MINING PLAN

OF MINOR MINERAL LEASE FOR SAND, STONE & BAJRI, SITUATED IN KHASRA NO. 1291&1, MEASURING 4-09-69 HECTARE MAUZA BANAL & RIYUR, TEHSIL –DHARAMPUR DISTT – MANDI (H.P.)

LETTER OF INTENT GRANTED IN FAVOUR

THE GENERAL MANAGER,
TRIVENI MAHADEV & THANA PLAUN HEPs,
M/s H.P. POWER CORPORATION Ltd,
TEHSIL KOTLI, DISTRICT MANDI,
HIMACHAL PRADESH

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

2023

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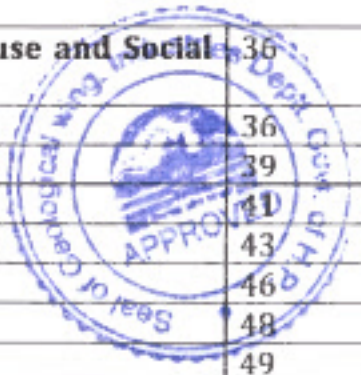

MAP INDEX

Declaration
Certificate of RQP

Seal of Geological wing, Industries Deptt. Govt. of H.P. APPROVED

भूवैज्ञानिक शाखा,
उद्योग विभाग शिमला
Geological wing
Deptt. of Industries
Shimla
APPROVED
With Conditions
शर्तों के साथ अनुमोदित
Vide Letter No. Udyog-Bhu (Khani-4) laghu-4/2016- 4302
Dated
दिनांक 21-7-23

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

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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' for grant of mining lease for mining sand, stone and bajri for a period of one year vide letter No. Udyog-Bhu(Khani-4) Laghu-41/2016-597 dated 23/05/2020 and extended for further period of one year vide letter No. Udyog-Bhu(Khani-4) Laghu-41/2016-5808 dated 9/11/2021 .

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 0f 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 2015' 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

Son 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 3 Km. from Dhrampur. The area can also be approached through an unmetalled road which leads to Dharampur-Kamlah 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, Sathuj 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	Survey of India
Surveyed in	1989-90, upgraded 2005
Sheet No.	H43E9
Scale	1:50,000
Edition	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.

Table 1Showing latitude and longitude of the area

Pillar	Latitude	Longitude
A	31° 47' 41.09"	76° 45' 02.20"
B	31° 47' 35.03"	76° 45' 02.52"
C	31° 47' 33.51"	76° 45' 02.79"
D	31° 47' 27.11"	76° 45' 00.32"
E	31° 47' 23.39"	76° 44' 56.46"
F	31° 47' 20.80"	76° 44' 48.59"
G	31° 47' 22.62"	76° 44' 45.41"
H	31° 47' 28.71"	76° 44' 54.78"
I	31° 47' 32 .10"	76° 44' 59.25"
J	31° 47' 41.09"	76° 45' 02.20"

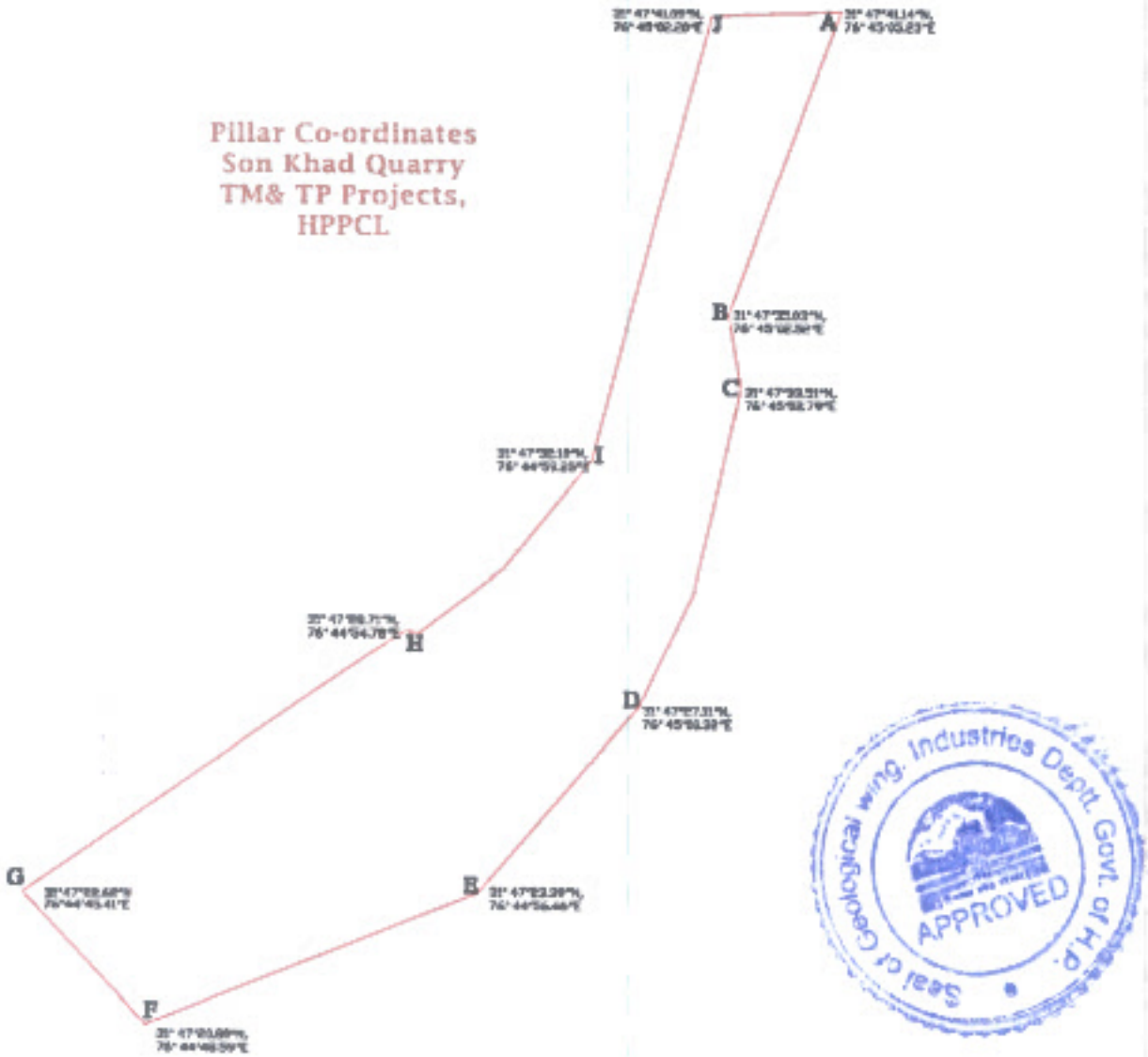


Figure 2: Calculated Coordinates of Boundary Pillars

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

S. No	Khasra Number	Area Hectares	Owner of Land	Kism	Mauza/mohal
1	1291	3-73-23	Government	Gair mumkin khad	Banal
2	1	0-36-46	Government	Gair mumkin khad	Riyur
TOTAL		04-09-69 HECTARES			

2.3 Address & Detail of Lease

	Village: -	Banal & Riyur
	Patwar circle:	Banal
	Post Office: -	Banali
	Tahsil: -	Dharampur
	District: -	Mandi
Administrative Office	Sub-Divisional Office (Civil): -	Dharmpur
	Divisional Office (Forest): -	Jogindernager
	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 K.mt.)
1	Quarry	Roadside NH 3	0.20
2	Roadside	Dharmpur	2
3		Mandi (District Offices)	70
4		Shimla (State Hq)	165
5		Bunter (Airport)	128
6		Jogindernager Metre gauge Rly Stn.	58
7		Sarkaghat	57
8		Sujanpur Tira	50

2.5 Approach to the Area.

The leased site is part of Riverbed and is at 2.5 km from Dharampur via NH3, which is approx. 200 m from the quarry site by a unmetalled Quarry road. The area can also be approached through an unmetalled road which leads to Dharampur-Kamlah road. Figure below shows the approach map of the area.

Figure 3: ***Approach to 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 Mandi District is as given below in the figure: -3: -

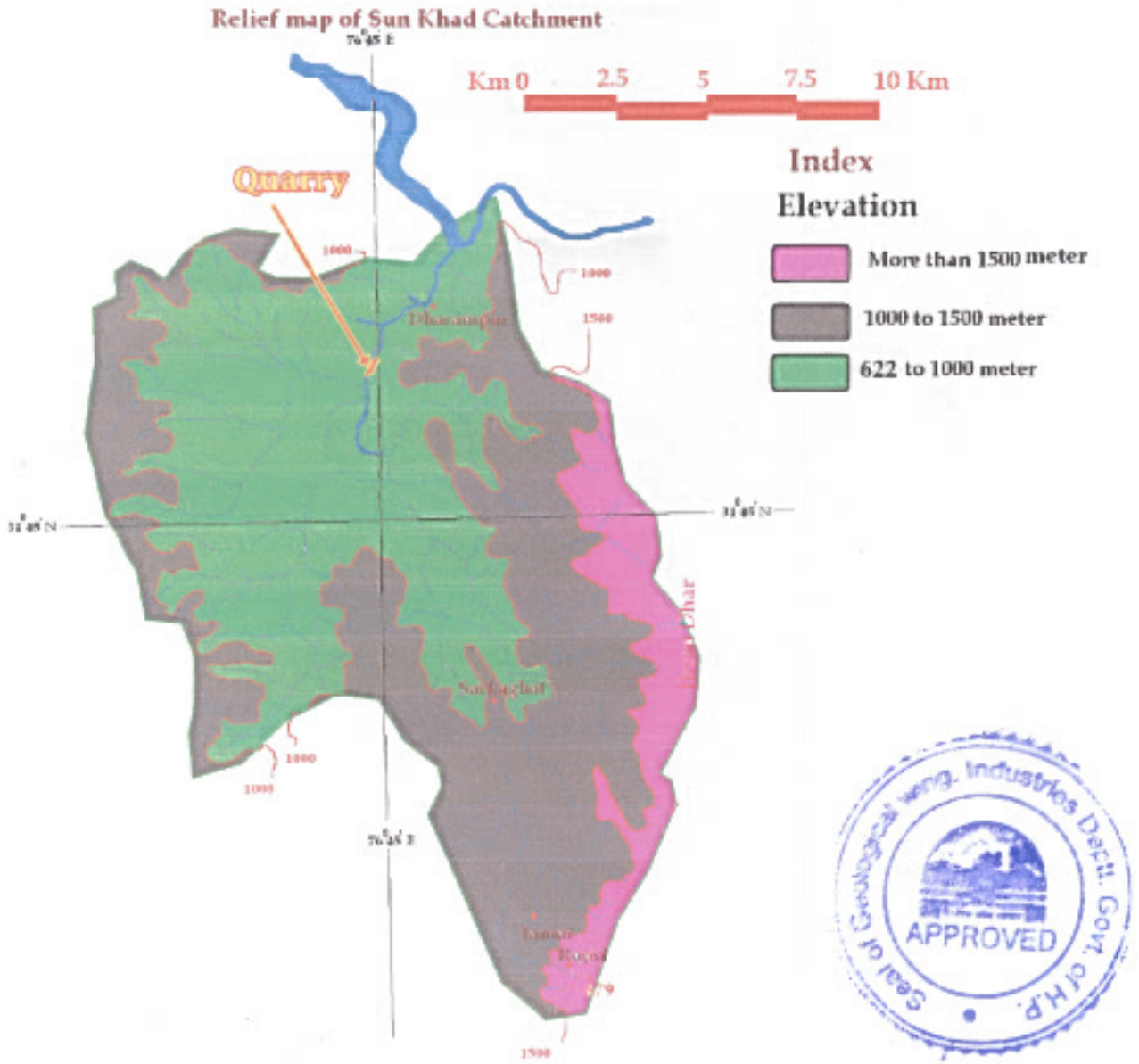


Figure 4: The broad Geo-Morphological Divisions of the Son Khad Catchment.

The Satellite photograph was taken from the Google is given below (Figure: -4) to depict the general physiography of the area showing that the major ridges/water divides are generally running N-S 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 Beas River is 648 Meters above MSL,
- The lowest contour of the leased-out area in Beas River is 642 Meters above MSL.

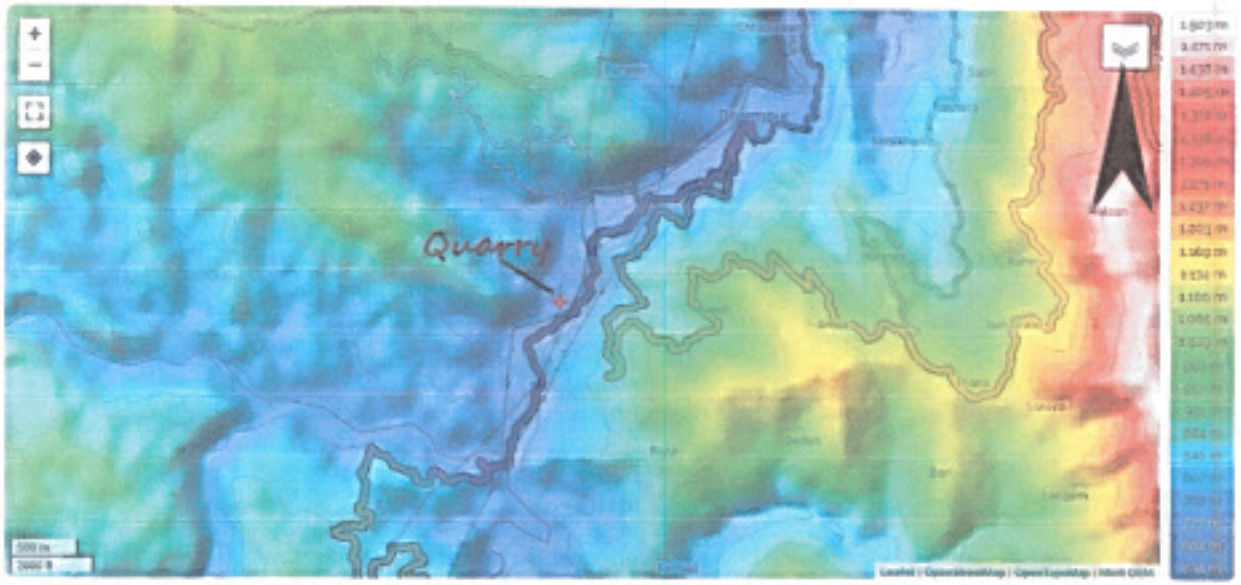


Figure 5: Terrain Map of the Area.

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.

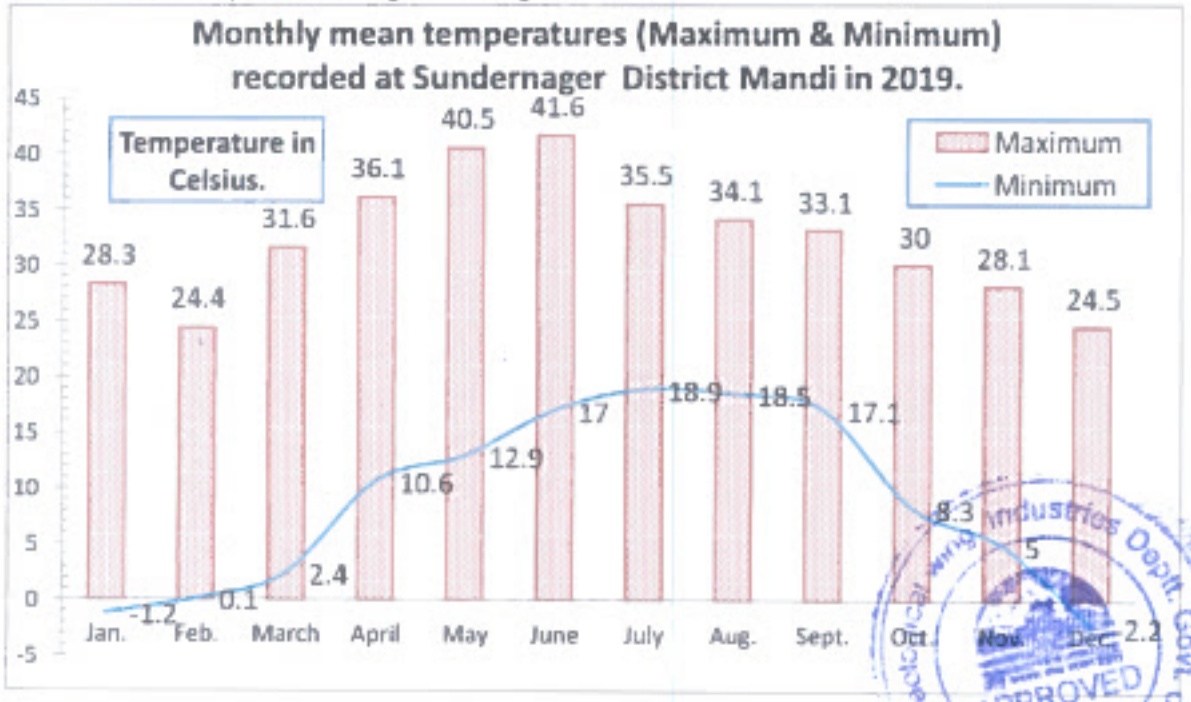
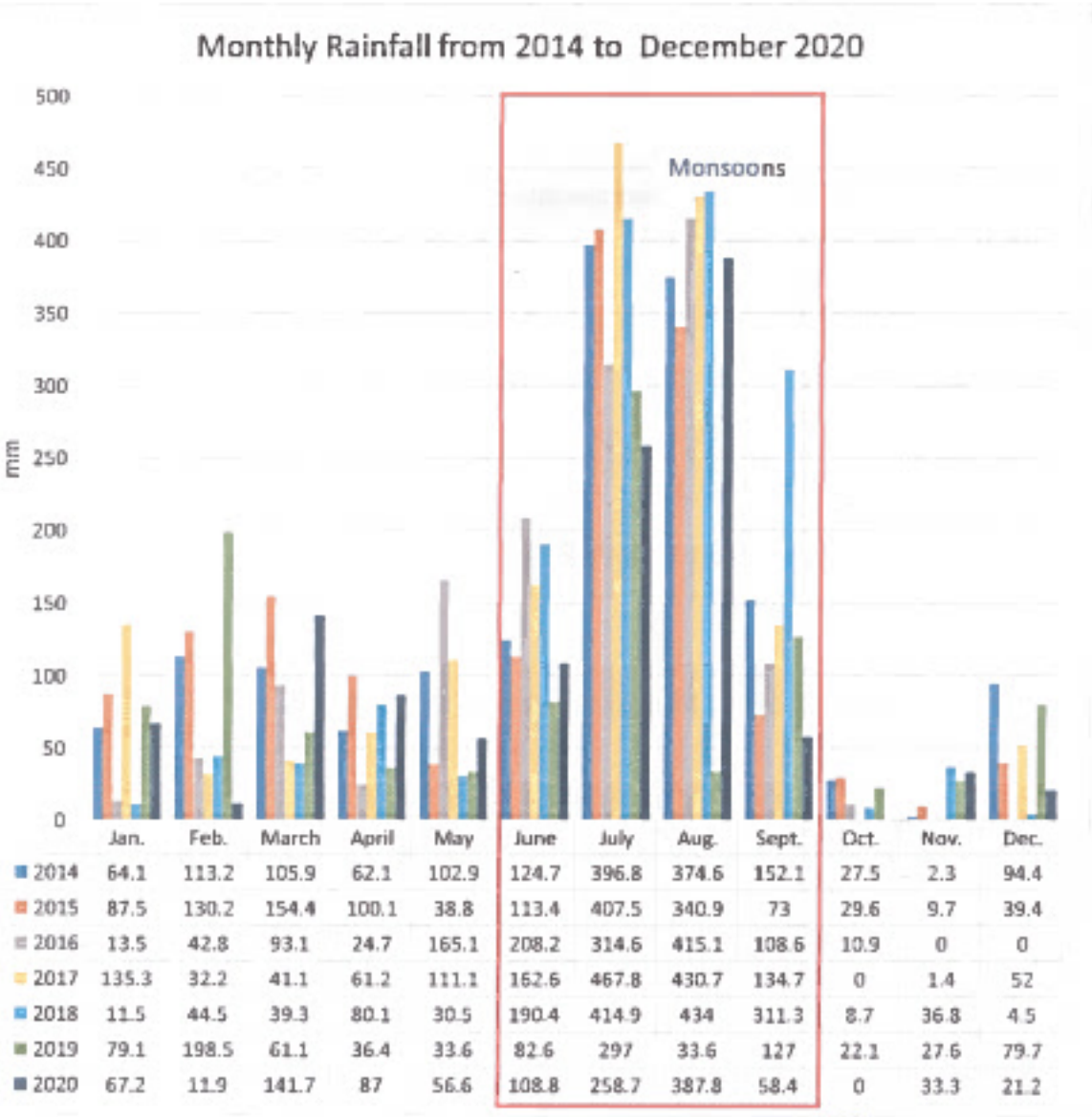


Figure 6: Mean monthly maximum and minimum temperature recorded at IMD station at Sundernager.

