricultural uses
6. Barren and Un-cultivable land
7. Barren & Un-cultivable Land.
8. Permanent Pastures and Other Grazing Land
9. Forest

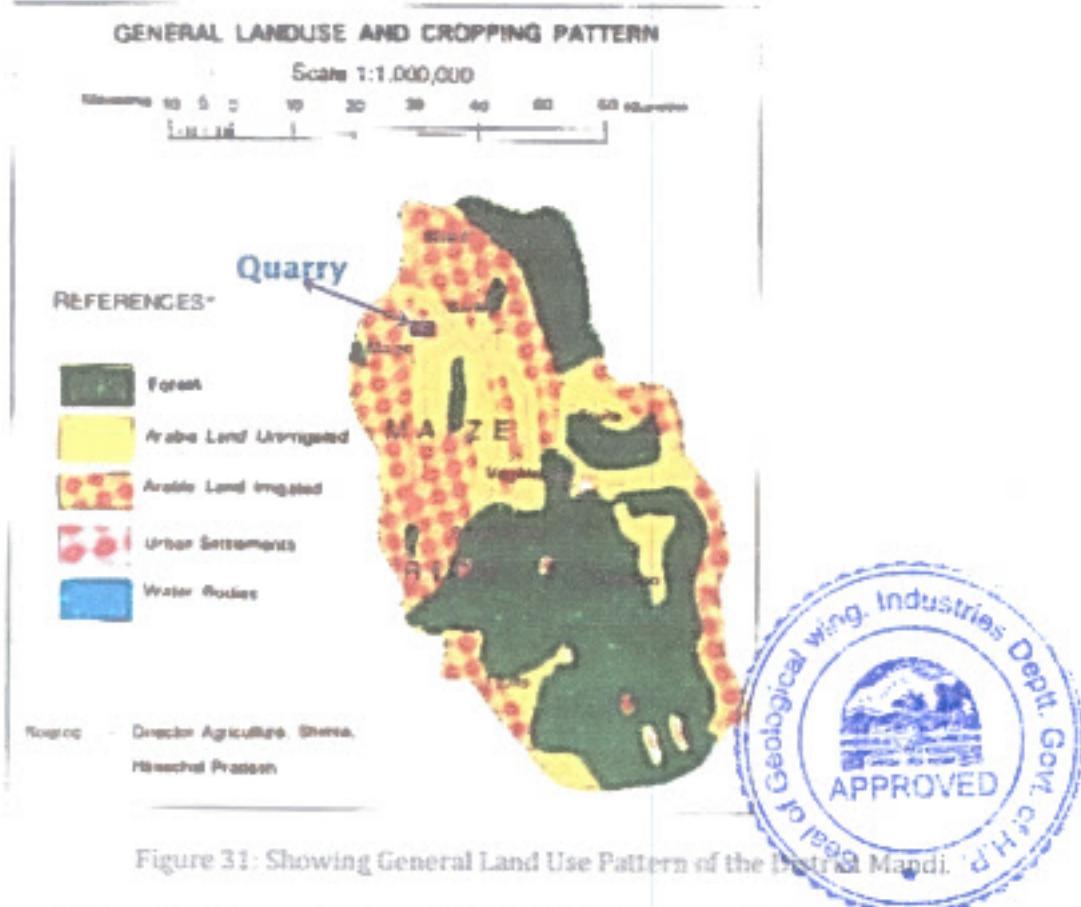


Figure 31: Showing General Land Use Pattern of the District Mandi.

The below figures show the land use pattern of nearby villages and sub tehsil Dharampur respectively.

**Land Use Pattern of Villges Around Mining Lease Area
(Census 2011).**

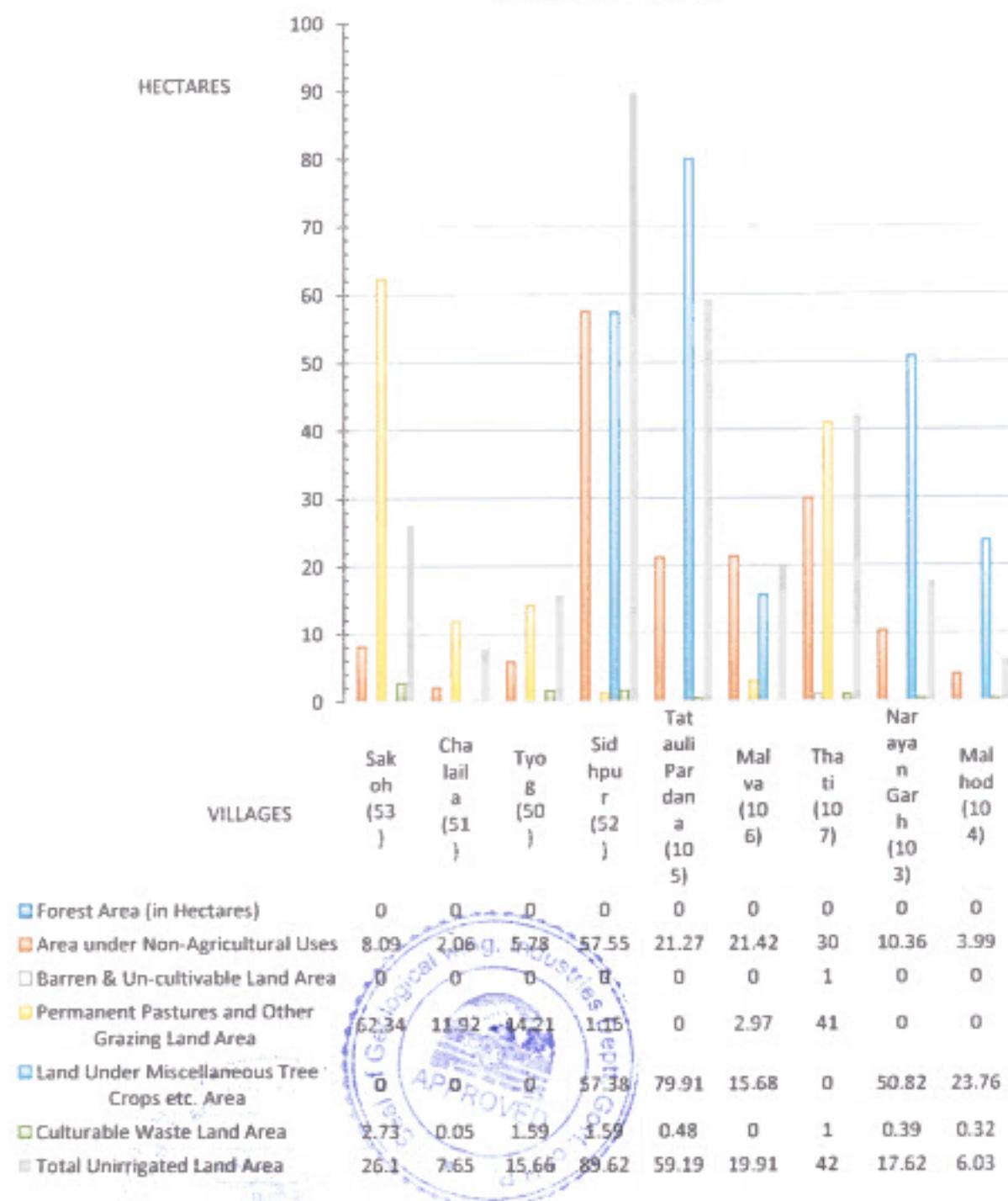


Figure 32: Showing Land Use Pattern of villages around the mining lease area.

