Himachal Pradesh Power Corporation Limited
(A State Government Undertaking)
Office of General Manager
Triveni Mahadev (78 MW) & Thana Plaun HEP (191 MW),
Kotli, Distt. Mandi-175003
Tel. No. 01905-281081, Email: - gmtmtpbnhppcl@gmail.com

HPPCL/GM-TM&TPHEP's/TP-E&F/K-1-2023- 1192-97 ***Dated:*** 21-08-23

To,

Nodal Officer-Cum-Divisional Forest Officer,
Jogindernagar Forest Division,
Jogindernagar, Distt. Mandi, H.P.

Sub: - Diversion of 406.79 hectares of Forest Land in favour of Himachal Pradesh Power Corporation Ltd. for the construction of Thana Plaun HEP (191MW), falling under Forest Division, Jogindernagar and Mandi, Distt. Mandi (H.P.).

Proposal No.: FP/HP/HYD/8255/2014.

Sir,

This is with reference to subject matter and additional information sought by the Hon'ble Forest Advisory Committee (FAC), MOEF&CC, GOI, New Delhi vide F.No. : 8-21/2021-FC, dated 20.02.2023.

In this context, the point wise reply to the information sought by Hon'ble FAC, MOEF&CC is as under:

#	Additional information sought	Reply
1	A study of the project area, impact of the proposed project and feasibility shall be conducted by the Wadia Institute of Himalayan Geology (WIHG), Dehradun at the cost of the user agency.	The said study has been conducted by Wadia Institute of Himalayan Geology (WIHG), Dehradun and the report of the same is attached as ***Annexure-I***.
2	The approved mining plans in case of the proposed quarry sites shall be submitted.	The approved mining plans (5 no. quarries), of the project have been attached as ***Annexure-II***.
3	The State Govt. shall explore and make effort to locate the dumping sites on non-forest land.	Generally locations of the dumping sites are selected keeping in view the closest approach to Project site. In case of Thana Plaun HEP due to; (i) terrain of the area downstream of the project (narrow valley) and (ii) Large length of submergence area (16.5 Kms), upstream of the project, there was no area available closest to the project site for dumping sites. Thus, after detailed investigations undertaken during Survey & Investigation works of the project the locations of dumping sites were finalised even though these dumping sites were more than 6 Kms. downstream of the project construction site. The same

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		were approved by Central Electricity Authority (CEA) while according concurrence in favour Thana Plaun HEP on dated 07.09.2021 under Electricity Act, 2003. Also, one crushing unit for the project is proposed to be set up in one of the Dumping sites (***Annexure-IV***). However, keeping in view of observation raised by FAC, MOEF&CC, GOI the proposed forest land for dumping sites was again got re-verified from District Collector, Mandi and Certificate for Non-availability of Non Forest land for dumping sites has been granted in favour of the project. The same is attached as ***Annexure-III.***
4	Crusher Units are proposed to be established; however as per SIR received from the IRO, their location has not been given in the proposal. The location plan for the crusher units shall be submitted.	The area proposed for the crushers is already included under Dumping Yard-I and Quarry site-4 of the present proposal. The locations of the proposed Crusher Units (2 nos.) has been duly marked on the project location map and is attached as ***Annexure-IV.***
5	The road/bridge from Kotli to Jogindernagar is coming under submergence zone. In this regard, the NOC from the concerned agency shall be submitted.	NOC regarding realignment/shifting of road/bridge from Kotli to Jogindernagar has been obtained from HP Public Works Department and is attached as ***Annexure-V.***
6	Out of 45 patches for CA, 22 CA patches have some discrepancies as reported by the IRO in Site inspection report. The proposed Compensatory Afforestation areas shall be revisited keeping in view the observations of the IRO and areas suitable for plantation and free from all encumbrances shall be provided for the purpose of Compensatory Afforestation.	Additional CA patches of 105 hectares (70 ha. for Mandi Forest Division and 35 ha. for Jogindernagar Forest Division), have been provided by the user agency on dated 19.08.2023. Further action to be taken by O's/o DFO Jogindernagar and DCF, Mandi.