3.4 Rainfall



	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
2014	64.1	113.2	105.9	62.1	102.9	124.7	396.8	374.6	152.1	27.5	2.3	94.4
2015	87.5	130.2	154.4	100.1	38.8	113.4	407.5	340.9	73	29.6	9.7	39.4
2016	13.5	42.8	93.1	24.7	165.1	208.2	314.6	415.1	108.6	10.9	0	0
2017	135.3	32.2	41.1	61.2	111.1	162.6	467.8	430.7	134.7	0	1.4	52
2018	11.5	44.5	39.3	80.1	30.5	190.4	414.9	434	311.3	8.7	36.8	4.5
2019	79.1	198.5	61.1	36.4	33.6	82.6	297	33.6	127	22.1	27.6	79.7
2020	67.2	11.9	141.7	87	56.6	108.8	258.7	387.8	58.4	0	33.3	21.2

Figure 7: Rainfall of the District.

3.5 Any other important feature

The mining leased area falls in riverbed of Son Khad tributary of Beas River and accessibility to the quarry site is through a kutcha road from NH-3.

PART I

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

4.1 General

The leased area is situated in the Son Khad, a primary tributary of Beas River. Son Khad originates at a height of 1879 meter above mean sea level, from Sinkandr Dhar (origin lies in the Survey of India, topo-sheet NoH43E14. The general flow is S to N.

The attitude at confluence with Beas River is 622 Metres above MSL (lies in the Survey of India, toposheet No H43E113). The total length is about 27 Km. (The total catchment of the Son Khad lies on survey of India Topo-sheet Nos H43E9, H43E10, H43E13 & H43E14.

The general analysis of the drainage system of Son Khad is given below in table 5 (as per 1:125000 scale)

Table 3 **Showing drainage analysis of the Son Khad Catchment**

Sr .No	Drainage	No of Stream	Total Length Km	Average Length Km	Bifurcation ratio
1	Ist Order	65	156	2.4	0.92
2	2nd order	16	33.6	2.1	0.94
3	3rd order	5	31.6	6.3	0.83
4	4th order	1	9.4	9.4	0.50
	Total stream	**87**	**230**		

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.

Basic Geometry of the catchment is as: -

Area of the Catchment = 187.4 Sq. Km
Perimeter of the Catchment = 54 Km
Length of the river 27 Km
Length of Valley 22 Km
Width of the catchment at maximum 15.2 km
From various analysis of the drainage the son Khad can be divided into two parts

- From origin to the 800 meter above mean sea level
  The zone of active erosion—Young stage

- From 800-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

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

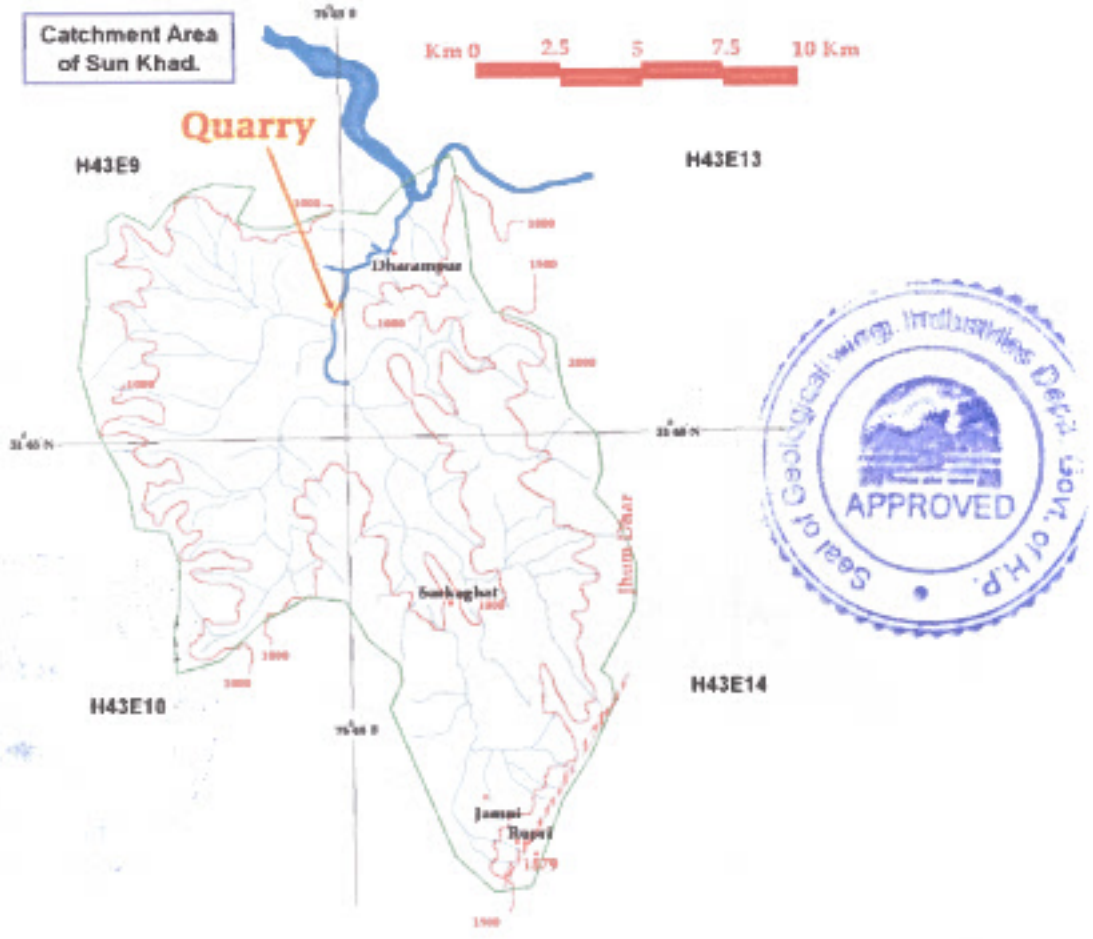


Figure 8: Catchment area of Son Khad.

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

Son Khad – Primary tributary of Beas River.

1.3 Drainage System

Beas River

1.4 Type of Drainage

Dendritic (Figure 7)

1.5 Origin of River/Stream

Son Khad originates at a height of 1879 meter above mean sea level, from Sinkandr Dhar (origin lies in the Survey of India, toposheet No H43E14). The general flow is S to N.

The attitude at confluence with Beas River is 622 Metres above MSL (lies in the Survey of India, toposheet No H43E13.

1.6 Attitude at Origin

1879 metres above MSL

1.7 Width of River at the place of Mining

85 to 180 Metres

1.8 The annual deposition at the place of mining

5 to 8 Cm, at different location, in the Son Khad as evident from the photo 1

Photo 1 **Showing annual deposition of 5 to 8 Cm near quarry area and also showing one-year depositional part.**

1.9 The Competency of the River/ Stream at the mining site

The general competency at the mining area is 6 to 10 Kg approx. The largest boulder varies 24 to 37 cm X 19 to 34 cm X 19 to 32 cm (length X breath X height) (Photo 4.)

Photo 2 :Showing the competency of river in leased area

1.10 The level of HFL

During monsoon floods the water level rises by about 1.5 metres, at times for short spells.

1.11 The level of LFL

About 0.40 centimetres.

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

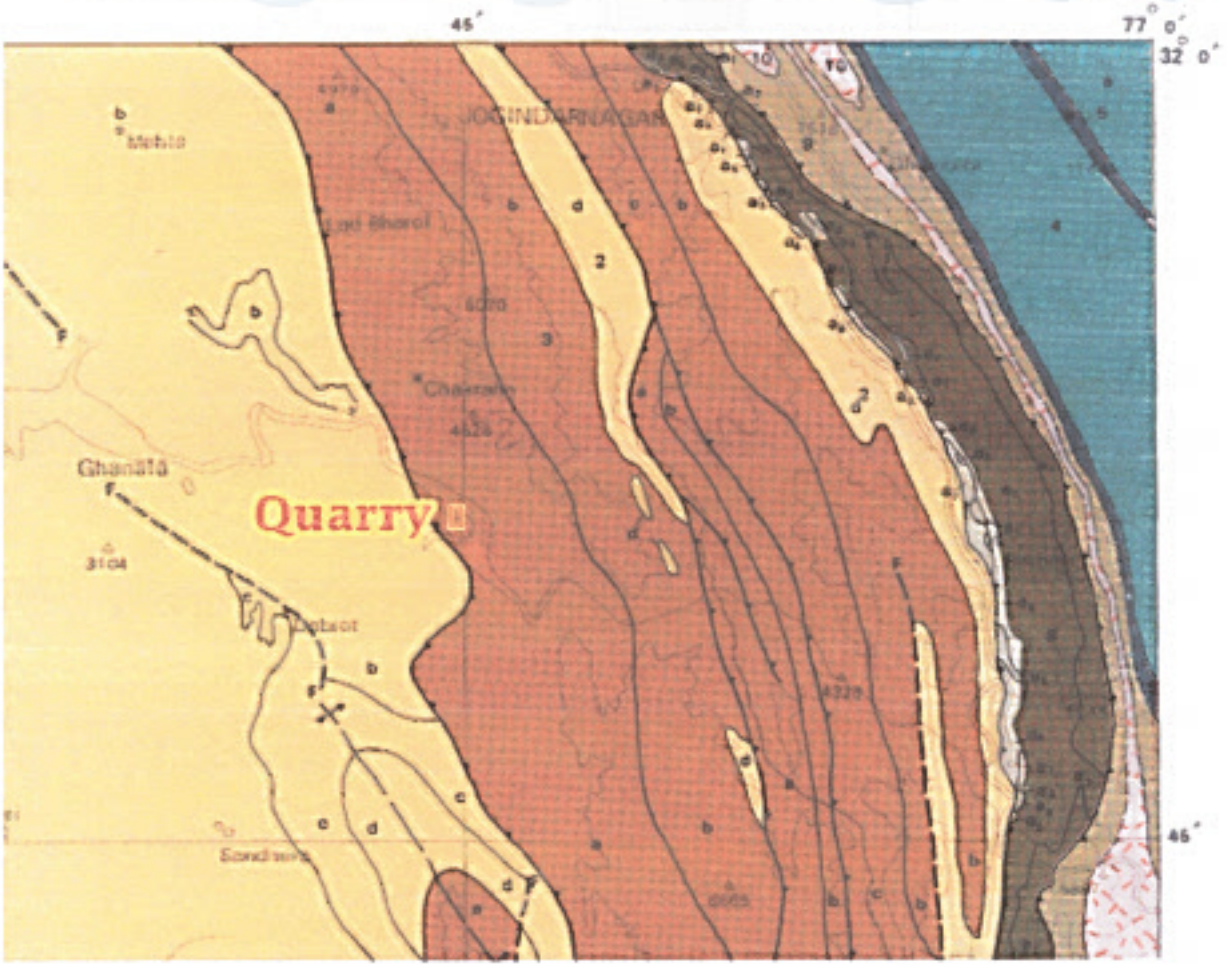
2.1 Regional Geology

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 Srikantia (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 canrbonaceous 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 Sondernagar 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 fresh water 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 fluviatile 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 Dharamsala / Kasauli Formation: grey sandstone, shale, clay; c. Lower Dharamsala / Dagshai Formation: red nodular clay, grey / green sandstone: d. Subathu / Kakara Series: grey / green splintery shale, sandstone and limestone bands	Subathu Group	Oligocene - Lower Miocene

Figure 9:Geological Map of the Area

Table: Stratigraphy of the Son Khad/Son Khad 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 immediately 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 choe-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.

In the advent of Neogene, a depression was formed in front of the rising mountains (Proto- Himalaya). This depression becomes a repository of a thick sequence of molassic sediments of the Siwalik. The Siwalik Group comprising conglomerates friable micaceous sandstone, siltstone and claystone.

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 bought 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.

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 bends 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 clays 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 Son 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 Son 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 3; **Showing the nature of the Lease area in the Son 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 boulderbeds.

Photo 4 Rocks on the banks.

2.6 Estimate Annual Deposition of Mineral

The area being part of the River 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 rainfall, which generally causes floods, the factor of five cm annual replenishment is taken into consideration in general. The annual replenishment of the material also depends on the discharge, grade of river and geology of catchment area. However, it is generally observed that replenishment of more than five cm occurs in a year as all the old pits get filled with mineral during the very first flood of the monsoon. *Hence mined out area of the pre- monsoon will be filled with mineral during monsoon and even during winter rains.*

3. RESERVE ESTIMATE

3.1 General Consideration

The basic requirement of the leased or 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 9 depicts the pie chart for the same.

Table shows the percentage wise distribution of minor minerals:

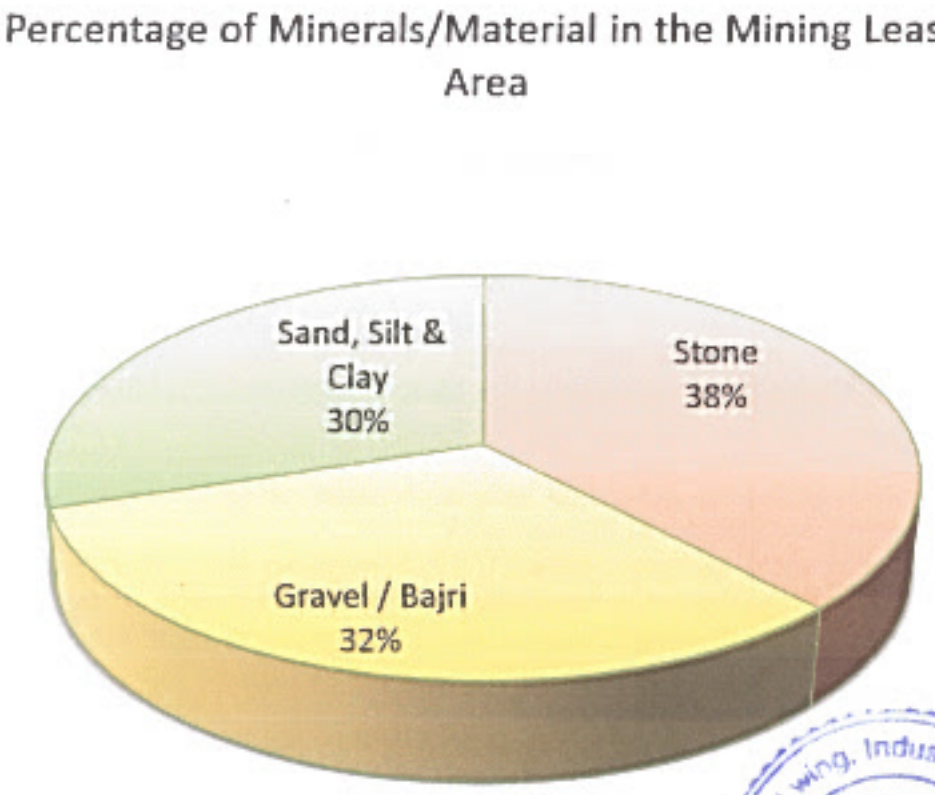


Figure 10: Percentage of each category of mineral present in the leased area

1	Stone	38%
2	Gravel / Bajri	32%
3	Sand, silt & clay	30%

3.3 Estimate of Geological Reserve

The entire block falls within the river corridor. Thus, the mining leased area of 40969 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 specific gravity to be 2.25, the Geological deposits in the area are to a tune of about 460900, tonnes as shown in the chart.

Geological Reserves

Geological Reserves	Thickness, in metres	leased Area (Square Metres)	Reserves Rounded off (In tonnes)
Proved	5	10969	460900
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 85 to 180 meters; thus, no mining is proposed in the area up to 9 to 18 meters from the banks.
- ✓ 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 12, table 7 and figures 13.

- ***The part of the area, i.e., 21700 square metres of lease area, is mineable as it falls within the river corridor, leaving out the safety zone provided along the banks.***

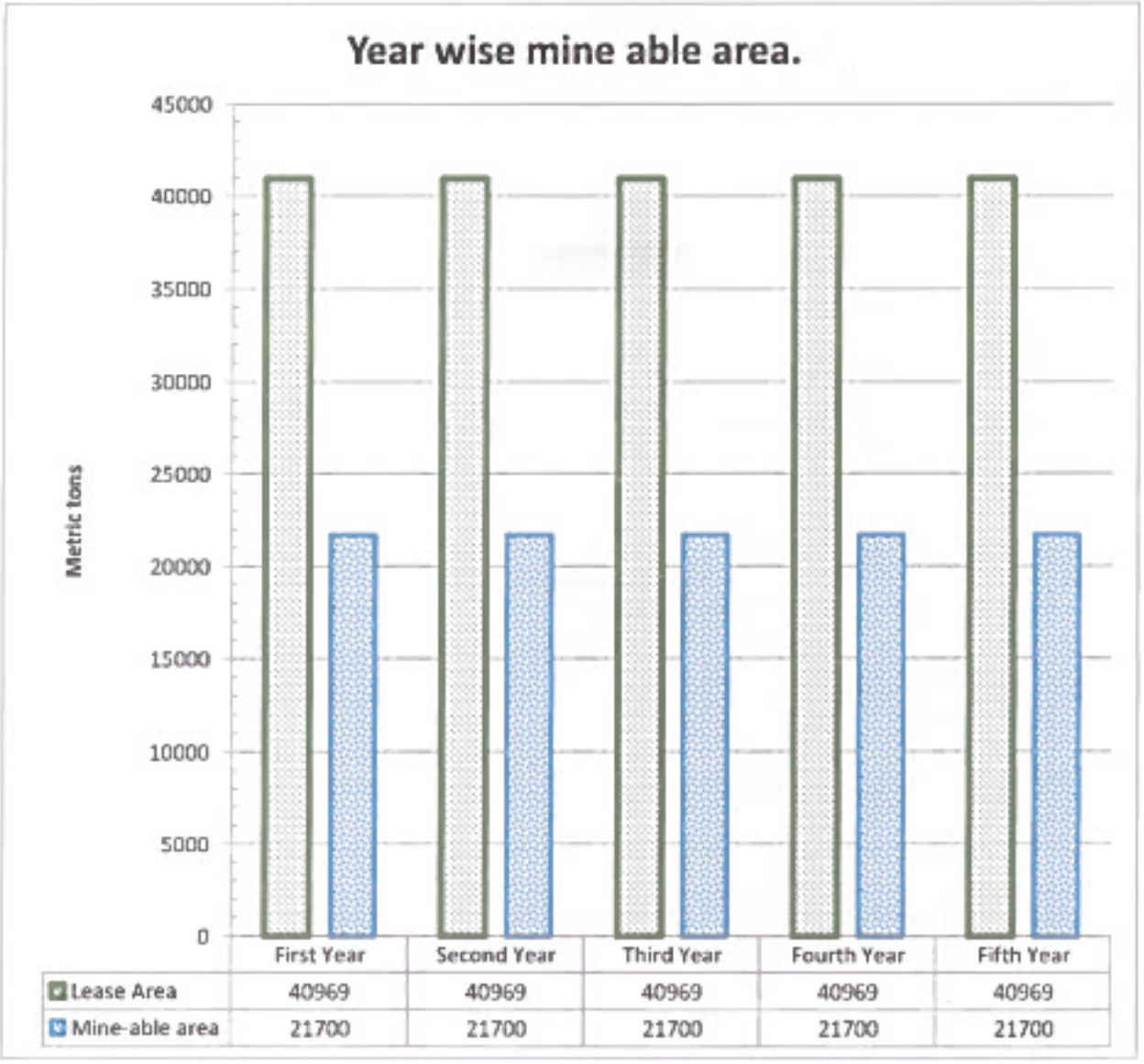


Figure 11: Mineable area.