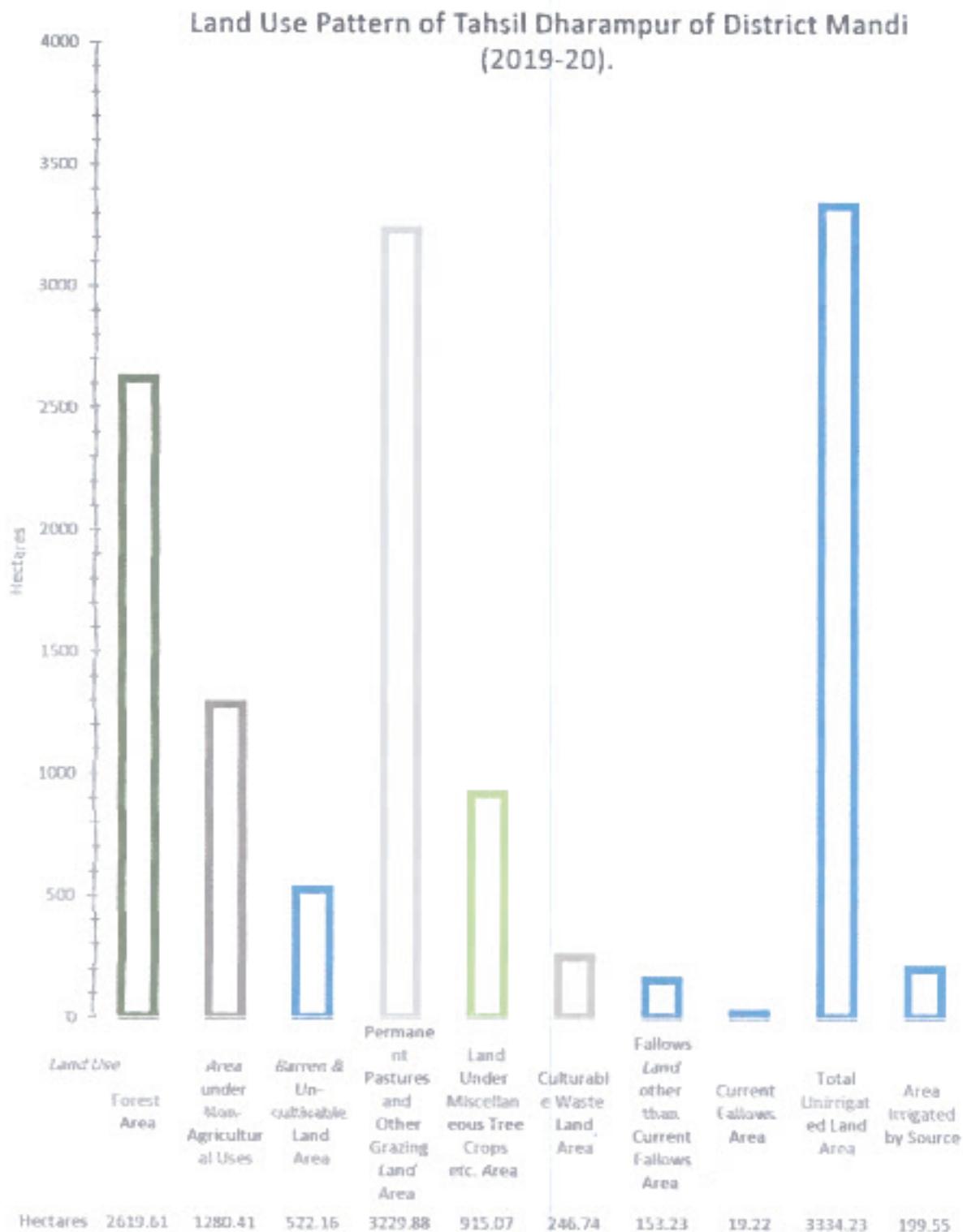


Figure 33: Land Use Pattern of Tahsil Dharampur of District Mandi.



Land Cover & Land Use Map of Buffer Zone Five Kilometres Radius.



Figure 34: Showing the Five kms Radius Buffer zone.

1.4 AGRICULTURE:

The economy of Mandi district is predominately agrarian as around 80 per cent of the total population is dependent on agriculture and activities allied to it for earning their livelihood. The moisture retention capacity of the area is poor due mainly to the fact the bed rocks are argillaceous and the land the uneven. The crops usually face moisture stress during the remaining period of the year due to

inadequate and irregular rainfall. The irrigation facilities are provided by lifting water from streams, shallow dug wells and medium to deep tube wells in the valley area.

The source of water and irrigation in district Mandi can be classified into following five classes

- Lift Irrigation Scheme,
- Kuhls,
- Well used for domestic purposes,
- Well used for irrigation,
- Tube wells/

Major food crops are grouped into three categories:

- Cereals,
- Pulses,
- Other food crops like Chilies, ginger, sugarcane, and turmeric.
- Non-food crop area is of two kinds:
- Oil seeds,
- Other non-food crops such as cotton, tobacco, and fodder crop,

The area under each category of the crop is given below in figure: -35.

Figure: -36 show production of agriculture produces in district Mandi. The area under vegetables and their production is given in the figure: -37.

Agriculture: Area (in Hectares) under Major Crops, District Mandi, 2019-20.