Table 7 Mineable reserves in the block

Leased Area Sq. metres	Mineable Area Sq. Metres	Stone	Gravel / Bajri	Sand, Silt & Clay	Total
40969	21700	18554	15624	14647	48825

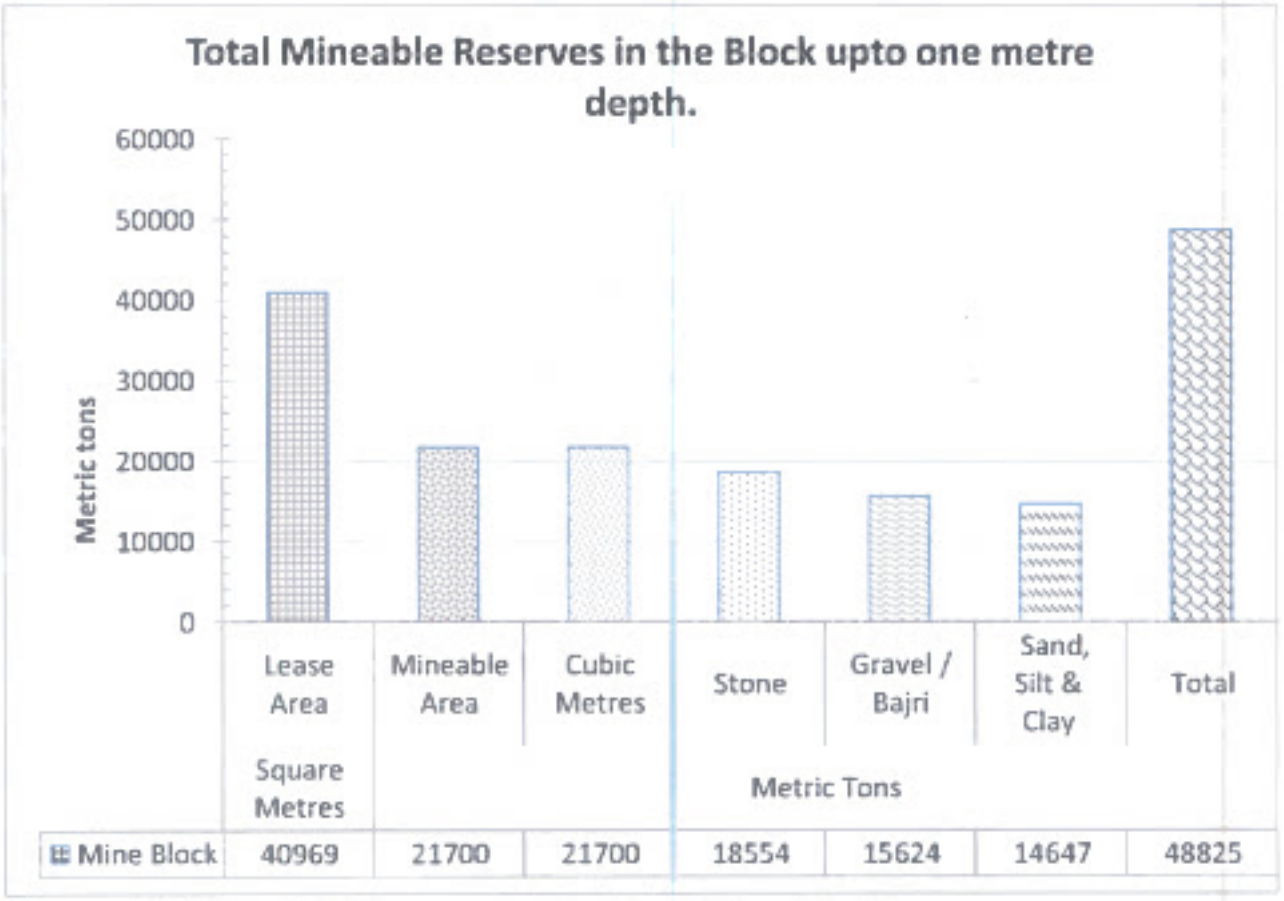


Figure 12: Mineable Reserve up to One Metre depth

Thus, the safe mine-able block of 21700 square metres contains 21700 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 mine-able area to be 48825 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 Riverbed, the minerals are inexhaustible, but presently these deposits are part of Geological Formations of catchments.

Figure 14 shows the proposed production of materials in five years.

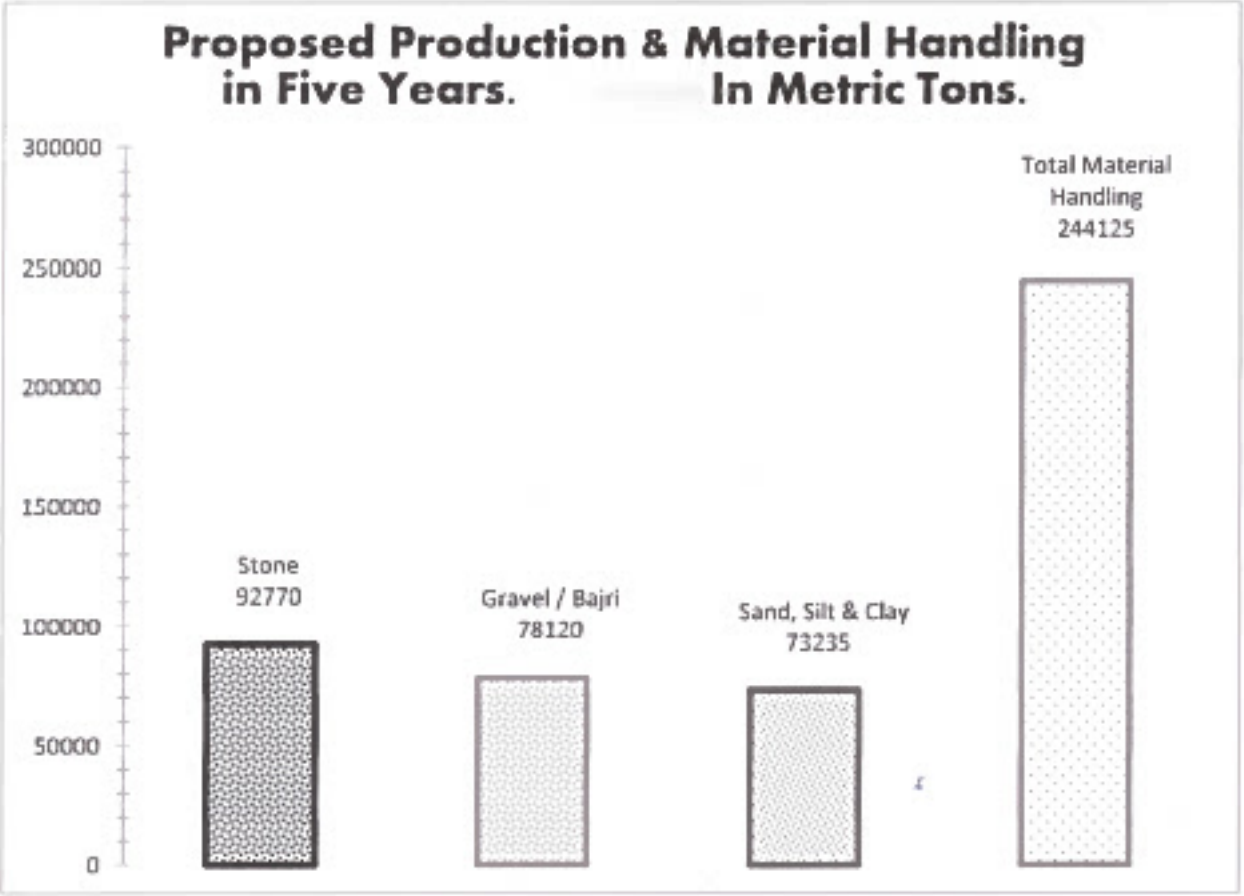


Figure 13:Proposed production of total material in five years

4 MINE DEVELOPMENT AND PLAN OF PROGRESSIVE MINING

The mining activity will be manual and to some extent semi mechanical. Normally it has been observed that a worker can mine/excavate about three to four tonnes of material in a day. To excavate 180 tonnes of material in a day 45/60 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 both manual as well as mechanically. Workers are mainly deployed in riverbed mining for extraction and for loading of extracted material into tipper truck and tractor trolleys loader/ JCB will be operated. Drivers/ Operators for loaders, tippers and tractors will be another category of workers.

Considerations

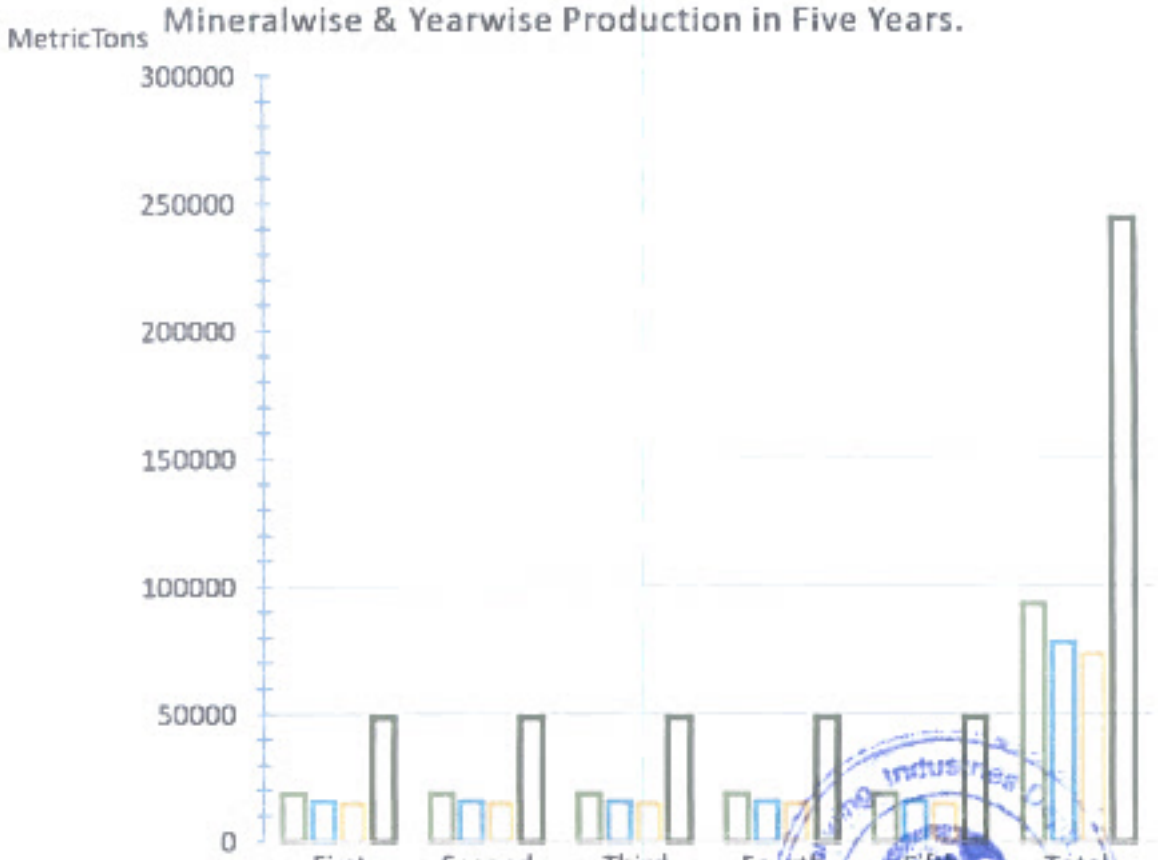
- No blasting is required.
- Only manual/semi mechanically extraction of RBM (River Borne Material) will be undertaken.

- 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 13 and Table 6 below show the production of Minerals in five years.

4.1a Year wise Production



	First	Second	Third	Fourth	Fifth	Total
Stone	18554	18554	18554	18554	18554	92770
Gravel / Bajri	15624	15624	15624	15624	15624	78120
Sand, Silt & Clay	14647	14647	14647	14647	14647	73235
Total	48825	48825	48825	48825	48825	244125

Figure 14:Year wise Availability of Materials (in Metric tons).

Table 4 Year wise production of materials.

Year	Stone	Gravel / Bajri	Sand, Silt & Clay	Total
First	18554	15624	14647	48825
Second	18554	15624	14647	48825
Third	18554	15624	14647	48825
Fourth	18554	15624	14647	48825
Fifth	18554	15624	14647	48825
Total	92770	78120	73235	244125

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 15, 16, 17, 18 & 19.

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

- ✓ Mining of 48825 tonnes of material is proposed to be mined from 21700 square meters of safe mining area out of 40969 square metres of leased block.
  - ➢ 18554 tonnes of stone and 15624 tonnes of bajri will be produced and dispatched to dedicated stone crushers.
  - ➢ 14647 tonnes of sand with inseparable silt & clay will be produced and dispatched to construction sites of the project.
  - ► About 15 percent of the leased Area falls outside the river corridor hence plantation can be undertaken in the 1st year at P.
  - ► More than 85 percent of the leased Area falls within the river corridor, *in situ* rocks form both the banks, therefore retaining walls are proposed marked C-1 on plate 3.

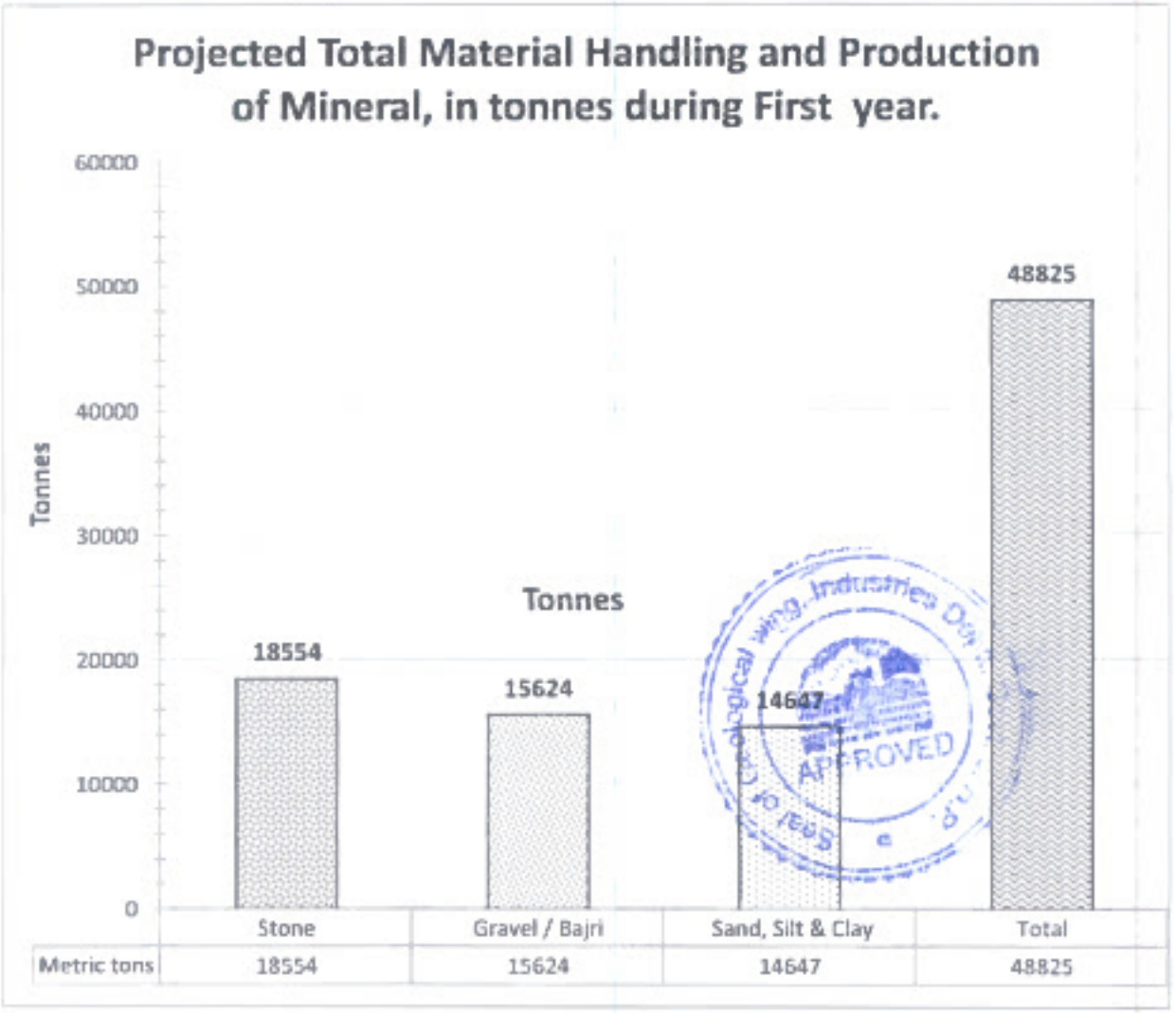


Figure 15- Proposed Production and Material Handling in the First Year of Mining.

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

During 2nd year of development and production programme:

- ✓ Mining of 48825 tonnes of material is proposed to be mined from 21700 square meters of safe mining area out of 40969 square metres of leased block.
  - ➢ 18554 tonnes of stone and 15624 tonnes of bajri will be produced and dispatched to dedicated stone crushers.
  - ➢ 14647 tonnes of sand with inseparable silt & clay will be produced and dispatched to construction sites of the project.
  - ➢ About 15 percent of the leased Area falls outside the river corridor hence plantation can be undertaken in the 1st year at P.
  - ➢ More than 85 percent of the leased Area falls within the river corridor, *in situ* rocks form both the banks, therefore retaining walls are proposed marked C-2 on plate 3.