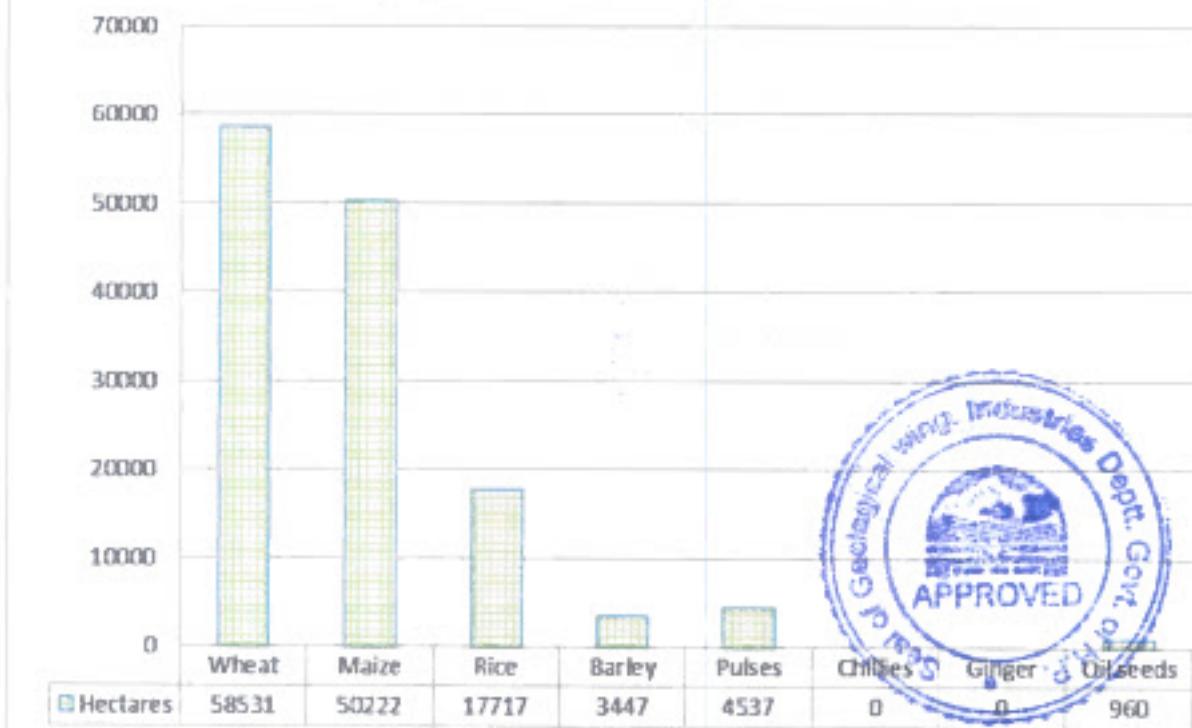


Figure 35:: Showing area under different crops in Mandi District.

Agriculture: Production (in Metric tons) of Major Crops, District Mandi, 2019-20.

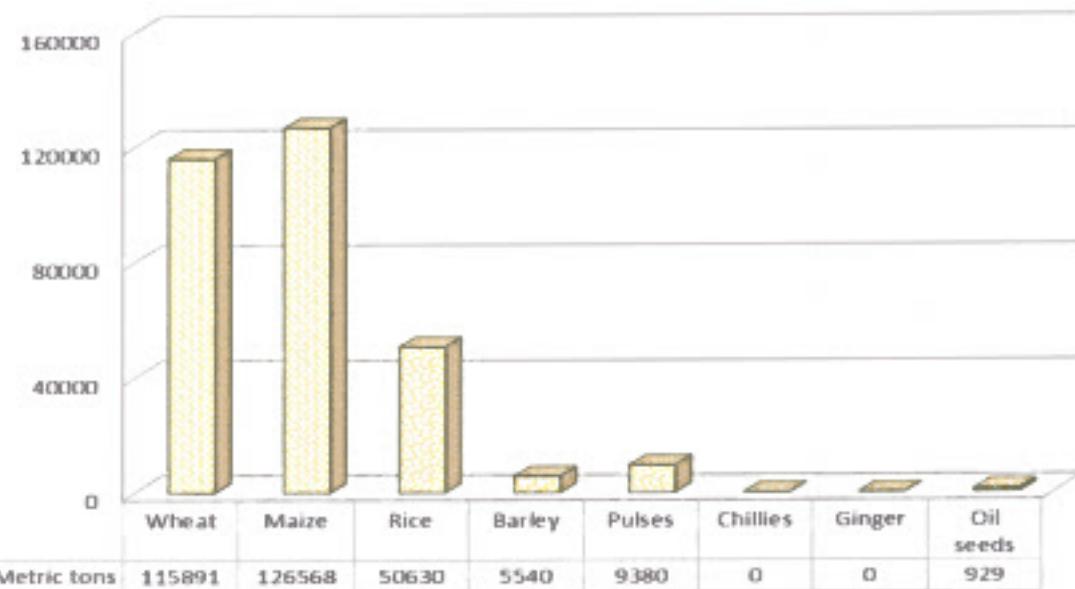


Figure 36 Showing production of each crop in District Mandi.

Vegetables

Area, in Hectares under and Production, in Metric Tons of Vegetables in District Mandi in 2019-20.



Figure 37: Showing area under vegetable, in Hectare and Production, in Metric tons, of District Mandi.

1.5 HORTICULTURE

The topography and the agro-climatic conditions of the district are quite suitable to produce the various fruits. The topography of the district can be grouped into three categories namely high hill areas located at a higher elevation, mid hill areas and low-lying valley areas. Fruits of various kinds depending upon the terrain, climatic condition and soil are grown in the district.

The main horticulture produce of the area can be classified into following five categories.

1. Apple
2. Other temperate fruits
3. Subtropical fruits
4. Nuts and dry fruits
5. Citrus fruits

The area under each fruit as well as the production of each fruit in district Mandi are shown in Table 6.

Table 5; Area under each fruit and their production in District Mandi.

Status of Horticulture District Mandi, 2019-20

Fruit	Area (In Hectares)	Production (In Metric Tons)
Apple	16748	57158
Plum	2856	827
Peach	783	443
Apricot	297	320
Pear	1772	1216
Cherry	24	8
Green Almonds	0	
Persimmon	252	
Olive	298	
Kiwi	29	



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Thodu Khad Quarry

Strawberry	2	0
O T F	6313	2930
Almonds	1502	288
Walnut	1055	137
Piccanut	392	22
Nuts & Dry Fruits	2949	447
Orange	730	255
Malta	196	0
K. Lime	2999	245
Galgal	538	345
Others	3	0
Citrus	4466	845
Mango	4964	2683
Litchi	590	701
Gauva	693	317
Papaya	24	32
Loquat	4	0
Aonala	154	70
Grapes	2	7
p-grnate	473	202
Jackfruit	215	32
Others	8	15
O S T F	7127	4059



1.6 ANIMAL HUSBANDRY

Economy of the district is predominantly agrarian, but role of Animal Husbandry is equally important as the farmers must keep the cattle for the purpose of ploughing the land and to obtain manure for maintaining fertility of the fields and to meet daily need of milk of their family. The total population of the livestock in District Mandi is given in the figure: -38. The population of the Buffaloes and Cattle in District Mandi is given in the figure: -39.

Animal Husbandry: Population of Livestock, District Mandi, 2019-20.

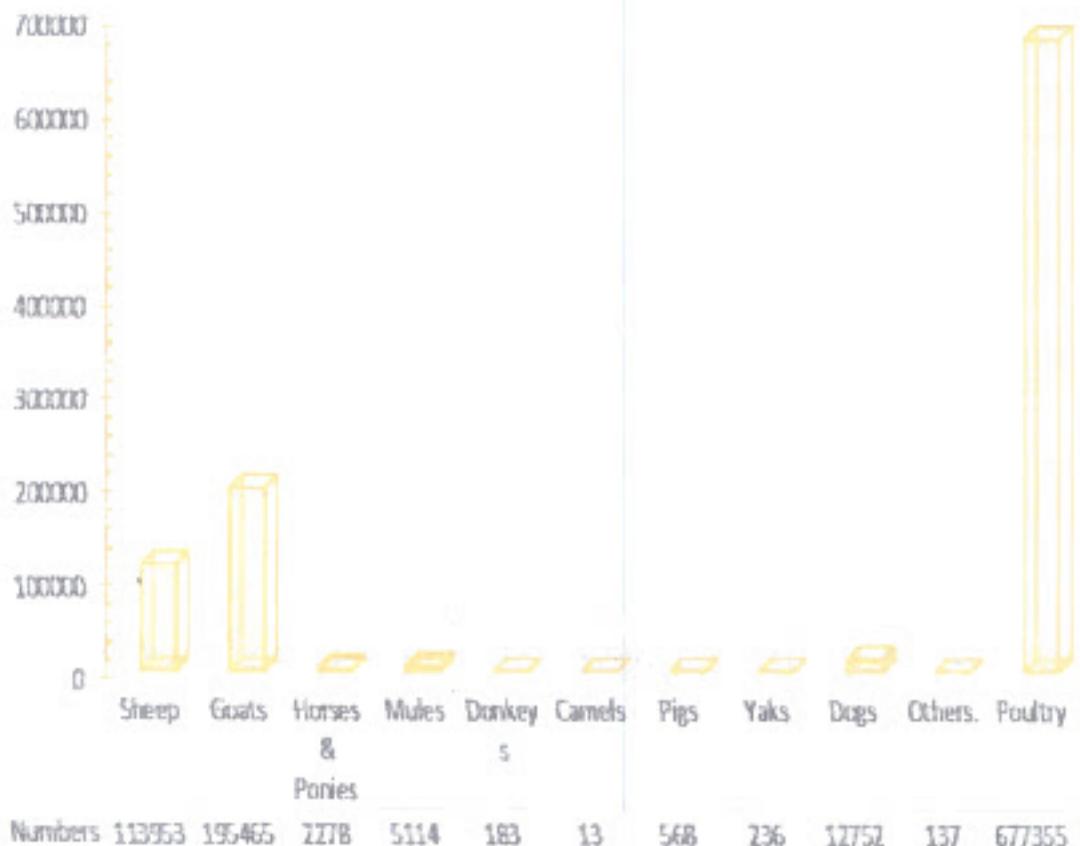


Figure 38:Livestock population of District Mandi.



Animal Husbandry: Population of Cattle, District Mandi 2019-20.

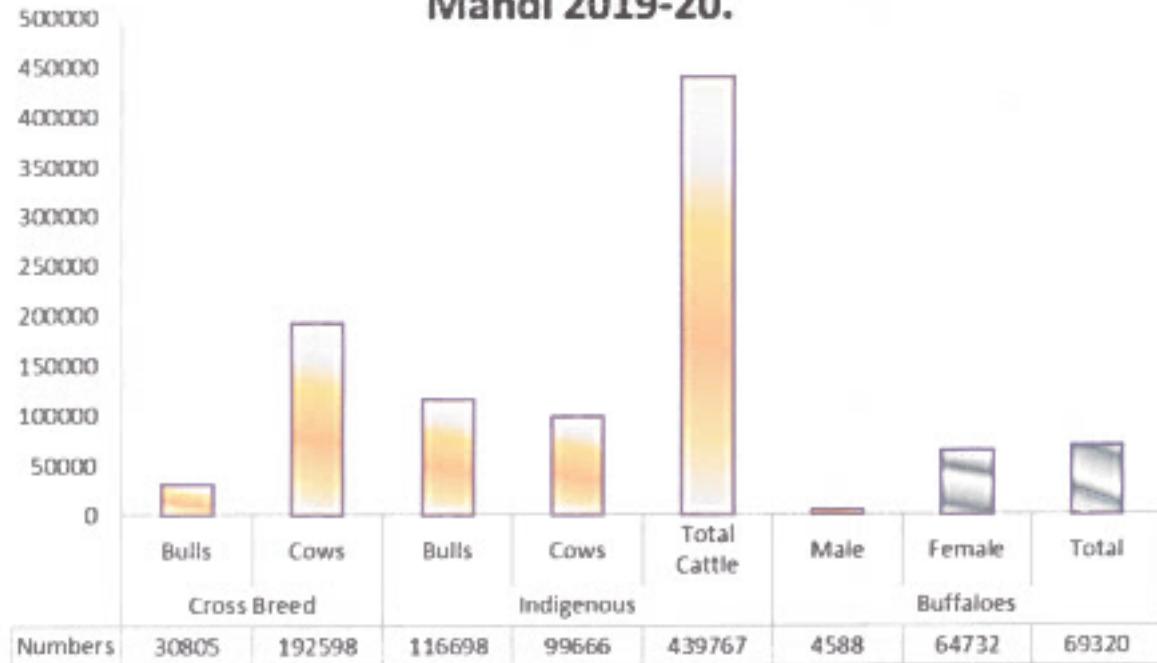


Figure 39: Showing Population of Cattle Buffaloes in District Mandi.

1.7 FISHERIES

There is a vast network of perennial rivers, khads and streams in the district. Following prominent of fish family are found in the rivers and streams of Mandi district:

- Trout
- Mahasir
- Gid Seviyon
- Dise Gugli and
- Mirror Carps



The exotic trout fish species are found in Uhl, Lambadag and Tirthan. A trout hatchery is maintained at Barot. The Mahashir fish is found in river Sutluj near Dehar while Barbustor, Gid, Kuni and Himalayan Barble are found in Uhl and Sutluj tributaries. River Uhl, Pandoh, Mandi, Kunkatar, Sandhol, Dehar, Barot, Kamand, Balichowki are famous for trout fishing.

No perennial stream passes through the area under consideration.

**Fisheries: Annual Production and value of catch,
District Mandi, 2019-20.**

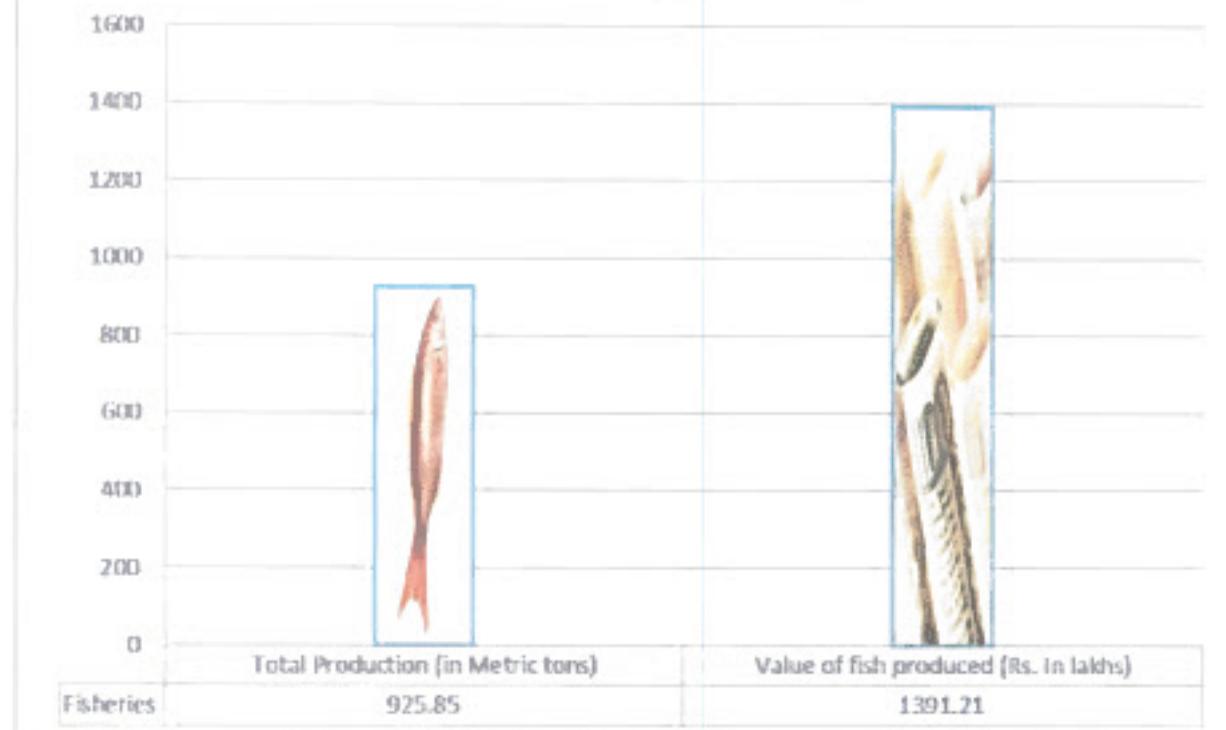


Figure 40: Showing Fish catch / production and its sale value in 2016-17.