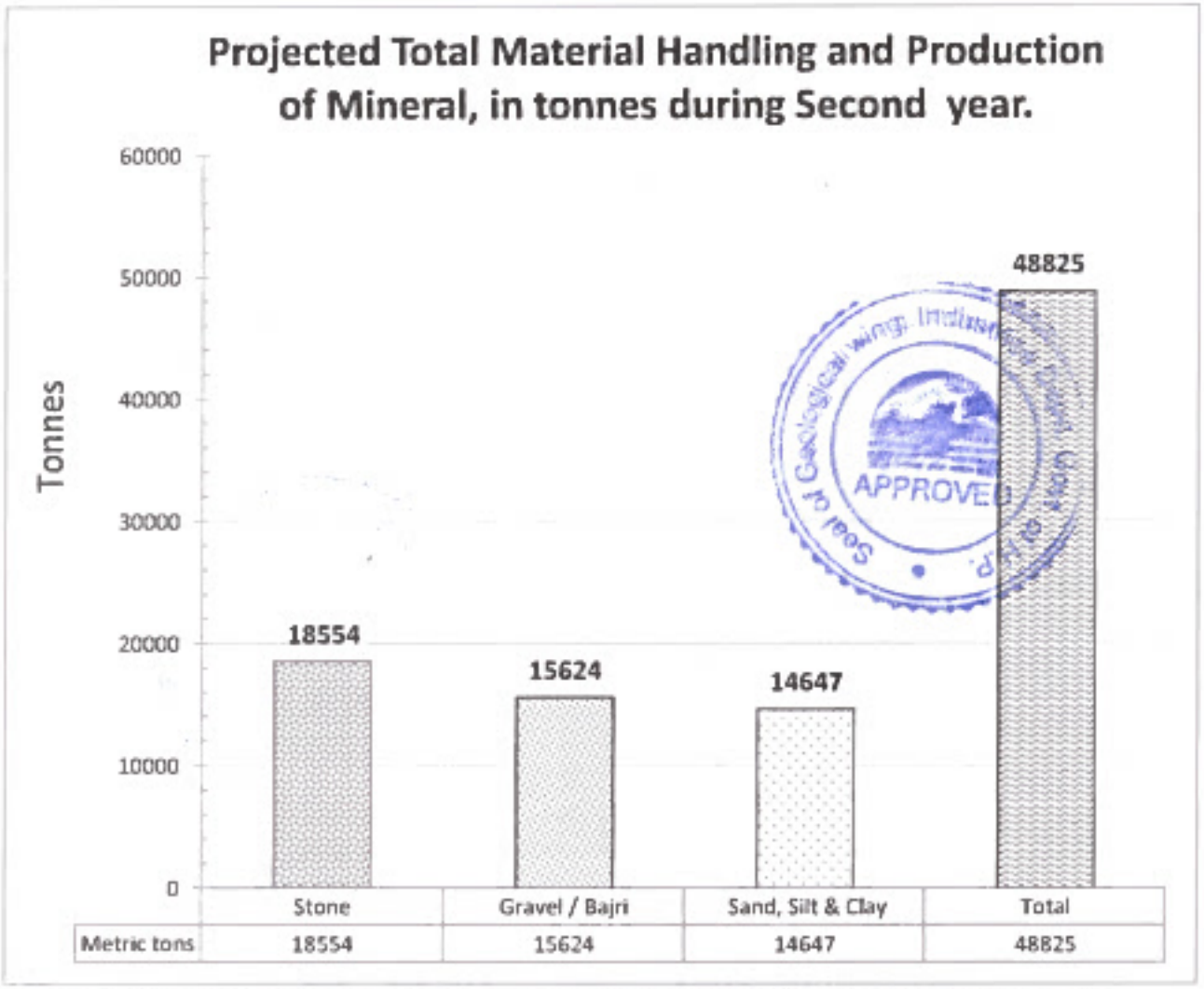


Figure 16- Proposed Production and Material Handling in the second Year of Mining.

4.2 c Development and Production at end of third Year.

During 3rd year of development and production programme:

- ✓ Mining of 48825 tonnes of material is proposed to be mined from 21700 square meters of safe mining area out of 40969 square metres of leased block.
  - ➢ 18554 tonnes of stone and 15624 tonnes of bajri will be produced and dispatched to dedicated stone crushers.
  - ➢ 14647 tonnes of sand with inseparable silt & clay will be produced and dispatched to construction sites of the project.
  - ➢ About 15 percent of the leased Area falls outside the river corridor hence plantation can be undertaken in the 1st year at P.
  - ➢ More than 85 percent of the leased Area falls within the river corridor, *in situ* rocks form both the banks, therefore retaining walls are proposed marked C-3 on plate 3.

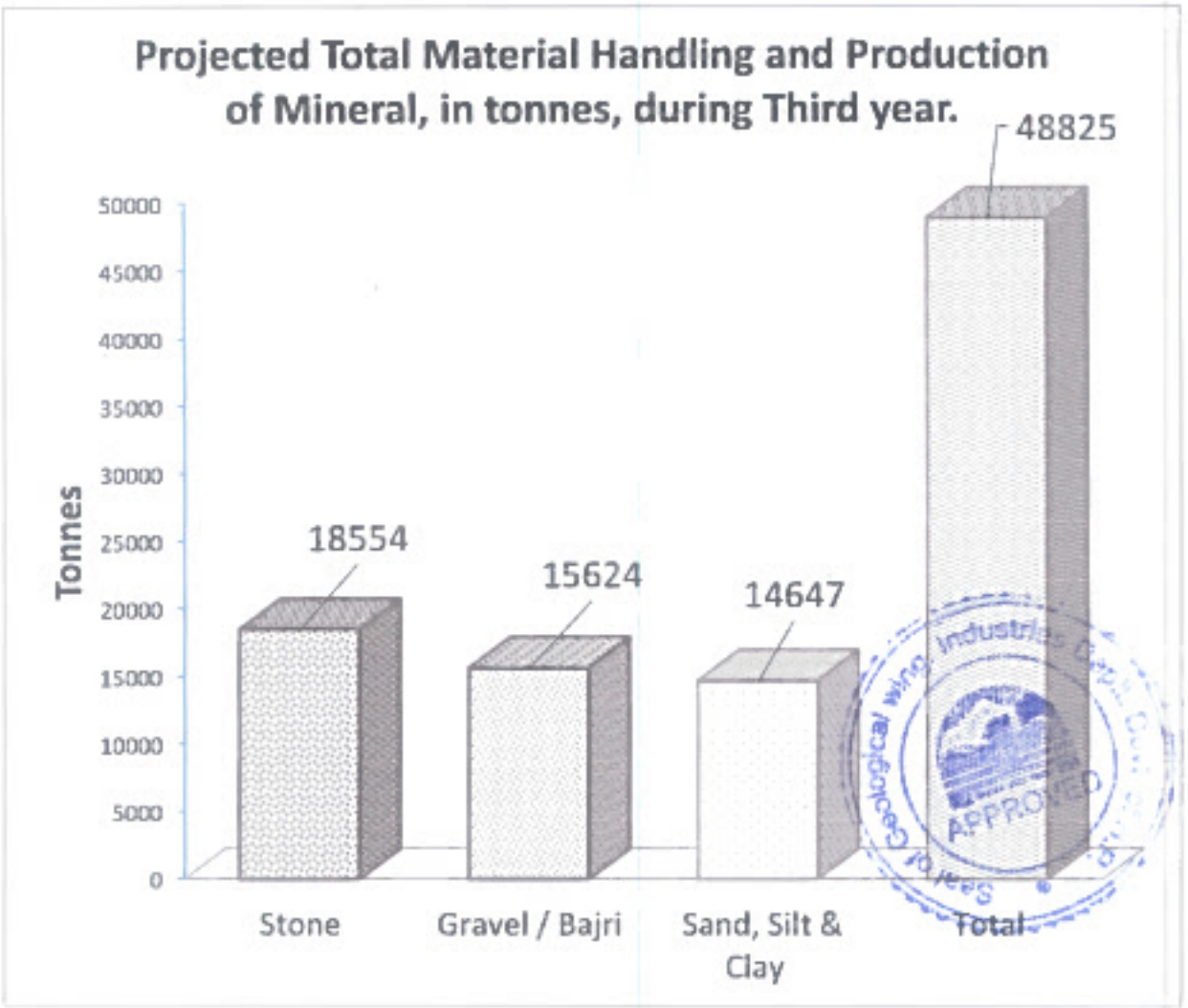


Figure 17- Proposed Production and Material Handling in the Third Year of Mining.

4.2 d Development and Production at end of fourth Year.

During 4th year of development and production programme:

- ✓ Mining of 48825 tonnes of material is proposed to be mined from 21700 square meters of safe mining area out of 40969 square metres of leased block.
  - ➢ 18554 tonnes of stone and 15624 tonnes of bajri will be produced and dispatched to dedicated stone crushers.
  - ➢ 14647 tonnes of sand with inseparable silt & clay will be produced and dispatched to construction sites of the project.
  - ➢ About 15 percent of the leased Area falls outside the river corridor hence plantation can be undertaken in the 1st year at P.
  - ➢ More than 85 percent of the leased Area falls within the river corridor, *in situ* rocks form both the banks, therefore retaining walls are proposed marked C-4 on plate 3.

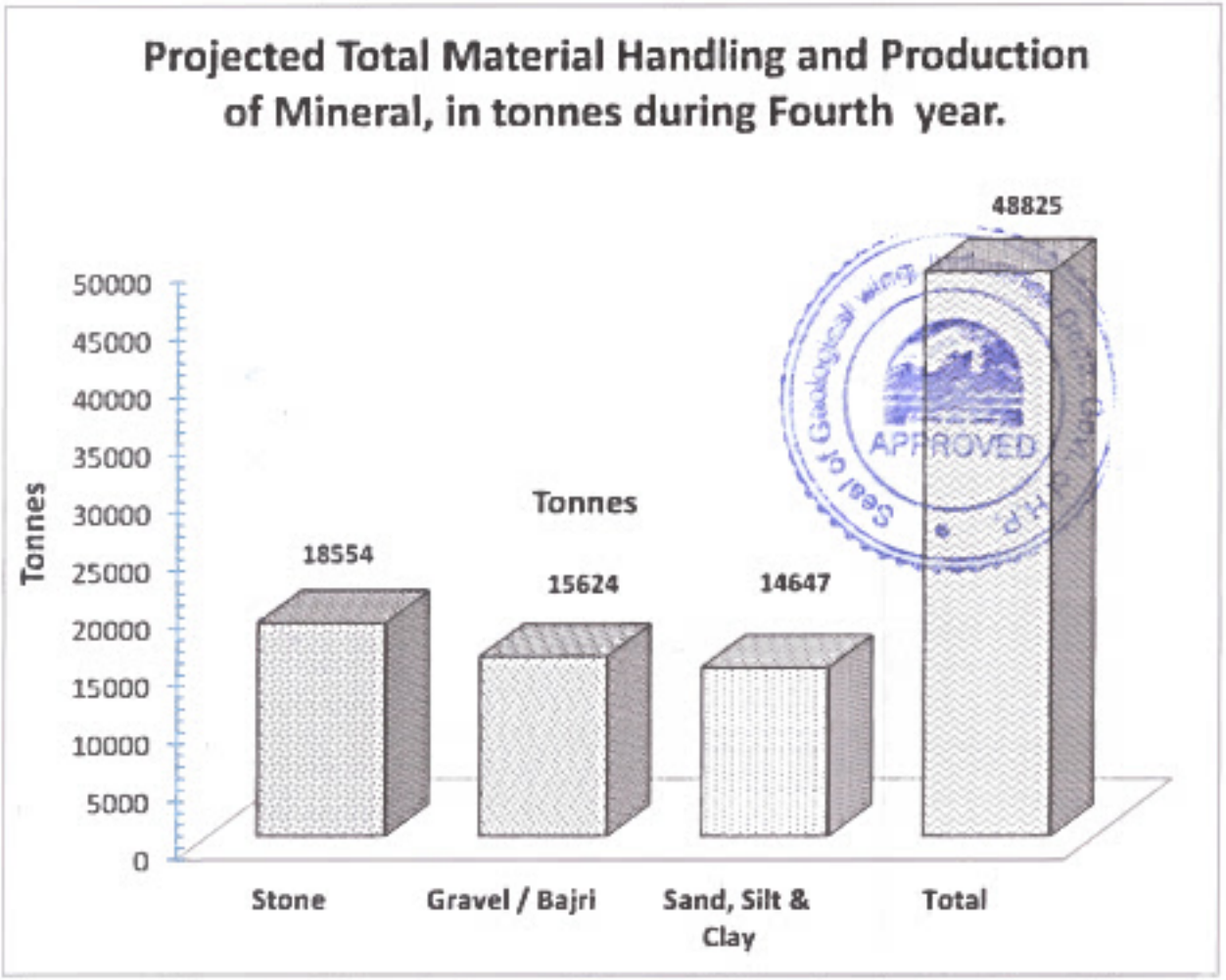


Figure 18- Proposed Production and Material Handling in the Fourth Year of Mining.

4.2 e Development and Production at end of fifth Year.

During 5th year of development and production programme:

- ✓ Mining of 48825 tonnes of material is proposed to be mined from 21700 square meters of safe mining area out of 40969 square metres of leased block.
  - ➢ 18554 tonnes of stone and 15624 tonnes of bajri will be produced and dispatched to dedicated stone crushers.
  - ➢ 14647 tonnes of sand with inseparable silt & clay will be produced and dispatched to construction sites of the project.
  - ➢ About 15 percent of the leased Area falls outside the river corridor hence plantation can be undertaken in the 1st year at P.
  - ➢ More than 85 percent of the leased Area falls within the river corridor, *in situ* rocks form both the banks, therefore retaining walls are proposed marked C-6 on plate 3.

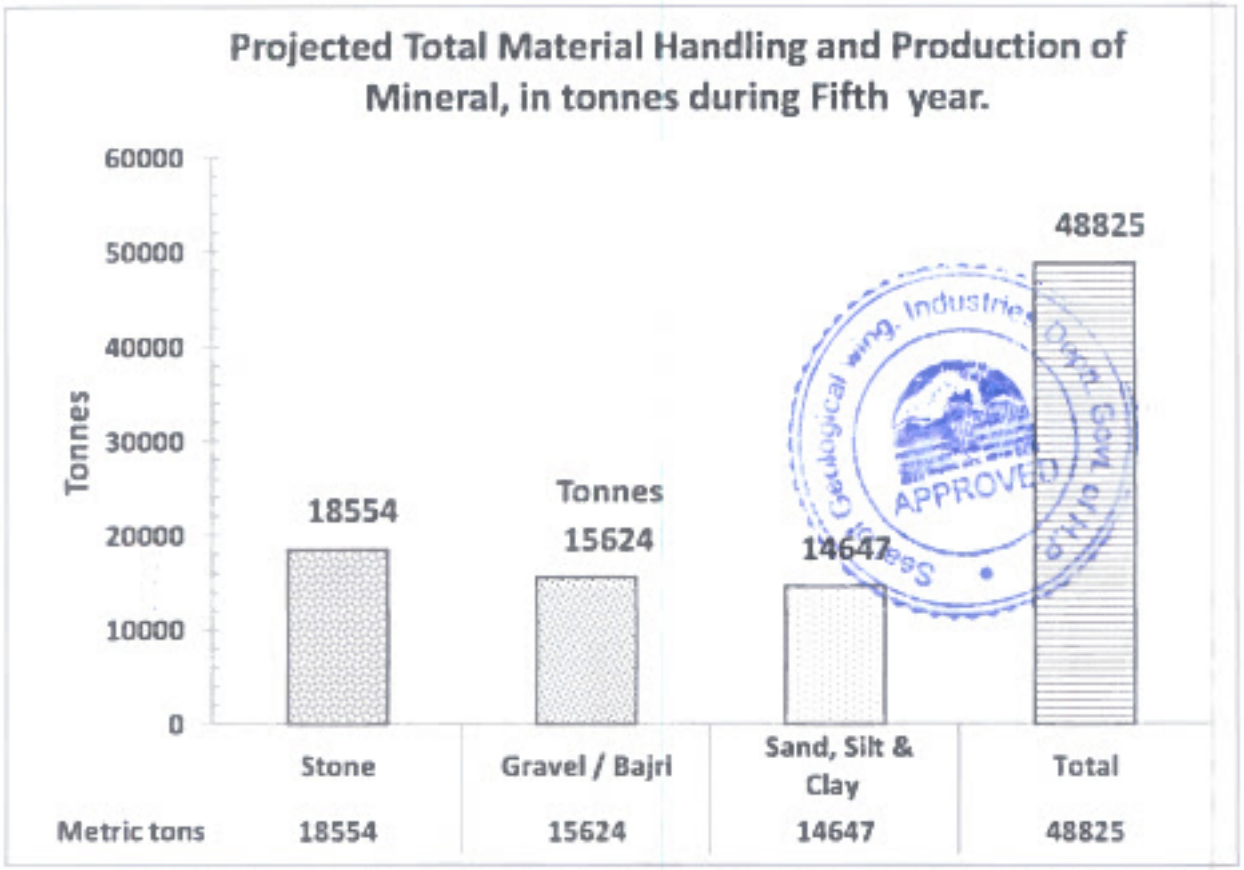


Figure 19- Proposed Production and Material Handling in the Fifth Year of Mining.

4.3 End Use of Mineral

The extracted mineral stone, sand and Bajri for will consumed in the Project construction activities.

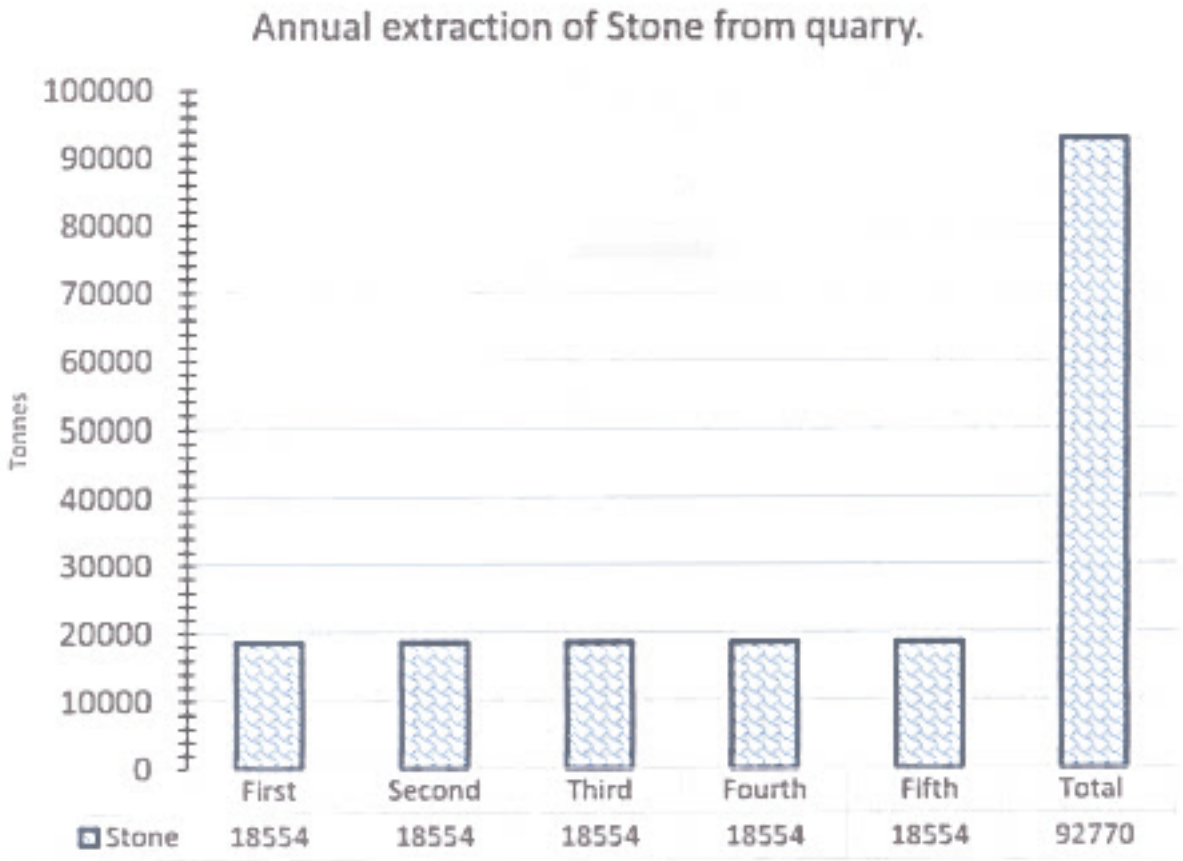


Figure 20: Year wise production of Stone.