1.8 FLORA AND FAUNA

1.8.1 Flora

The Chil is considered the prevailing conifer up to about 1950 meter when it gives place to the Deodar and the blue pines. In Mandi district the forest range between scrub, sal and bamboo forest of the low hills to the fur and alpine forests of the higher elevation. Lowest point of the southern boundary of the district is 427 meter above sea level and highest range of is at an elevation of 2658 meters in the north. The forests grown between these two extremes vary as the elevation itself.

The most prominent varieties of trees found in the district are

- Simbal (*Bombax malabaricum*),
- Mango (*Magnifera indica*)
- Tun (*Cedrela toona*)
- Several species of acacia and albizia



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Thodu Khad Quarry

Salambra (Odina wodier)

Termnalia

Jamun (Engenia jambolana

Larger tour

Bamboo

The common fruit trees are banana, apple, ber, jamun, mango, mulberry, almond, peach etc

Shrubs

The most common shrub at the higher elevation is Barberis, indigopera and Desmodium and following other shrubs are also found

1. Vitex
2. Munj
3. Ber
4. Ipomea
5. Dodonea &
6. Bamboo.

The common fruit trees are banana, apple, ber, jamun, mango, pear, mulberry, apple, almond, cherry, peach etc

1.8.2 Fauna

Animals

Due to wide variations in the attitude a large variety of fauna is available in the forests of the district. The black bears are common in the higher valley. The leopards are found throughout the district. Barking dears and gural are found at medium elevation the musk deer or Kastura and serao are found in the district. Common Mammals & Birds in the Mandi District is given in the Table :-7

Table 7: Common mammals and birds in the Mandi District.

Table 6



Birds		
Zoological Name	English Name	Common Name
<i>Milvus migrans</i>	Vulture	Cheel, Gidh, Eell
<i>Eudynamys scolopacca</i>	Koel	Koel
<i>Columba livia</i>	Pigeon	Kabuttar
<i>Coracias bengalensis</i>	Blue jay	Nilkantha

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<i>Colinus livia</i>	Hawk	Baj
<i>Francolinus francolinus</i>	Black partridge	Kala Tittar
<i>Francolinus pondicerianus</i>	Grey partridge	Safed Tittar
<i>Payo crissatus</i>	Peacock	Mor
<i>Coturnix columba</i>	Common quail	Bater
<i>Alectoris graeca</i>	Chakor	Chakor
<i>Corvus splendens</i>	Crow	Kanwa
<i>Psittacula krameri</i>	Parrot	Totta
<i>Tragopan melanocephalus</i>	Western horned Tragopan	Phulgar/Jujurana
<i>Picoides maculatus</i>	Fulvourbreasted Pied Woodpecker	Kathfowra
<i>Streptopelia decaocto</i>	Ring dove	Gughi
<i>Streptopelia chinensis</i>	Spotted dove	Gughi
<i>Accipiter badius</i>	Shikra	
<i>Aquila rapax vindhian</i>	Tawny eagle	
<i>Ducula bicolor</i>	Green Pigeon	
<i>Parus rufonuchalis</i>	Tits	
<i>Picus canus</i>	Black napped Woodpecker	Woodpecker
<i>Dryocopus javensis</i>	Woodpecker	
<i>Muscicapa subrufa</i>	Himalayan Fly Catcher	
<i>Acridotheres tristis</i>	Common Myna	Ghatari
<i>Terpsiphone paradisi</i>	Paradise flycatcher	Choti- Pinja
<i>Passer domesticus</i>	House sparrow	
<i>Carduelis spinoides</i>	Himalayan Green Finch	Chitr

Table 7

Mammals in Mandi

Zoological Name	English Name	Common Name
<i>Felis bengalensis</i>	Leopard Cat	Mirag, Bagh
<i>Felis Chaus</i>	Jungle Cat	Jangli Billi

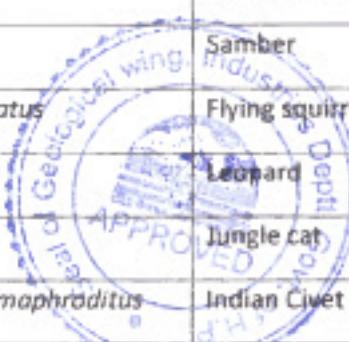


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<i>Muntucus muntisk</i>	Barking Dear	Kakkar
<i>Vulpes bengalensis</i>	Fox	Lomari, Fohiki
<i>Canis aureus</i>	Jackal	Gidder
<i>Macaca mulatta</i>	Ressus monkey	Lal Bander
<i>Presbytis entellus</i>	Languor	Languor
<i>Sus scrofa</i>	Boar	Suar
<i>Hystrix indica</i>	Porcupine	Sehal
<i>Lepus nigricollis</i>	Hare	Khargosh, Sherru, farru
<i>Moschus moschiferus</i>	Musk deer	Kastura
<i>Capra ibex</i> Ibex	Ibex	
<i>Hemitragus jemlahicus</i>	Himalayan Thar	Thar
<i>Selenarctos thebatanus</i>	Black Bear	
<i>Ursus arctos</i>	Brown Bear	
<i>Panthera unica</i>	Snow leopard	
<i>Sus scrofa</i>	Wild Boar	
<i>Axis axis</i>	Spotted deer	Chital
<i>Cervus unicolor</i>		
<i>Hylopites fimbriatus</i>	Flying squirrel	
<i>Panthera pardus</i>	Leopard	Cheetah
<i>Felis chaus</i>	Jungle cat	
<i>Paradoxurus hermaphroditus</i>	Indian Civet	Sakralu
<i>Hipposideros armiger</i>	The great Himalayan leafnosed Bat	Chamgadar



In the area surrounding the mining lease following are the common birds: -

- Chakor
- Crow
- Red Jungle Fowl (Jangli Murga)
- Black Partridge (Kala Titar)

- Grey Partridge (Safed Titar)
- Woodpecker

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Thodu Khad Quarry

In the leased-out area and surrounding hills following are the common animals:-

- Leopard (Bagher)
- Hare
- Wild Boar (Jangli Soor)
- Jackal
- Barking Deer (Kakkar)
- Monkey
- Sambar
- Pig

1.9 CLIMATE

The climate of district is hot in summer as it is situated in valley at lower altitude while surrounding mountains top experience pleasant weather and cold in winters. Monsoon brings plenty of rain from July to September. October to November is pleasant weather, during this time Lake is completely full. Hottest months are May and June when temperature usually hover around 37-38 degree Celsius and sometimes for few days jumping to above 40 degrees Celsius, the nights are comparatively cooler, and month wise temperature is given in figure 6.

The area enjoys monsoon rainfall from third week of June to mid-September.

The climatic information given is based on the data obtained from Revenue Department of Himachal Pradesh. The Indian Meteorological Department is maintaining a Meteorological Station at D.C office Mandi, and at Sundernagar. All information available indicates following seasons in the district:

Winter
Summer/Pre-monsoon
Monsoon
Post Monsoon/ Autumn



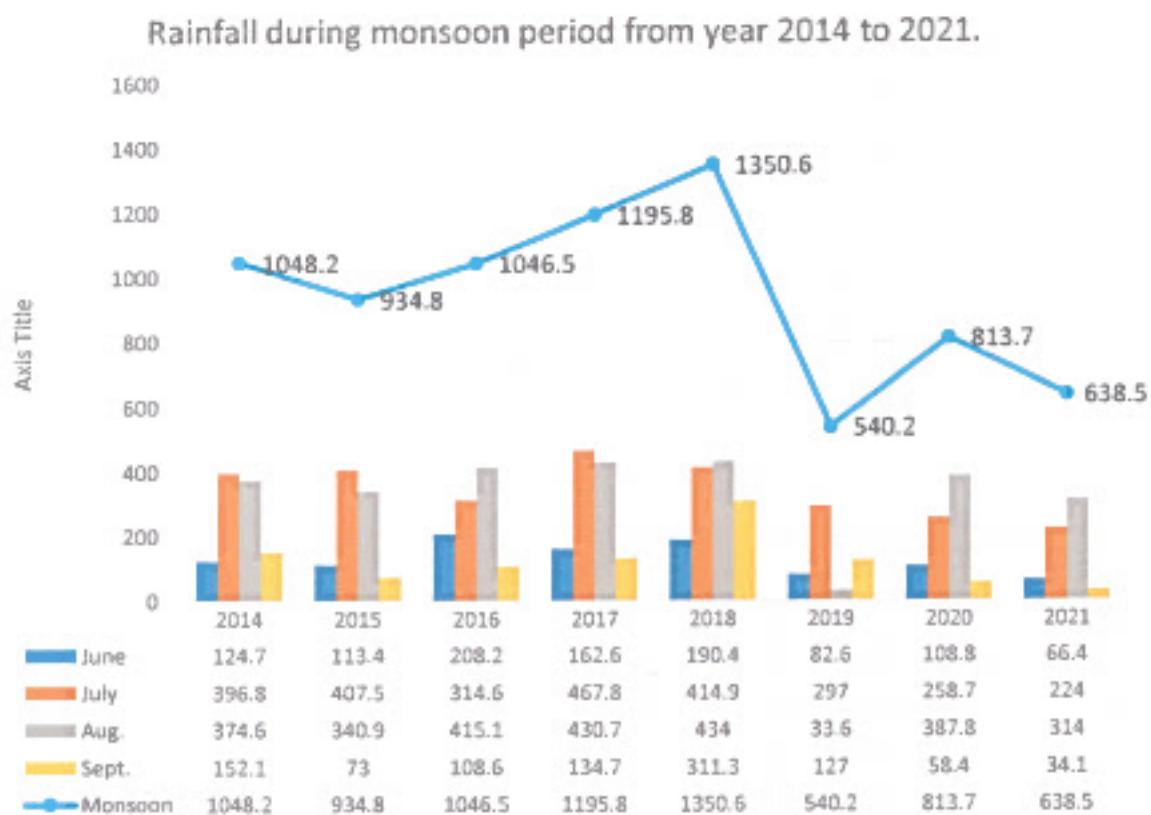


Figure 41: Yearly monsoon Rainfall from year 2014 to 2021.



2.0 ENVIRONMENT MANAGEMENT PLAN

The impact on environment due to mining operation is generally: -

- Change in Topography & land use pattern.
- Effect on Flora & Fauna
- Ground Vibrations and Fly Rocks.
- Effect on Hydrology
- Effect on Climate
- Air Pollution
- Noise Pollution
- Visual Impact
- Socio- economic Impact
- Accumulation of Scree.

2.1 CHANGE IN TOPOGRAPHY.

- ✓ No affect.
- The area is riverbed and mined out pit will be filled during rainy season hence there would be no change. It is part of a Riverbed.
- The highest point of the Lease area is at 721 metre above mean sea level.
- The lowest point is at 630 m above MSL.
- Mine Area is proposed in the entire safe area.
- The block would be completely replenished during monsoons floods.
- The mining shall be confined to well within the riverbed corridor.
- Mining shall be undertaken to a depth of one metre or water level whichever is less.
- The Lease area is and shall remain riverbed.
- Thus, the topography or landform of the Riverbed *per se* will not be changed.
- The land use of the mining Lease area is defined in the Revenue record as 'Gair Mumkin khad'.
- The land under active mining would always remain riverbed, during as well as post mining.

2.2 Effect on Climate

- The mining Lease area is small.
- Mining will be confined to 71450 square metres area.
- The mining depth will be up to one metre or up to water level whichever is less, thus water regime will not be disturbed.
- The mining will be confined from within the riverbanks.
- Some micro level impact near the freshly exposed surface may happen for short duration as some humid material may be exposed
- The impact will need no mitigating measures.

2.3 Impact on Air

- No blasting material is to be used.



- The major contributors of air pollution in open cast mining are excavation, loading and transportation, generating dust, which leads to momentary rise in the suspended particulate matter (SPM).
- The mining activity will be limited to excavation of about 595 metric tons of stone, Bajri and sand with silt-clay per day.
- 66 tipper truck trips will be able to move the required material from mine to crusher / Project sites.
- This activity would generate limited disturbance to air quality.

2.4 Impact on Noise Level and Mitigation Measures

- The mining area represents calm surroundings.
- The mining shall be manual causing hardly any noise.
- The noise would be generated by the movement of trucks / tractor trolleys engaged in the transportation of the mined material.
- About 38 trucks trips would be required for transporting mined material per working day from mining area to destination.
- The dedicated tipper truck would be properly and regularly undergoing maintenance to create minimum noise.
- Care would be taken to properly maintain the silencers of the vehicles.
- No use of horn shall be allowed in or near the mining area.
- A thick belt of broad leaf trees, bushes and shrubs would be planted near the banks of River to screen the noise, if permitted by the private land holders.

2.5 Effect on Flora & Fauna

- The mining Lease area is riverbed.
- There is hardly any flora or fauna on the riverbed to attract any protective or mitigating measures

2.6 Soil Cover

- The mining will be confine to Riverbed.
- It has no soil cover as the area gets frequently flooded during monsoons.
- Thus, there shall be no impact on any natural soil cover.