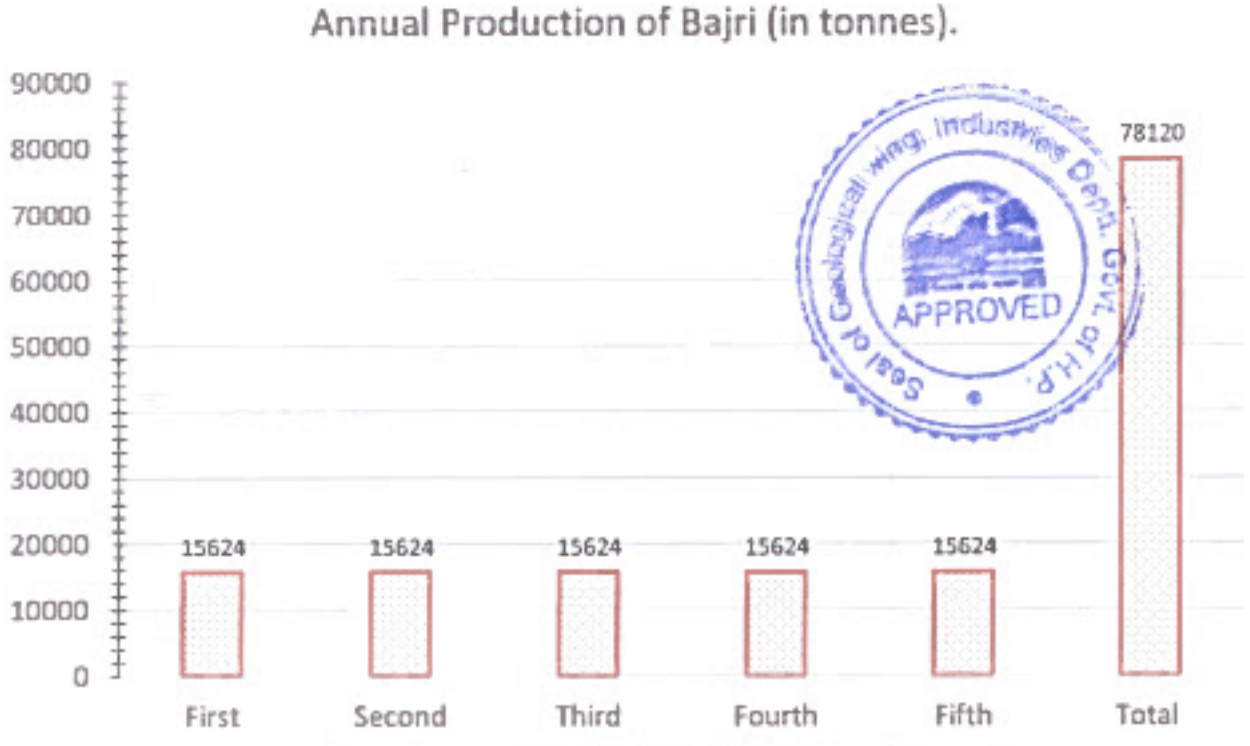


Figure 21: Annual Production of Bajri.

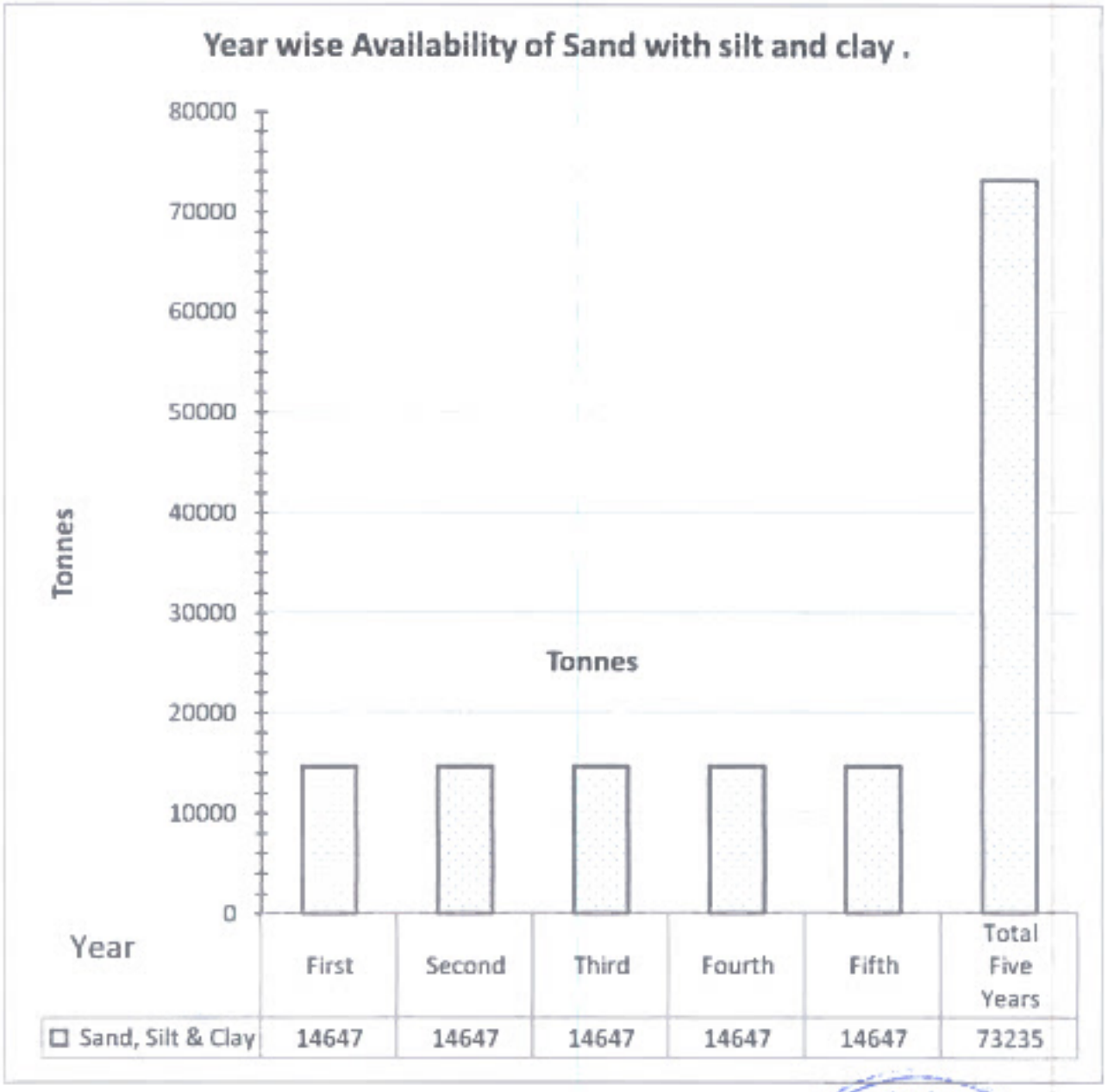


Figure 22: Annual production of sand along with silt & clay

4.4 Detail of road Transport

The maximum total extraction of minerals stone, sand and bajri for use in the Project would be 48825 tonnes or 180 Tonnes per day, considering 270 working dry days. Thus, about 20 tipper truck trips would be required to move the material from quarry to crusher / construction sites. The track through River is about 200 metres from the leased area to roadside. The evacuation route is shown in figure 23.

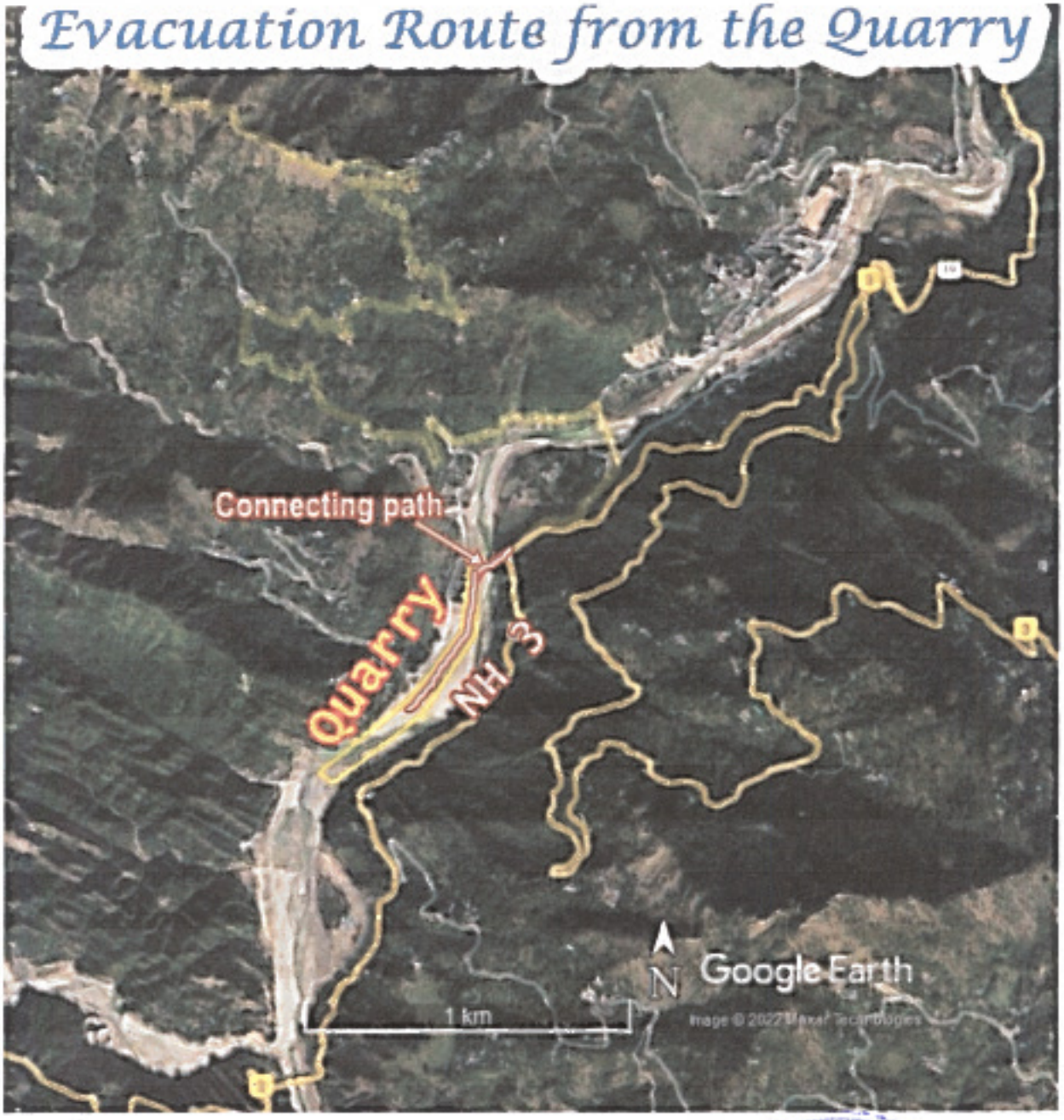


Figure 23. Evacuation route Map

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

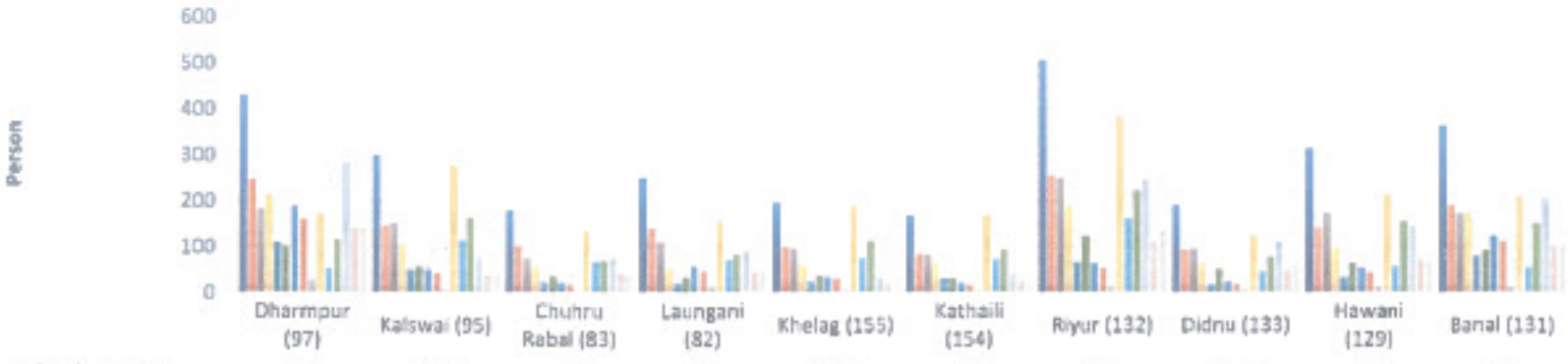
1.1. Demography of the area

The total population of the surrounding area, as per the 2011 Census is given below in the figure 24. Education wise and employment wise break of population in surrounding villages is given in figure 25. The population details of Mandi District and sub tehsil Dharampur is given in figure 26.

Village	Dharmpur (97)	Kalswai (95)	Chuhru Rabal (83)	Laungani (82)	Khelag (155)	Kathaili (154)	Riyur (132)	Didnu (133)	Hawani (129)	Banal (131)
Total House Hold	168	85	62	73	70	54	165	62	115	124
Population	643	405	235	303	257	229	694	257	411	536
Male	357	197	125	160	123	115	323	111	175	270
Female	286	208	110	143	134	114	371	146	236	266
Schedule Caste	87	65	93	63	90	105	242	31	138	44
SC_Male	41	27	48	27	43	54	106	13	58	22
SC_Female	46	38	45	36	47	51	136	18	80	22
Schedule Tribe	16	0	0	1	0	0	0	0	0	0
ST_Male	9	0	0	1	0	0	0	0	0	0
ST_Female	7	0	0	0	0	0	0	0	0	0

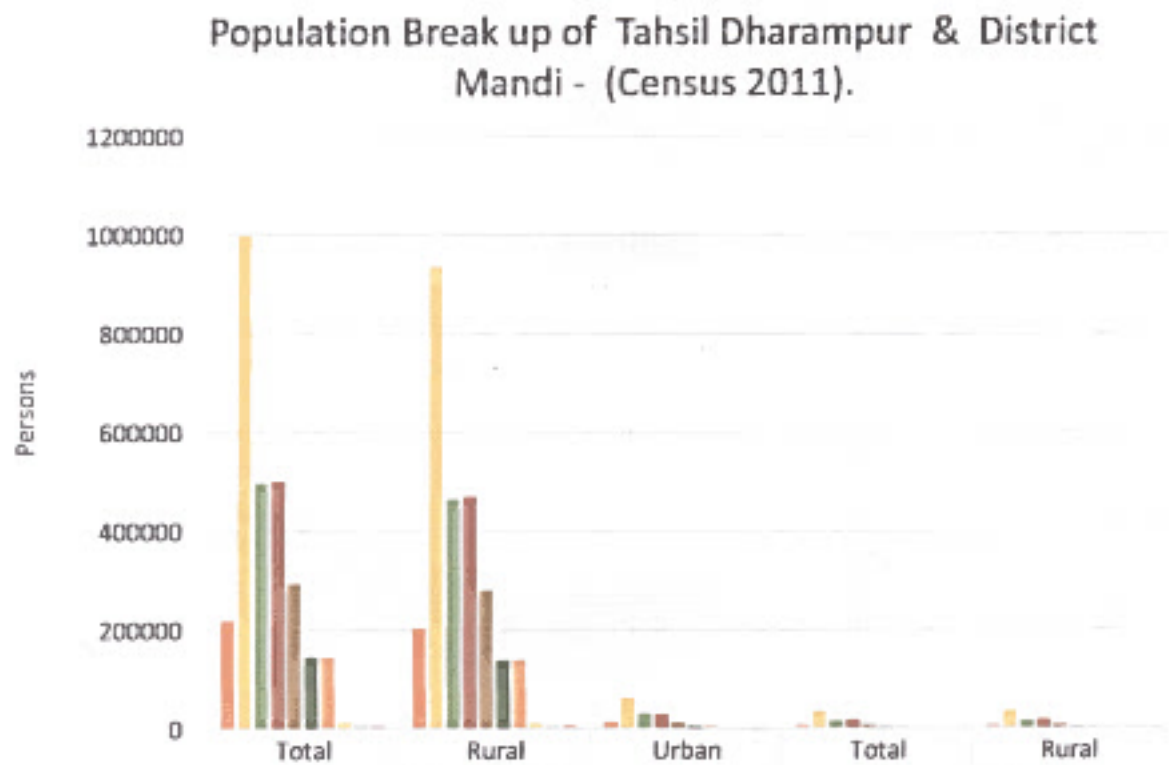
Figure 24; Population of the villages of the zone of influence.

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



	Dharmpur (97)	Kalswai (95)	Chuhru Rabal (83)	Laungani (82)	Khelag (155)	Kathaili (154)	Riyur (132)	Didnu (133)	Hawani (129)	Banal (131)
Total Literate	429	298	177	249	195	166	505	190	314	363
Male Literate	246	147	102	140	99	84	256	94	142	190
Female Literate	183	151	75	109	96	82	249	96	172	173
Total Illiterate	214	107	58	54	62	63	189	67	97	173
Malel Illiterate	111	50	23	20	24	31	67	17	33	80
Female Illiterate	103	57	35	34	38	32	122	50	64	93
Total Workers	188	50	22	57	33	21	66	23	55	123
Male Workers	160	44	17	46	29	16	52	17	43	111
Female Workers	28	6	5	11	4	5	14	6	12	12
Marginal Workers	123	278	137	155	190	167	383	125	213	209
Marginal Workers M	56	115	68	71	77	74	161	47	58	56
Marginal Workers Fe	117	163	69	84	113	93	222	78	155	153
Non Workers	283	77	76	91	34	41	245	109	143	204
Non Workers M	142	38	40	43	17	25	110	47	74	103
Non Workers Fe	141	39	36	48	17	16	135	62	69	101

Figure 25: Break up of literacy and employment of Population in Surrounding Villages (Census 2011).



	Mandi District			Dharampur Tahsil	
Household	219145	203747	15398	8292	8292
Population	999777	937140	62637	34777	34777
Male	498065	466050	32015	16550	16550
Female	501712	471090	30622	18227	18227
Schedule Caste	293739	280580	13159	8463	8463
SC_Male	147250	140605	6645	4087	4087
SC_Female	146489	139975	6514	4376	4376
Schedule Tribe	12787	12359	428	23	23
ST_Male	6345	6114	231	14	14
ST_Female	6442	6245	197	9	9

Figure 26: 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 area 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 27 there is moderately high percentage of *unemployed (33.49%)* and *underemployed (51.19%)* people in the area despite moderately high level of literacy, (71.94% literates, figure 28) of literacy.

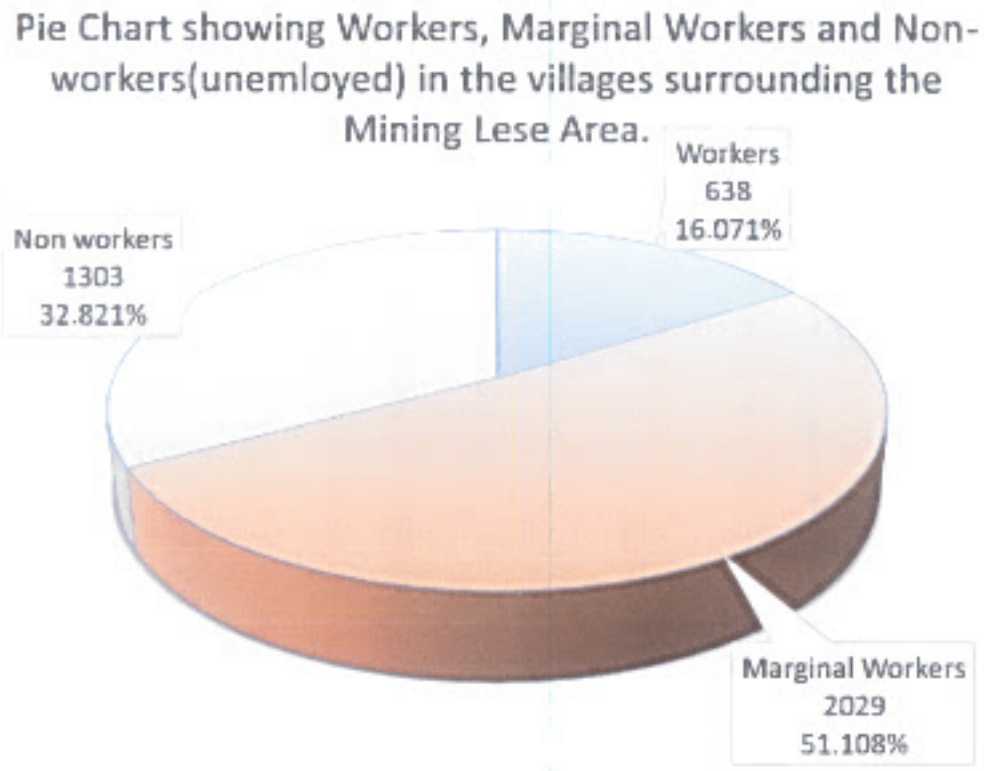


Figure 27: Employment percentage in adjoining villages.

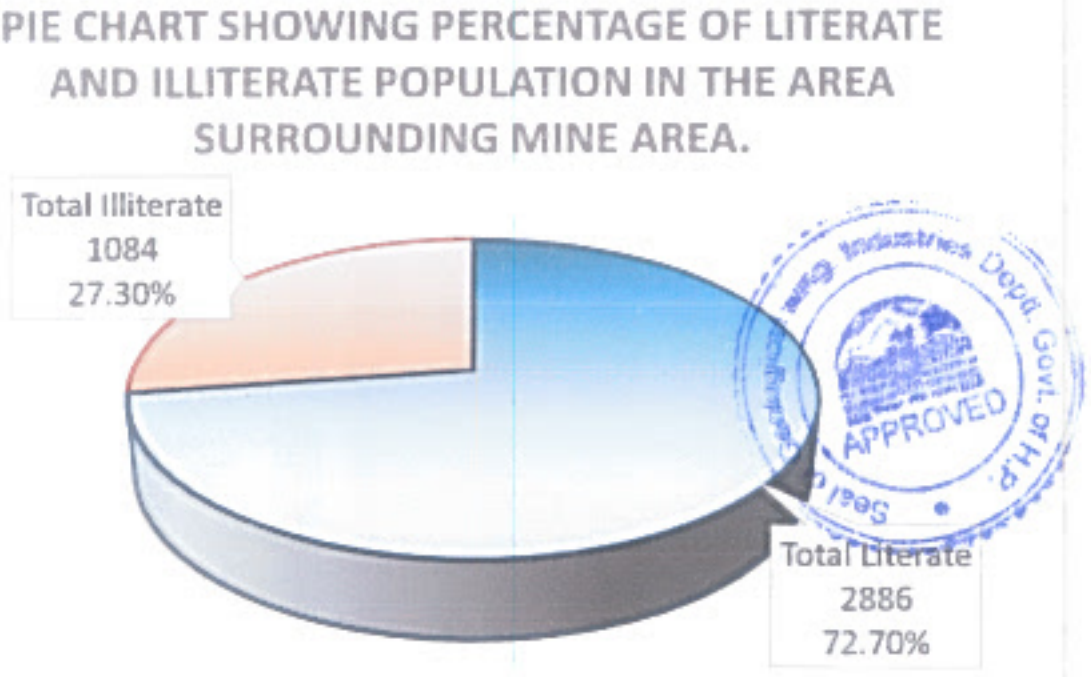


Figure 28: showing Percentage of literate and illiterate POPULATION in the Surrounding mine area

1.3. Land Use Pattern

Primarily the land of the district can be classified in following 6 categories as shown in figure 29.

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

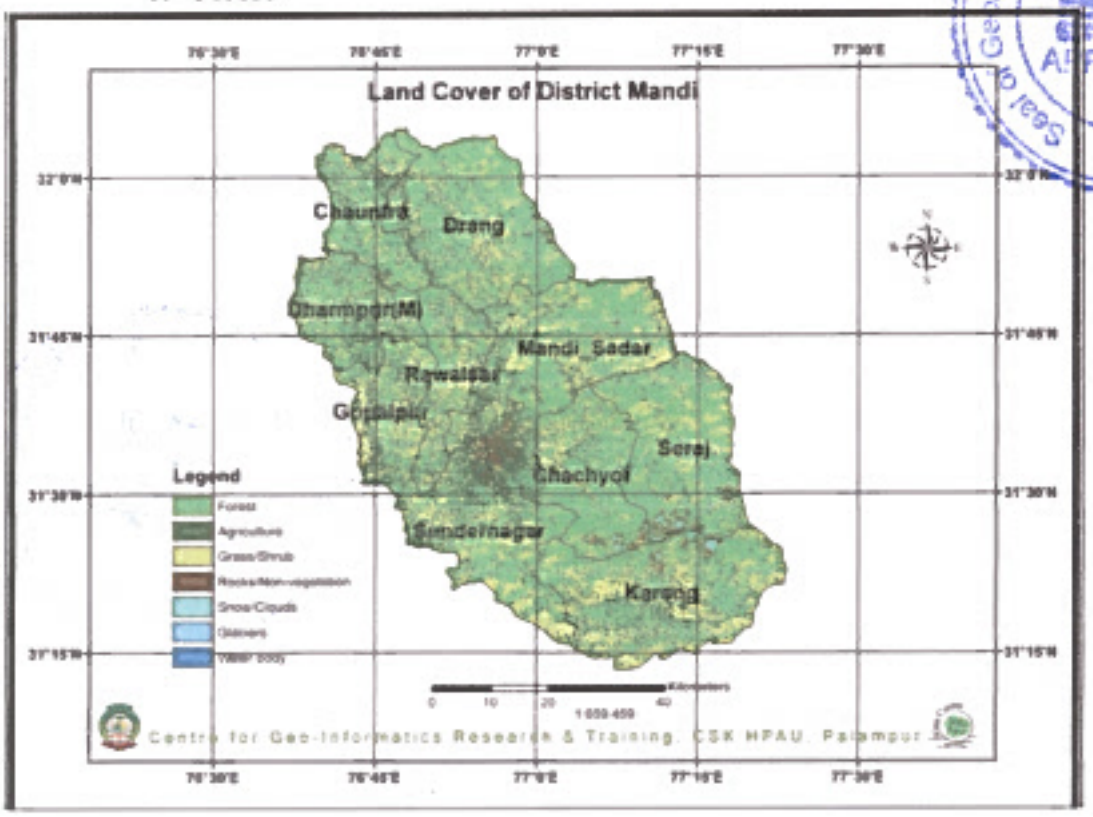
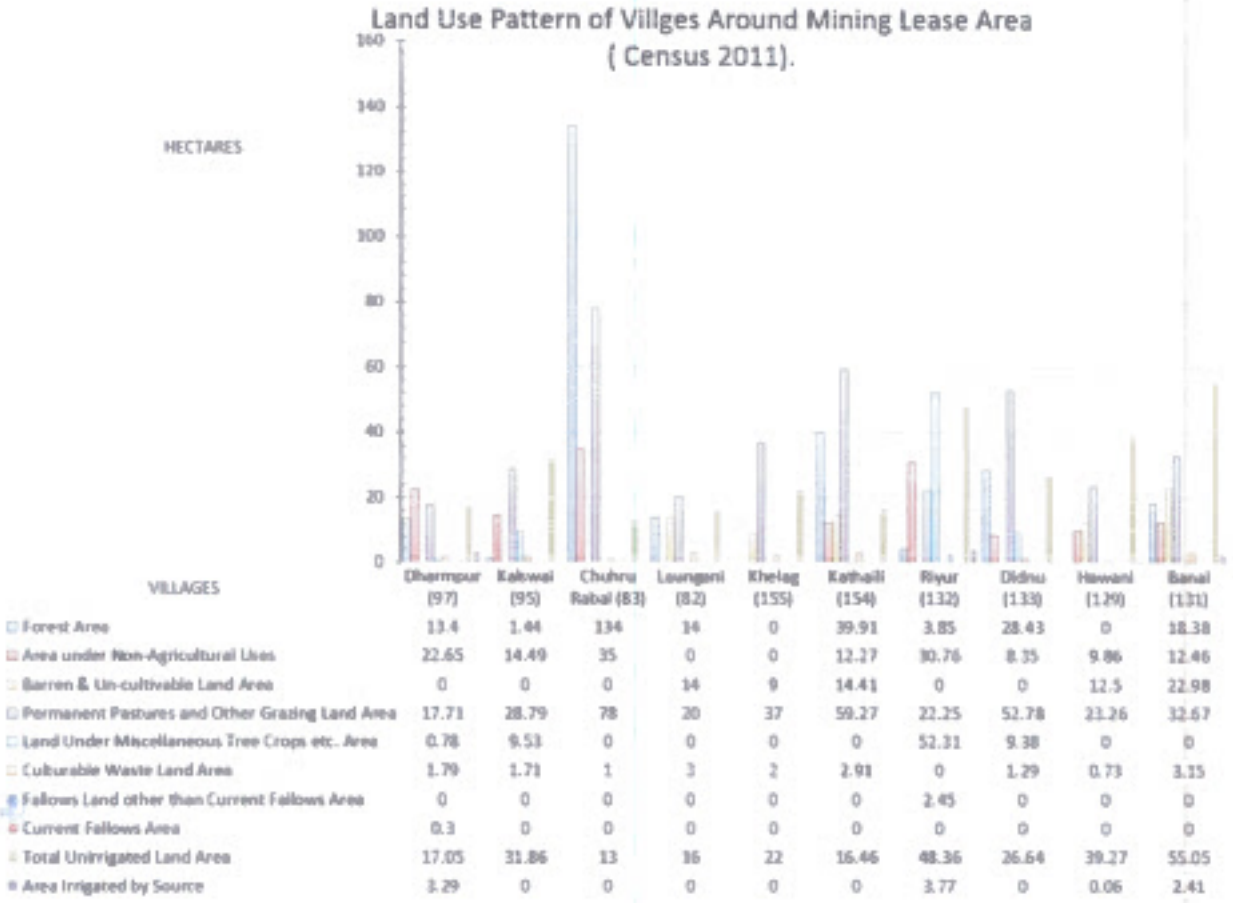


Figure 29: Showing General Land Use Pattern of the District Mandi.

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



	Dharmpur (97)	Kalowai (95)	Chuhru Raibal (83)	Loungani (82)	Khelag (155)	Kathaili (154)	Riyur (132)	Didnu (133)	Hawani (129)	Banal (131)
Forest Area	13.4	1.44	134	14	0	39.91	3.85	28.43	0	18.38
Area under Non-Agricultural Uses	22.65	14.49	35	0	0	12.27	30.76	8.35	9.86	12.46
Barren & Un-cultivable Land Area	0	0	0	14	9	14.41	0	0	12.5	22.98
Permanent Pastures and Other Grazing Land Area	17.71	28.79	78	20	37	59.27	22.25	52.78	23.26	32.67
Land Under Miscellaneous Tree Crops etc. Area	0.78	9.53	0	0	0	0	52.31	9.38	0	0
Culturable Waste Land Area	1.79	1.71	1	3	2	2.91	0	1.29	0.73	3.15
Fallows Land other than Current Fallows Area	0	0	0	0	0	0	2.45	0	0	0
Current Fallows Area	0.3	0	0	0	0	0	0	0	0	0
Total Unirrigated Land Area	17.05	31.86	13	16	22	16.46	48.36	26.64	39.27	55.05
Area Irrigated by Source	3.29	0	0	0	0	0	3.77	0	0.06	2.41

Figure 30: Showing Land Use Pattern of villages around the mining lease area.

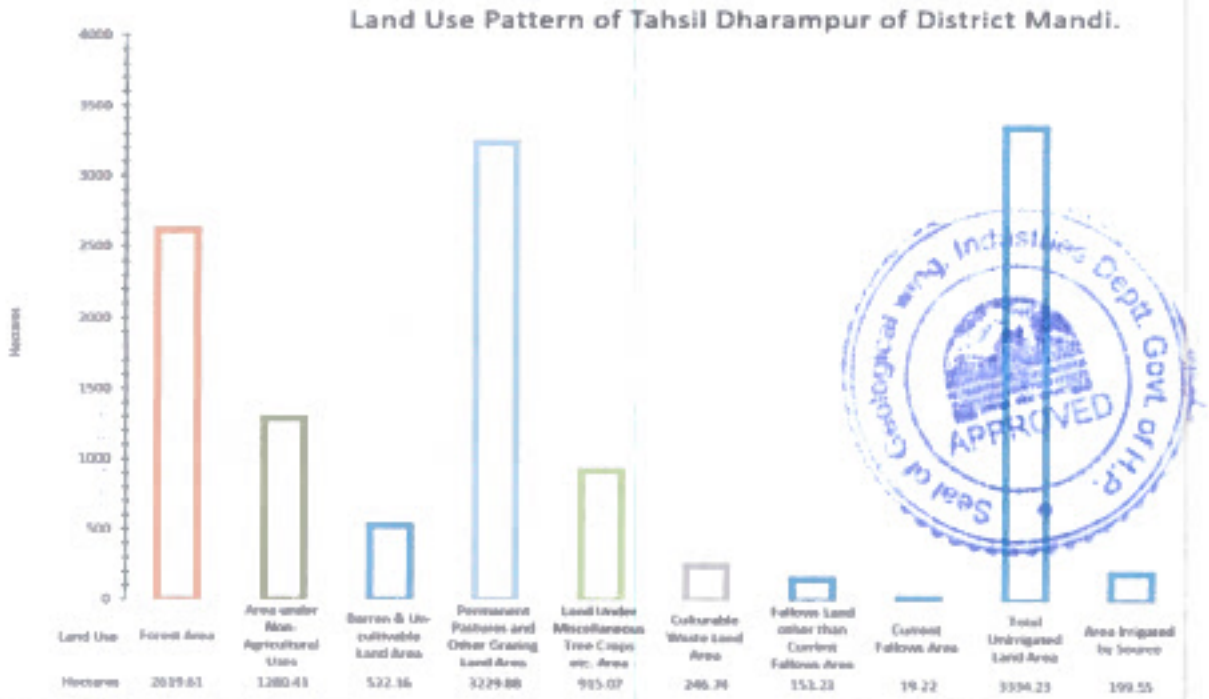


Figure 31: Land Use Pattern of Tahsil Dharmpur of District Mandi.

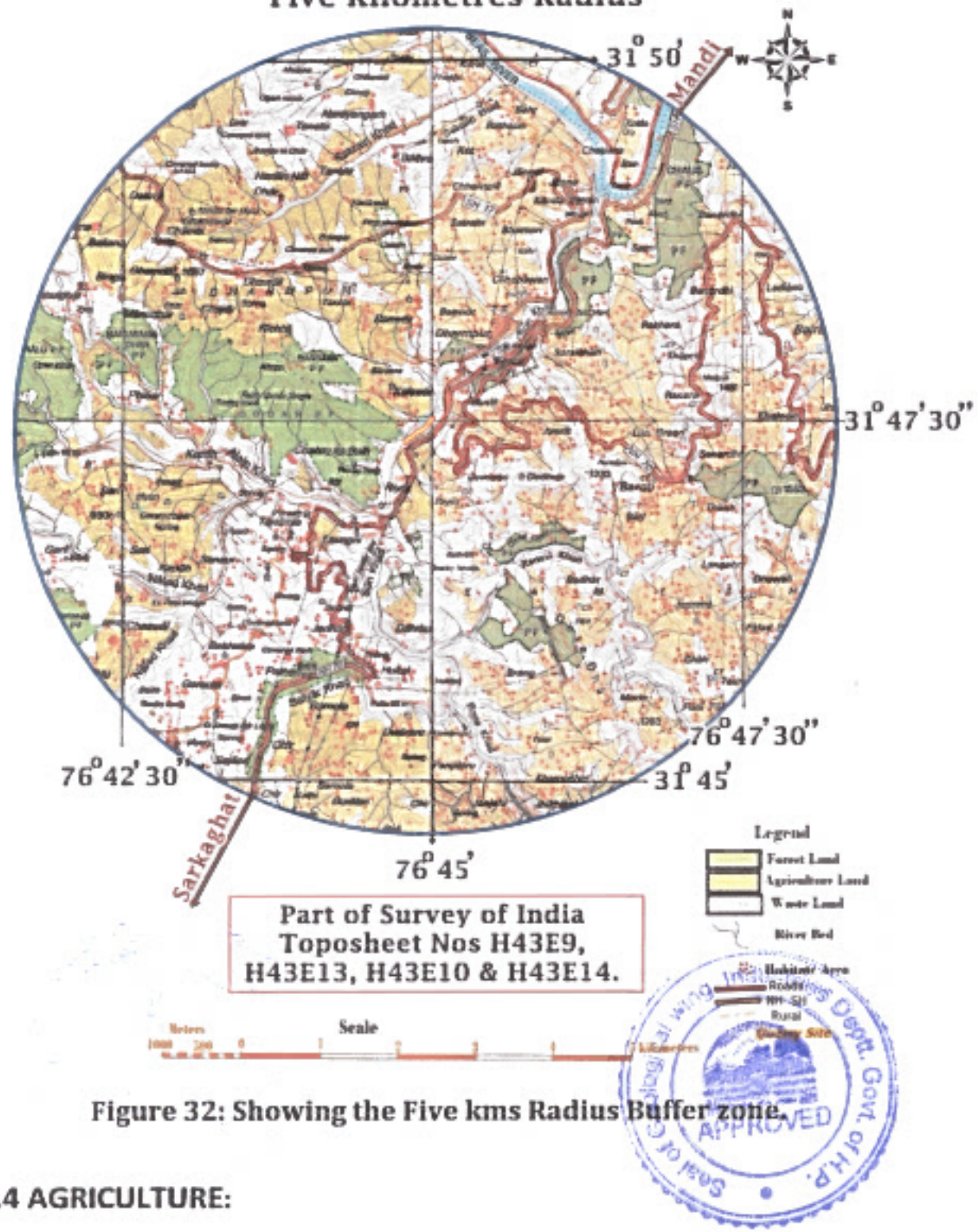


Figure 32: Showing the Five kms Radius Buffer zone.

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 steams, 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: -33.

Figure: -34 show production of agriculture produces in district Mandi. The area under vegetables and their production is given in the figure: -35.