2.7 Impact on Hydrology

- The mining area is part of riverbed.
- The mining depth will be up to one metre or up to water level whichever is less, thus water regime will not be disturbed
- The mining will be confine to central part of riverbed, away from banks.
- Thus, mining would be dredging the riverbed and reducing the silt burden downstream.
- The ground water (undercurrent of the river) will not be disturbed as mining will be undertaken above Water table.

2.8 Waste disposal Management

The area is in a regular course of the Khad, and silt clay is the only waste likely to be produced. As the silt and clay are inseparable from sand at the quarry site, the sand along with silt & clay would be mined excavated and transported to the Project sites. The waste generated if any will be used as backfill where separable.

2.9 Socio- Economic Impact

- No adverse impact on the socio-economic condition of the area is envisaged.
- The induction of mining sector development in and around predominantly agricultural area is bound to create its impact on the socio-economic life of the local inhabitants. The impact is generally positive. The mining activity though with small direct employment potential but would create jobs for at least 120 persons (*if part manual mining is resorted to*) directly and indirectly, in mining, transportation, and crushing unit. However, to avoid congestion and to improve mining efficiency mechanical mining is recommended if permitted to.

2.10 Transport of Mineral

From Quarry to Road heads towards Dharmpur - Seoh rural road is about 200m through the Khad track. The mined material is transported through tracks made in the Khad. About 595 metric tonnes of material shall be transported per day with an average of 66 tipper truck trips. The movement of 66 tipper truck trips would not have much impact on traffic on rural road and would cause negligible environmental impact.



PART III

1. Progressive Mine Closure Plan/Reclamation Plan

1.1 Reclamation

- The mined area being part of the river course cannot be reclaimed for any other purpose.
- The land under active mining would always remain riverbed, during as well as post mining.
- The highest point of the Lease area is at 721 metre above mean sea level.
- The lowest point is at 630 m above MSL.
- The mining shall be confined to well within the riverbed corridor.
- No mining near the banks up to 1/10th of its width is to be undertaken as per guidelines, i.e. 5 to 12 metres, from banks.
- The mining depth will be up to one metre or up to water level whichever is less, thus water regime will not be disturbed.
- The entire quarried area will be replenished and reclaimed by the river during monsoon floods.
- The Lease area is and shall remain riverbed.
- Thus, the topography or land use of the Riverbed *per se* will not be changed.
- As such no reclamation work of mined area is required to be undertaken.

1.2 Mine Waste Disposal:

a) Year wise generation of mine waste and soil cover.

As explained earlier the following category of the waste is generated during riverbed mining.

- Silt/ Clay Mixture

The silt and clay are generally being inseparable from sand and extracted along with it.

As such no waste will be generated during the mining of stone, sand and bajri.

1.3 The arrangements made for topsoil utilization, if any

As the mining area is part of riverbed, having no topsoil cover therefore, no topsoil is required to be removed, or disposed of.

1.4. Preventive Check dams

Considering the rocky condition of riverbanks, only a few check walls are required to be constructed at some vulnerable sites. H.P.P.W.D. link road passes along the lease area. For the protection of link road check/retaining walls have been suggested to be erected at vulnerable points mainly at C1 to C5. The total length may extend to 200 metres costing about Rs.80000/-.

1.5 Plantation work

As far as the order of Apex court in writ petition(s) No(s) 114/2014 titled as Common Cause Vs Union of India & others is concerned, the riverbed which suffer frequent floods during monsoon period and where no grass growth is possible, as such mining area cannot

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Thodu Khad Quarry

be re-grassed after termination of mining operation. There is some space outside/above the HFL, within the lease area, where no mining operations can be undertaken and as such is suitable for plantation.

Year	Area to be covered (In Sq. Metres)	Number of trees to be planted	Cost of Plantation & Maintenance
First	50	7	3000
Second	50	8	4000
Third	150	15	8000
Fourth	150	15	10000
Fifth	200	20	15000
Total	600	65	40000

Year wise survival rate.

The survival rate is about 30 percent in the area because of the rocky nature of the site. However, after yearly review it will be ensuring that the plants are properly looked after and in case of failure of some plants to survive, these will be promptly replaced. Thus, though cost of maintaining the plants will be remarkably high but by the end of five years, the survival rate will be ensured to be at least 90 percent.

2 STRATEGIES FOR PROTECTION OF POINT OF PUBLIC UTILITY etc.

There is a rural road passing along the Khad at places. No mining has been proposed up to ten metres for its protection. There is no other point of utility within radius of 100 metres of the mining lease periphery, which may need any kind of protection.

3 MANPOWER DEVELOPMENT

The mining activity will be mainly manual. Workers are mainly required in riverbed mining for extraction and loading of overburden material into tippers and tractor trolleys. Drivers for tippers and tractors will be another category of workers. Thus, employment potential is as given below:

Supervisor
Drivers and JCB operators
Unskilled workers

6
73



Thus, total generation of Employment will be to a tune of 80 both skilled and unskilled workers.

4 USES OF MINERAL

The stone, sand and Bajri will be consumed in the dedicated crushing unit of the Project and product grit and sand will be used in construction activities of the project.

5 DISASTER MANAGEMENT & RISK ASSESSMENT:

The mining lease area part of Riverbed which is prone to some risk hazards but there will not be any major risk hazard associated with the process. The possible scenarios selected for this project are as below:

- Inundation / Flooding
- Drowning
- Accident during mineral loading, transporting, and dumping
- Accident due to vehicular movement
- Earthquakes

Inundation/Flooding

The consequences of flooding/ inundation are catastrophic or fatal. The likelihood of occurrence of flooding is occasionally possible. As per mining plan the mining work will not be carried out during monsoon season. The likelihood of occurrence of drowning is rare due to dry season mining.

Accident during mineral loading, transporting, and dumping

The consequences of this scenario are minor which may be taken care with first aid care.

Accident due to vehicular movement

The consequences of this scenario are moderate and may result in hospitalization and day loss. The likelihood of occurrence is occasionally possible.

Earthquakes

The area falls in seismic zone IV. The mining operations are open cast pit mining. The mining pits will be only of one metre depth. There won't be any structure in the area likely to cause risk to worker. The workers rest sheds, store building and toilets will be constructed of lightweight wood and tin sheets.

6. RECOMMENDATION FOR RISK REDUCTION**Measures to prevent Inundation/Flooding/drowning**

- Being on riverbed there should not be any mining operation during monsoon or rainy day
- Formation of deep pits should not be allowed
- Whenever there is any alert of flooding the workers will be moved to safer area along the banks.

Measures to Prevent Accidents during Loading

- The truck should be brought to a lower level so that the loading operation suits to the ergonomic condition of the workers.
- The loading should be done from one side of the truck only.
- The workers should be provided with gloves and safety shoes during loading.
- Opening of the side covers would be done carefully and with warning to prevent injury to the loaders.
- Operations during daylight only.

Measures to Prevent Accidents during Transportation

- Vehicles will be periodically checked and maintained in good condition.
- Overloading will not be permitted.
- To avoid danger of accident roads and ramp near embankment should be properly maintained.
- The truck would be covered and maintained to prevent any spillage.
- The maximum permissible speed limit should be ensured.
- The truck drivers with proper driving license would only be employed.