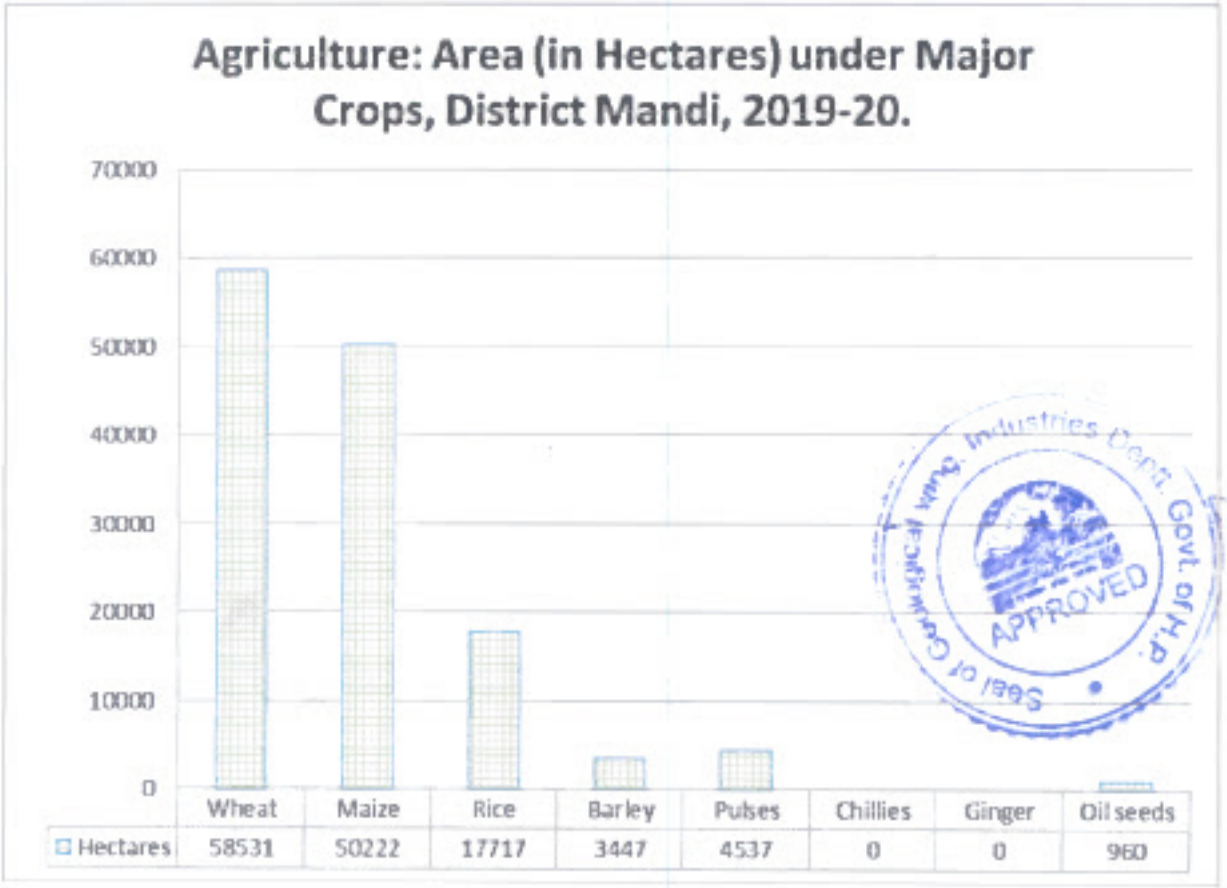


Figure 33: : Showing area under different crops in Mandi District.

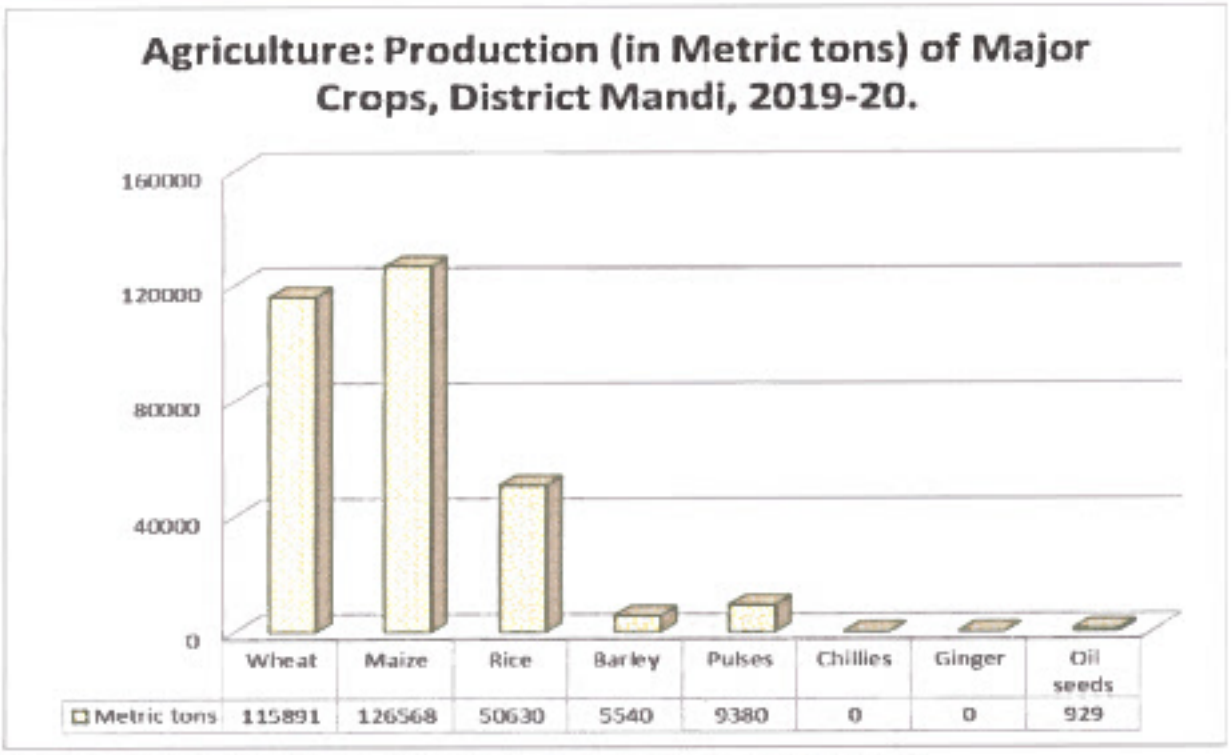


Figure 34 Showing production of each crop in District Mandi.

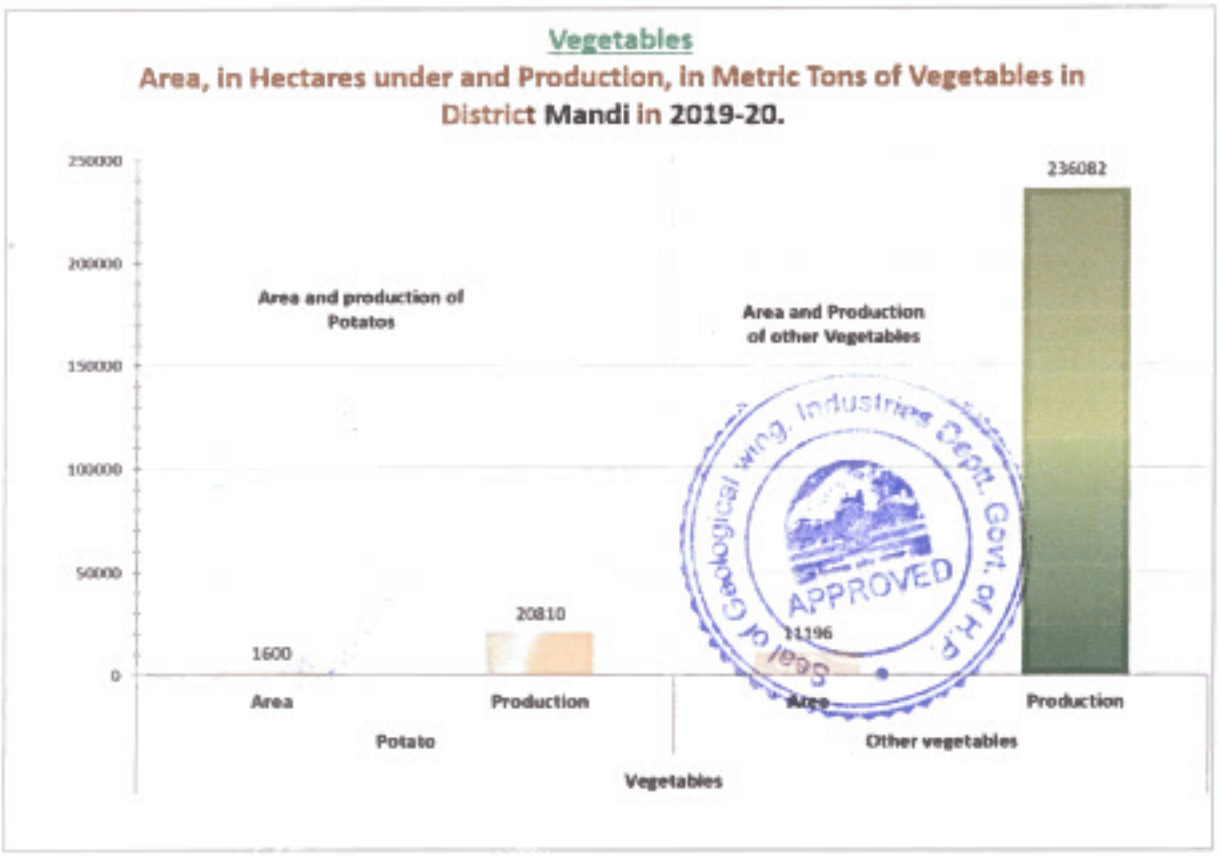


Figure 35: Showing area under vegetable, in Hectare and Production, in Metric tons, of District Mandi.

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	0
Persimmon	252	88
Olive	298	6
Kiwi	29	22

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: -36. The population of the Buffaloes and Cattle in District Mandi is given in the figure: -37.

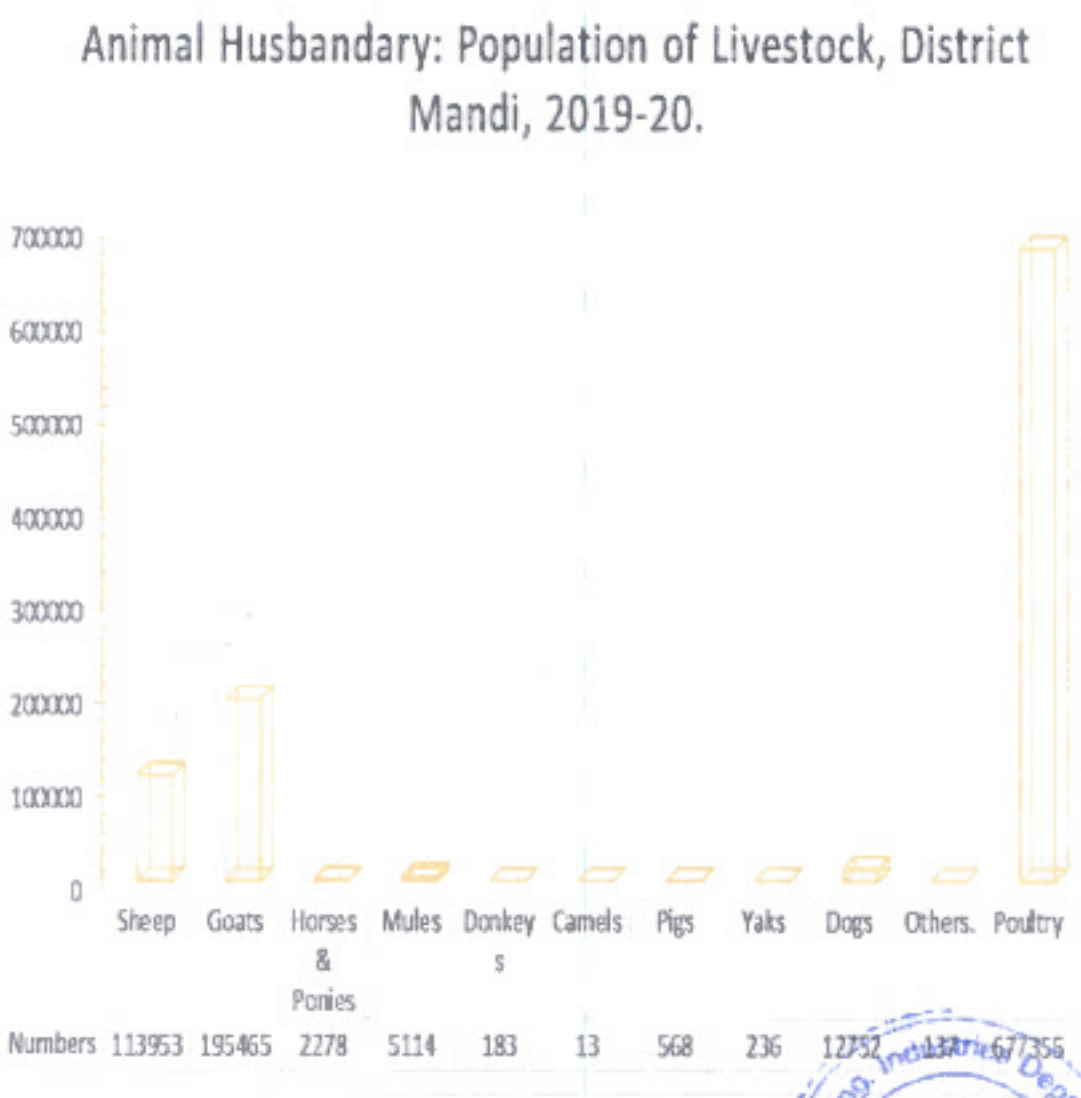


Figure 36:Livestock population of District Mandi

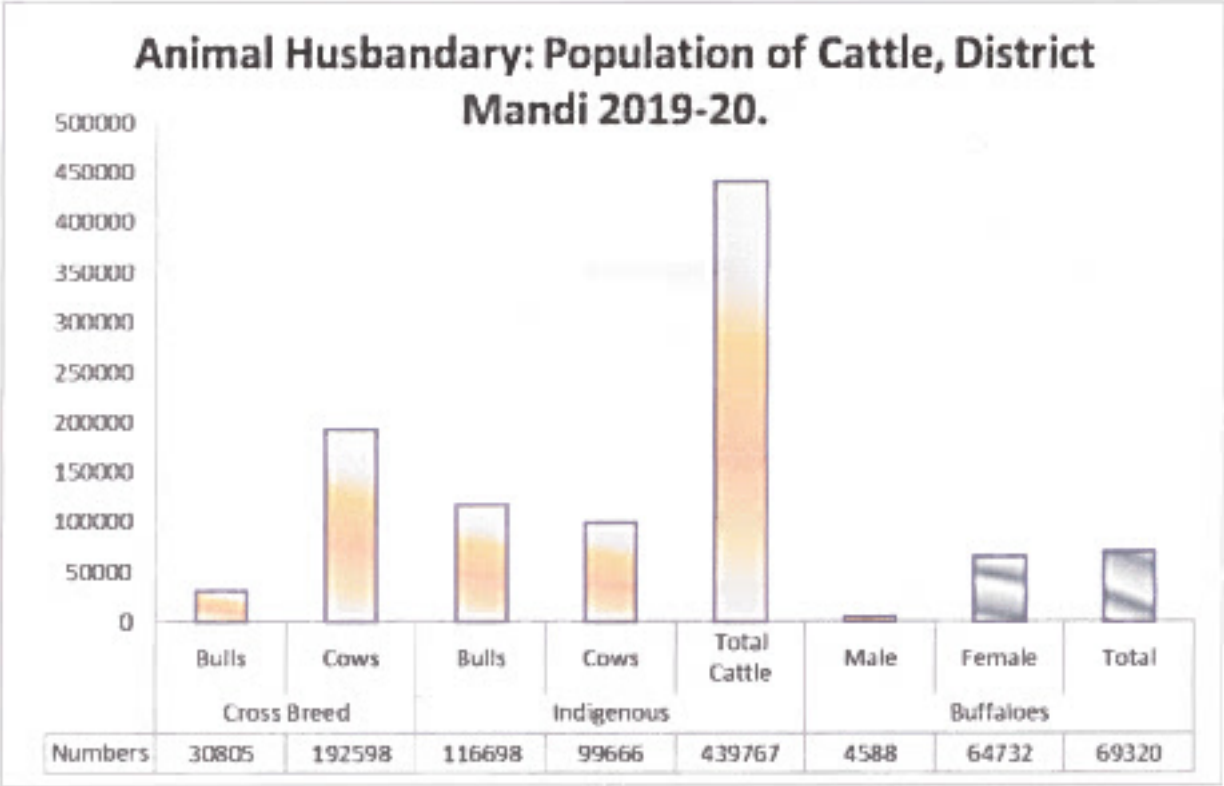


Figure 37: Showing Population of Cattle Buffaloes in District Mandi.

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 satluj 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.

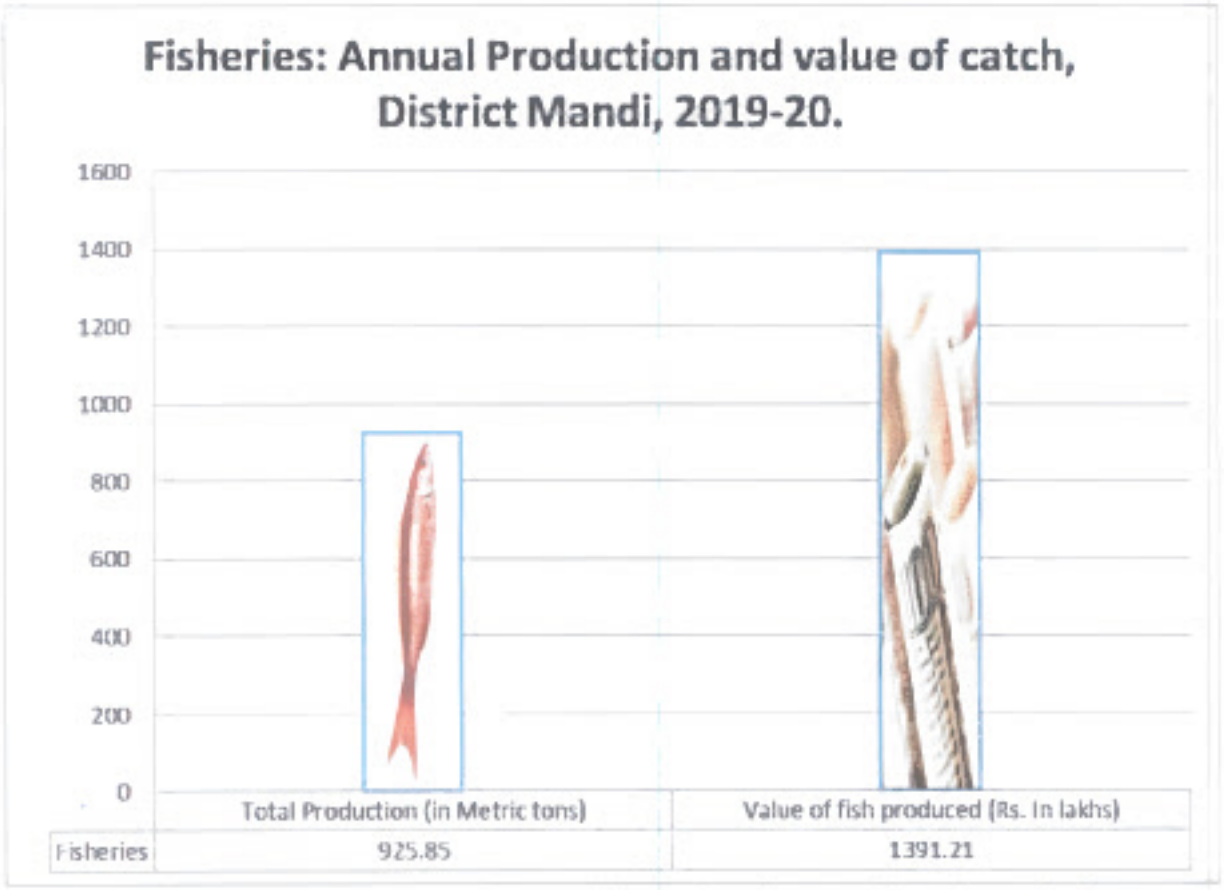


Figure 38: Showing Fish catch / production and its sale value in 2016-17.

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 (Bombex malabaricum),
Mango (Magniferaindica)
Tun (Cedrela toana)
Several species of acacia and albizia

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 Berberis, Indigofera and Desmodium and following other shrubs are also found.

1. Vitex
2. Munj
3. Ber
4. Ipomea
5. Dodonaea &
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**
Milvus migrants	Vulture	Cheel, Gidh, Eell
Eudynamys scolopacca	Koel	Koel
Columbia livia	Pigeon	Kabuttar
Coracias bengalensis	Blue jay	Nilkantha

Colums livia	Hawk	Baj
Francolius francolinus	Black partridge	Kala Tittar
Francolius pondicerians	Grey partridge	Safed Tittar
Payo crisslatus	Peacock	Mor
Coturnix colurnix	Common quail	Bater
Alectoris graeca	Chakor	Chakor
Crovus splendens	Crow	Kanwa
Prottocula Korneri	Parrot	Totta
Tragopan melanocephalus	Western horned Tragopan	Phulgar/Jujurana
Picoides macei	Fulvourbreasted Pied Woodpecker	Kathfowra
Streptopelia decaocto	Ring dove	Gughi
Streptopelia chinesis	Spotted dove	Gughi
Accipiter badius	Shikra	
Aquila rapax vindhian	Tawny eagle	
Ducula bicolor	Green Pigeon	
Parus rufonuchalis	Tits	
Picus canus	Black napped Woodpecker	Woodpecker
Drycocopus javensis	Woodpecker	
Muscicapa subrubra	Himalayan Fly Catcher	
Acidotheres tristis	Common Myna	Ghatari
Terpsiphone paradisi	Paradise flycatcher	Choti- Pinja
Passer domesticus	House sparrow	
Carduelis spinoides	Himalayan Green Finch	China

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Table 7

Mammals in Mandi

Zoological Name	English Name	Common Name
Felis bengalensis	Leapard Cat	Mirag, Bagh
Felis Chane	Jungle Cat	Jangli Billi

Muntucus muntisk	Barking Dear	Kakkar
Vaulpes bengalensis	Fox	Lomari, Fohiki
Camis aureus	Jackal	Gidder
Macaca mulatta	Ressus monkey	Lal Bander
Preshytes entellus	Languor	Languor
Sus sacrofa	Boar	Suar
Hystrix indica	Porcupine	Sehal
Lepus nigricoilis	Hare	Khargosh, Sherru, farru
Moschus moschifarus	Musk deer	Kastura
Capra ibex Ibex	Ibex	
Hemitragus jemlahicus	Himalayan Thar	Thar
Selenarctos thebatanus	Black Bear	
Ursus arctos	Brown Bear	
Panthera unica	Snow leopard	
Sus scrofa	Wild Boar	
Axis axis	Spotted deer	Chital
Cervus unicolor	Samber	
Hylopetes fimbriatus	Flying squirrel	
Panthera pardus	Leopard	Cheetah
Felis chaus	Jungle cat	
Paradoxurus hermaphroditus	Indian Civet	Sakralu
Hipposideros armiger	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

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

- Leopard (Bagher)
- Hare
- Wild Bore (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 rainfall records available with the District Collectors office from 2004 to 2014 are depicted in the figure 7.

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	**Dec. – March**
Summer/Pre-monsoon	**April- May**
Monsoon	**June- September**
Post Monsoon/ Autumn	**October- November**

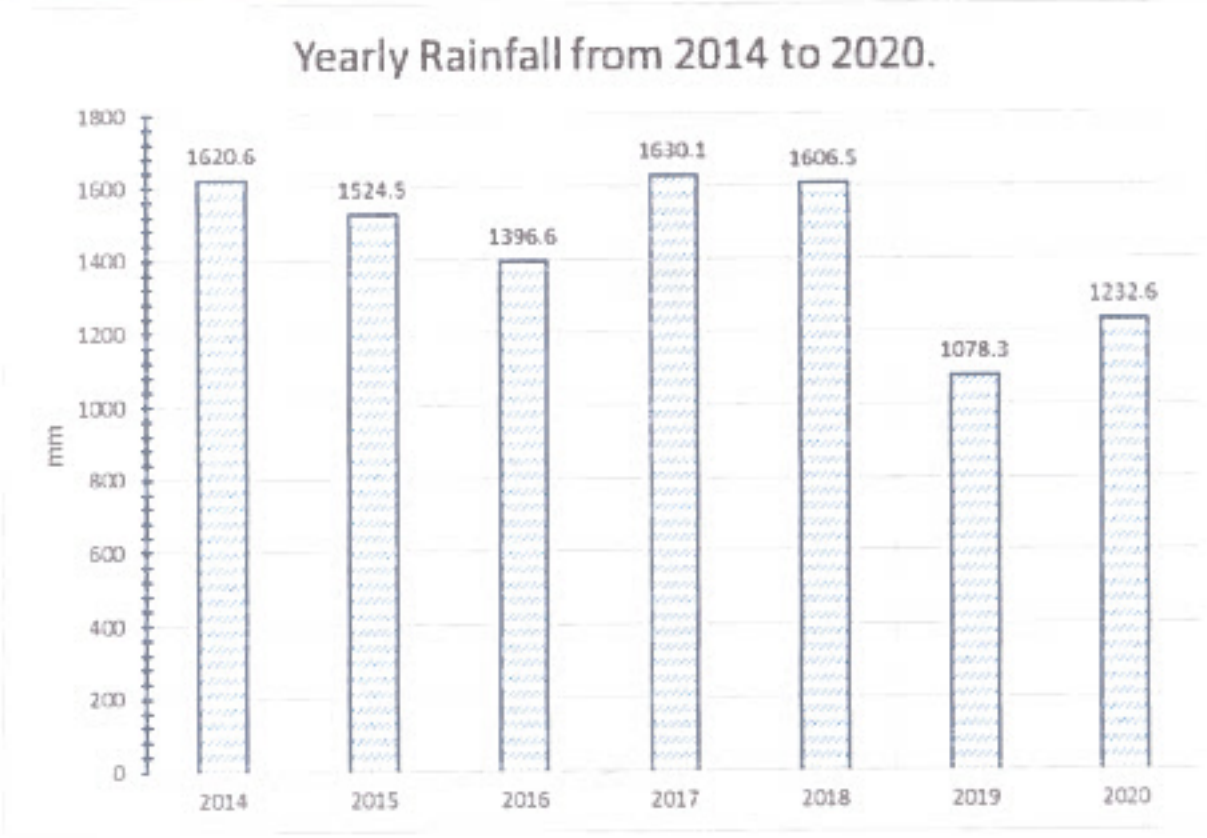


Figure 39:Yearly Rainfall from year 2014 to 2020.

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 648 metre above mean sea level.
- The lowest point is at 642 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 21700 square metres safe 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 180 tonnes of stone, Bajri and sand with silt-clay per day.
- 20 tipper truck trips will be able to move the required material from mine to crusher / Project sites.
- This activity would generate very 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 20 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. 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 30 persons directly and indirectly, in mining, transportation, and crushing unit.

2.10 Transport of Mineral

From Quarry to Road heads towards NH3 is about 200m through the Khad track. The mined material is transported through tracks made in the river. About 180 metric tonnes of material shall be transported per day with an average of 20 tipper truck trips. The movement of 20 tipper truck tips would have hardly any impact on traffic on NH 3 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 648 metre above mean sea level.
- The lowest point is at 642 m above MSL.
- The mining shall be confined to well within the riverbed corridor.
- No mining near the banks up to 1/10thof its width is to be undertaken as per guidelines, i.e. 9 to 18 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 mostly rocky condition of riverbanks, only small check walls are required to be constructed on the left bank and are shown as C-1 to C-5 in the plate 3.

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 foods during monsoon period and where no grass growth is possible, as such mining area cannot 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	5	2000
Second	50	5	2000
Third	50	5	2000
Fourth	50	5	2000
Fifth	50	5	2000
Total	250	25	10000

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 no 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. Worker are mainly required in riverbed mining for extraction and loading of riverbed material into tipper truck and tractor trolleys. Drivers for tippers and tractors will be another category of workers. Thus, employment potential is as given below.

Munshi 1
Drivers 3
Unskilled workers 17
Thus, total generation of Employment will be to a tune of 20 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 Son Khad, for Stone, bajri and sand situated in Khasra No. 1291 & 1 measuring 4.0969 Hectares, Mauza/Mohal Banal & Riyur, 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**

General Manager
TM & TP HEPs HPPCL
Kotli, Distt. Mandi (H.P.)

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. 1291 & 1, measuring 1.5452 Hectares, Mauza - Banal & Riyur, Tehsil Dharampur & District Mandi, of The General Manager, Triveni Mahadev & Thana Plaun HEP's, Himachal Pradesh Power Corp.Ltd., Tehsil Kotli, Distt. 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

Seal of Geological wing, Industries Deptt. Govt. of H.P. APPROVED

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

Plate 1

BOUNDARY, DISTRICT . . . .
- TAHSIL/SUB-TAHSIL . . .
DISTRICT HEADQUARTERS . . . . . .
TAHSIL/SUB-TAHSIL HEADQUARTERS . . . . . .
NATIONAL HIGHWAY . . . .
STATE HIGHWAY . . . .
IMPORTANT METALLED ROAD . . . .
RAILWAY LINE WITH STATION, NARROW GAUGE . . . .
RIVER AND KHAD . . . .
TOWNS . . . .

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

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

Plate 4

Land Cover & Lnd Use Map of Survey of India Buffer Zone Five Kilometres Radius

Part of Survey of India Toposheet Nos H43E9, H43E13, H43E10 & H43E14.

essee
he General Manager
riveni Mahadev & Thana Plaun HEP's,
imachal Pradesh Power Corp.Ltd.,
ehsil Kotli, Distt. Mandi

Jhumpa L. Jamwal
HP/RQP/21/1/2016

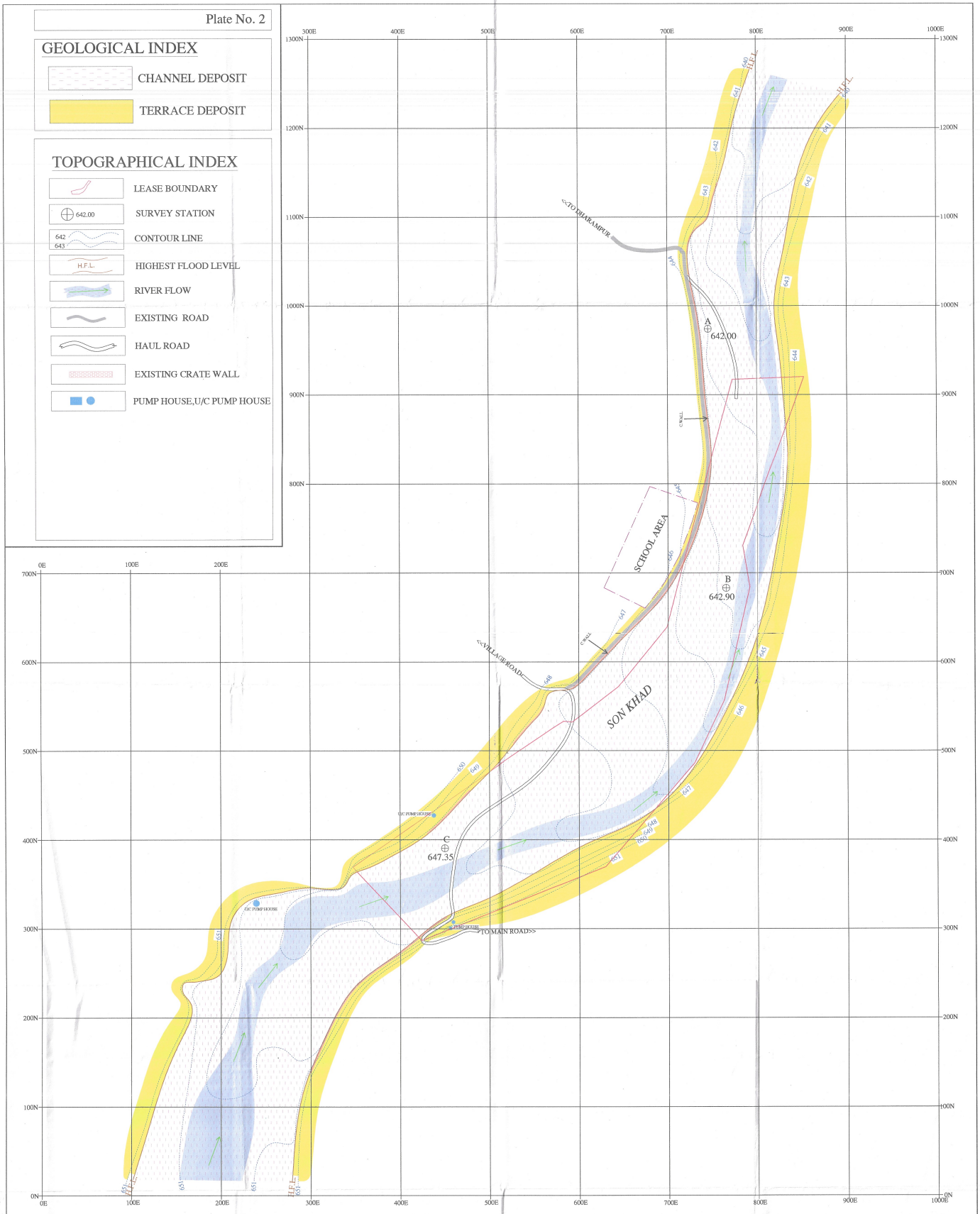
Plate No. 2

GEOLOGICAL INDEX

- CHANNEL DEPOSIT
- TERRACE DEPOSIT

TOPOGRAPHICAL INDEX

- LEASE BOUNDARY
- 642.00 — SURVEY STATION
- 642 / 643 — CONTOUR LINE
- H.F.L. — HIGHEST FLOOD LEVEL
- RIVER FLOW
- EXISTING ROAD
- HAUL ROAD
- EXISTING CRATE WALL
- PUMP HOUSE,U/C PUMP HOUSE



M/S TM & TP HEP'S, HPPCL.(SON KHAD Q-1.	
APPLIED BY	THE GENERAL MANAGER, TRIVENI MAHADEV & THANA PLAUN HEP'S, HPPCL.
SCALE	1:2000 (1 CM = 20 METERS)
CONTOUR INTERVAL	1.00 METER.

GEOLOGICAL AND SURFACE PLAN FEATURES.

COORDINATES : -

A N-31°47'42.95"
E-76°45'01.23"

B N-31°47'33.50"
E-76°45'01.90"

NORTH: -

CERTIFIED THAT THE PLAN IS CORRECT.

JHUMKA C. JAMWAL
No. HP/RQP/-1/1/2016

Geological wing, Industries Deptt. Govt. of H.P. APPROVED

Plate No. II

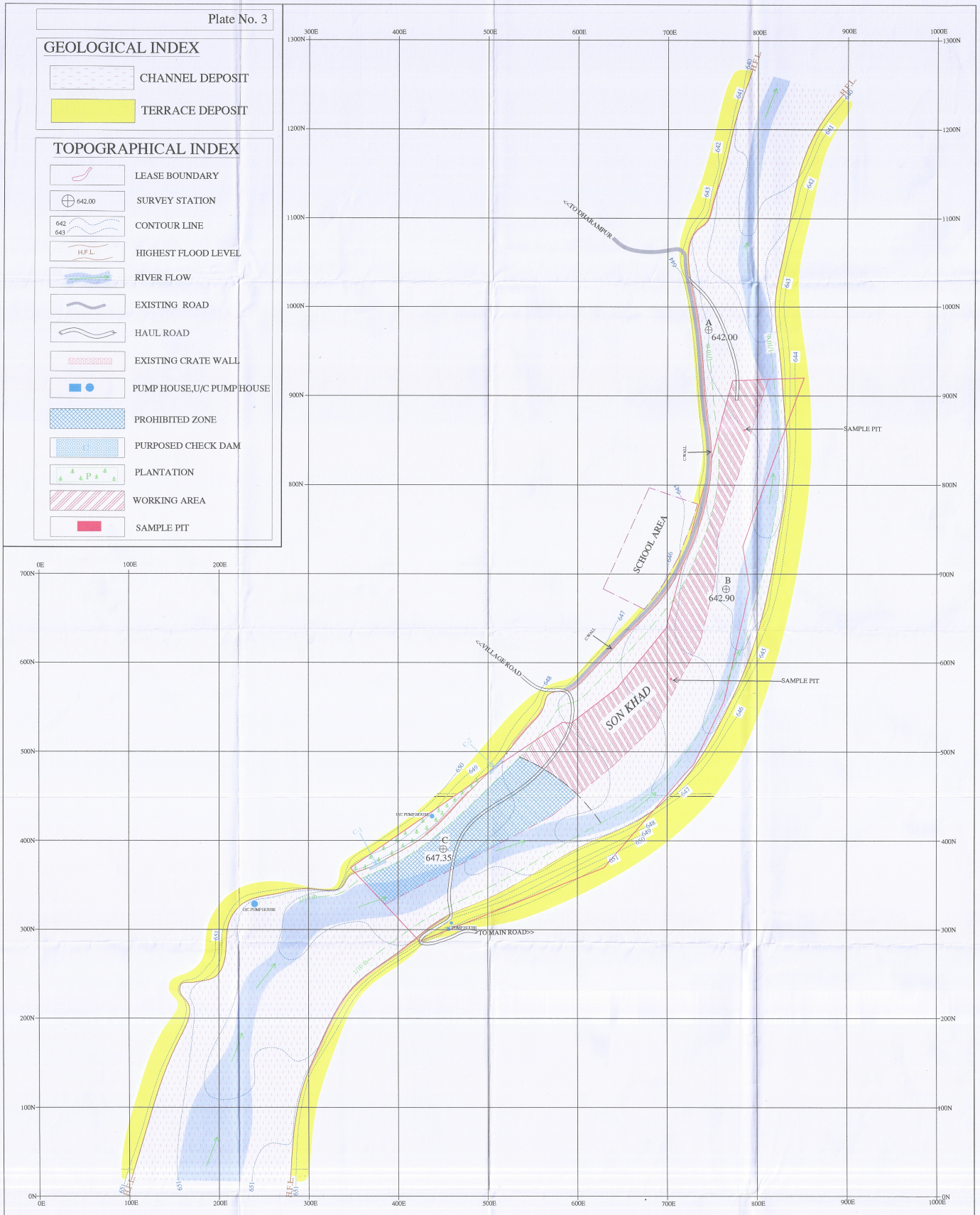
Plate No. 3

GEOLOGICAL INDEX

- CHANNEL DEPOSIT
- TERRACE DEPOSIT

TOPOGRAPHICAL INDEX

- LEASE BOUNDARY
- 642.00 SURVEY STATION
- 642 / 643 CONTOUR LINE
- H.F.L. HIGHEST FLOOD LEVEL
- RIVER FLOW
- EXISTING ROAD
- HAUL ROAD
- EXISTING CRATE WALL
- PUMP HOUSE,U/C PUMP HOUSE
- PROHIBITED ZONE
- PURPOSED CHECK DAM
- P PLANTATION
- WORKING AREA
- SAMPLE PIT



M/S TM & TP HEP'S, HPPCL.(SON KHAD Q-1.	
APPLIED BY	THE GENERAL MANAGER, TRIVENI MAHADEV & THANA PLAUN HEP'S, HPPCL.
SCALE	1:2000 (1 CM = 20 METERS)
~~CONTOUR INTERVAL~~	~~1.00 METER.~~

GEOLOGICAL PLAN SHOWING PIT POSITION AT THE 1ST TO 5TH YEAR.

COORDINATES : -

A N-31°47'42.95"
E-76°45'01.23"

B N-31°47'33.50"
E-76°45'01.90"

NORTH: -

CERTIFIED THAT THE PLAN IS CORRECT.

JHUMPA C. JAMWAL
No. HP/R-[illegible]/1/2016

Geological Wing, Industries Deptt. Govt. of H.P. APPROVED

Plate No. III