Measures to Prevent Accidents during Earthquakes

- Occasional drills to create awareness for safety measures during mining operations and specially the measures to be adopted during earthquakes etc will be undertaken in consultation with experts.



Declaration

This is to declare that the Mining Plan of Minor Mineral lease of part of Saklain Khad, for Stone, bajri and sand situated in Khasra No. 1/1, 1/2, 5748/5595/1 & 5748/5595/2 measuring 9.5030 Hectares, falling in Mauza/Mohal Tatoli Pardana & Sidhpur, Tehsil Dharampur & District Mandi, has been prepared with our consent and approval and that we will abide by all commitments there under.

The 'Mining Plan and Progressive Mine Closure Plan' complies all statutory rules, regulation, orders made by competent authorities of State or Central Government or orders passed by courts have been taken into consideration and wherever specific permissions are required, shall be obtained.

We undertake to implement all measures proposed in the 'Mining Plan and Progressive Mine Closure Plan' in time bound manner.

We have deposited a sum of Rs. with the competent authority of the State Government in form of fixed deposit Receipt as financial assurance of the same.

In case of default on our part, the approval of Mining Plan may be withdrawn, and aforesaid sum assured may be forfeited

Date

Place

Kotli

Ihawz
The General Manager

Triveni Mahadev & Thana Plaun HEP's,
Himachal Pradesh Power Corp.Ltd.,
Tehsil Kotli, Distt. Mandi.



Certificate

Certified that the provisions of the Himachal Pradesh Minor Minerals (Concession) and Minerals (Prevention of Illegal Mining, Transportation and Storage) Rules 2015, Metalliferous Mines Regulation 1961 and other guidelines issued in this regard, from time to time, have been complied for, in the preparation of Mining Plan of Minor Minerals lease for Stone, sand & bajri, situated in Khasra No. 1/1, 1/2, 5748/5595/1 & 5748/5595/2 measuring 9.5030 Hectares, falling in Mauza/Mohal Tatoli Pardana & Sidhpur Tehsil Dharampur & District Mandi, of The General Manager, Triveni Mahadev & Thana Plaun HEP's, Himachal Pradesh Power Corporation Ltd., Tehsil Kotli, District Mandi.

While preparing the 'Mining Pan' including progressive mine closure plan all statutory Rules, Regulations, Orders made by competent authorities of State or Central Government or orders passed by Courts have been taken in consideration.

- The information provided and data furnished in this 'Mining Plan' is correct to the best of my knowledge.

Date

Place: Shimla



Jhumpa C. Jamwal
Cottage No. 21, Type IV,
HP Government Officers Residences,
CPWD Colony, Bemloe, Himachal Pradesh
RQP Registration No. HP/RQP/21/1/2016

HIMACHAL PRADESH



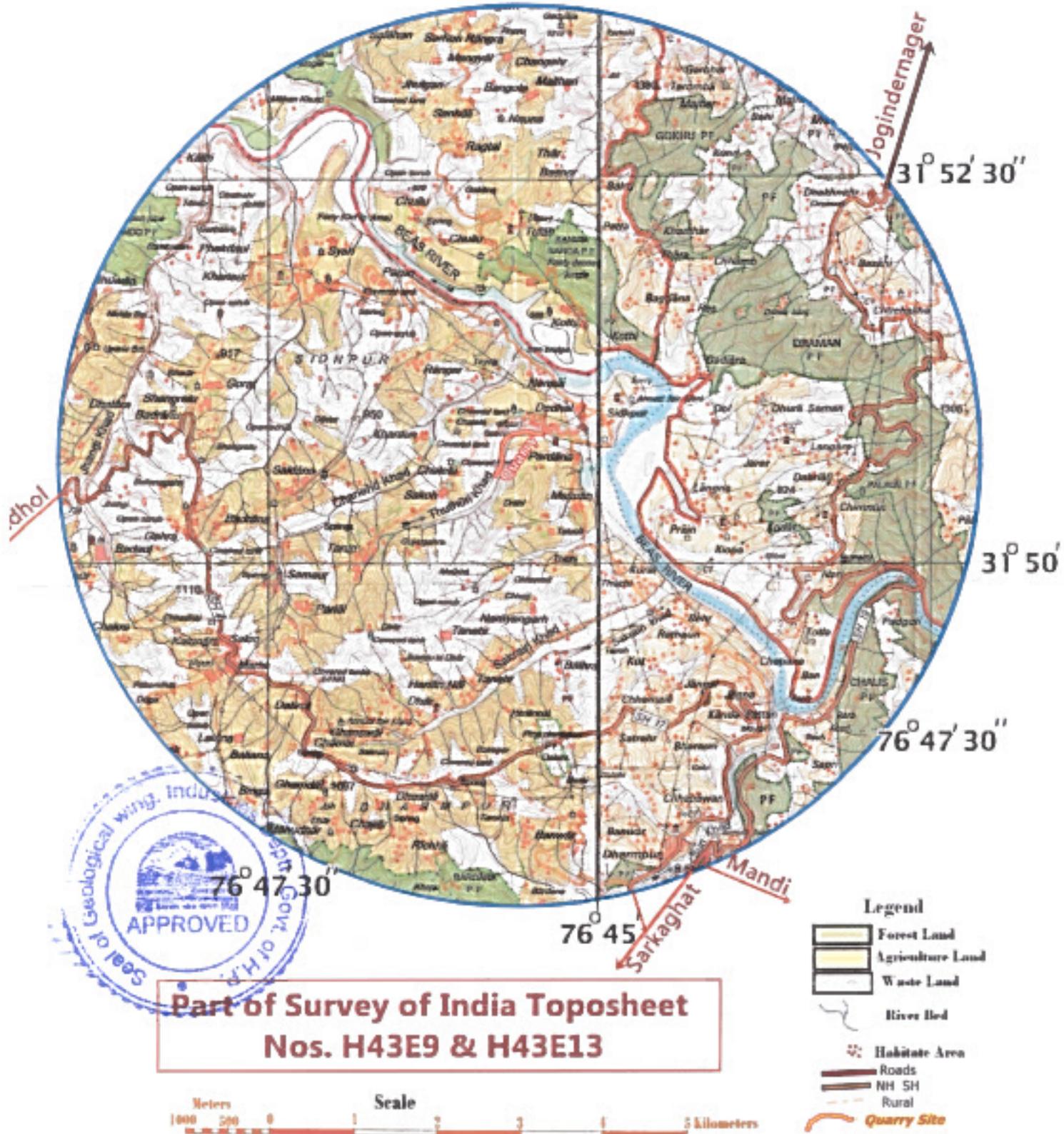
Plate 1

Lessee
 General Manager
 Triveni Mahadev & Thana Plaun HEP's,
 Himachal Pradesh Power Corp.Ltd.,
 Tehsil Kotli, Distt Mandi,
 HP-175003



Jhunjhunwala
 Jhunjhunwala C. Jamwal
 HP/RQP/21/1/2016.

Land Cover & Land Use Map of Buffer Zone Five Kilometres Radius.



lessee

The General Manager
Triveni Mahadev & Thana Plaun HEP's,
Himachal Pradesh Power Corp.Ltd.,
Tehsil Kotli, Distt. Mandi.

Jhumka C. Jamwal
HP/RQP/21/1/2016.