This is for your kind information and further necessary action, please.

Yours faithfully,

DA: As above

21/08/23
General Manager
TM & TP HEPs HPPCL
Kotli, Distt. Mandi (H.P.)

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CC:

1. The Director (Personnel)-cum-Chief Environment Specialist, HPPCL, Himfed Building, BCS, New Shimla- Himachal Pradesh-09
2. The Director (Civil), HPPCL, Himfed Building, BCS, New Shimla- Himachal Pradesh-09.
3. The General Manager (CP), HPPCL, Himfed Building, BCS, New Shimla- Himachal Pradesh-09.
4. The Chief Conservator of Forests (Mandi), Mandi Forest Circle, HP Forest Department, Mandi.
5. The Deputy Conservator of Forests (Mandi), Mandi Forest Division, HP Forest Department, Mandi

ANNEXURE- I

Geological Feasibility Report

Thana Plaun Hydro-Electric (HE) Project, Beas River, Mandi district, Himachal Pradesh

Vikram Gupta

Wadia Institute of Himalayan Geology
Dehra Dun – 248 001

July 2023

Geological Feasibility Report - Thana Plaun Hydro-Electric (HE) Project, Beas River, Mandi district, Himachal Pradesh

This has been with reference to the letter from Himachal Pradesh Power Corporation Limited (HPPCL), Govt of Himachal Pradesh (reference letter No. HPPCL/GM-TM&TP HEP's/TP-E&F/K-1-2023-426-33 dated 15-05-2023), and subsequently numerous discussions on the subject of the geological feasibility report related to the occurrence of geo-hazards in the vicinity of the Thana Plaun Hydroelectric (HE) project. In this regard, all the necessary documents prepared for the subjects, such as test reports, various detailed project reports, and clearance certificates obtained from different organizations, etc. were assessed. In order to take stock of the situation, numerous discussions with the project personnel, and lastly the joint visit of Dr Vikram Gupta (Scientist 'G') along with various project personnel namely Er. Sanjay Kumar Jagota (General Manager), Er. Sanjeev Sharma (Senior Manager), Sh. Rahul Sharma (Dy Manager, Env) and Er. Kapil Katoch (Asst. Engineer) was made on June 04, 2023. The results/inferences drawn from reviewing all the reports and the investigations carried out are summarized in this report.

Introduction

The proposed Thana Plaun Hydro-Electric (HE) Project is a storage cum run-of-the-river scheme on the Beas river in the Mandi district of Himachal Pradesh. It has a live storage capacity of 44.93 MCM. The project involves the construction of a 106.70m high and 225.93m long Concrete Gravity Dam near the village Thana. It is located ~ 40 km downstream of Pandoh Dam (Mandi district, Himachal Pradesh) and ~ 1 km downstream of Kunkatar bridge. The project layout comprises a very short water conductor system on the right bank leading to an underground powerhouse cavity located just downstream of the toe of the dam. The powerhouse cavity comprises 3 nos. of main units of 50.33 MW each and 2 nos. of environmental units of 20 MW each. The water coming out of the turbines is discharged back into the Beas River through 2 no's of short tail race tunnels. The normal tail water level at the powerhouse location is EL 634.00m with a gross head of 75.67m. It is planned that the project will be implemented by the Himachal Pradesh Power Corporation Limited (HPPCL), Govt of Himachal Pradesh.

Location of the Project

The proposed Thana Plaun HE project lies between latitudes 76º 15'E & 77º 45'E and longitudes 31º 45'N & 32º 25'N and is located in the Mandi district of Himachal Pradesh. It intercepts an area of ~ 7378 km^2. The dam site is located at a longitude 76º50'20.53"E and a latitude 31º49'28.22"N. The entire area is thinly populated. The complete project

including the dam site and the underground powerhouse location can be made accessible from the Jogindernagar – Neri - Dharampur highway through roads.

The total length of the reservoir is ~16.5 km. along the river Beas, 4.5 km along the Rana Khad, and 1.5 km along the Arnodi Khad from the Dam site. The area under submergence is 341.38 ha.

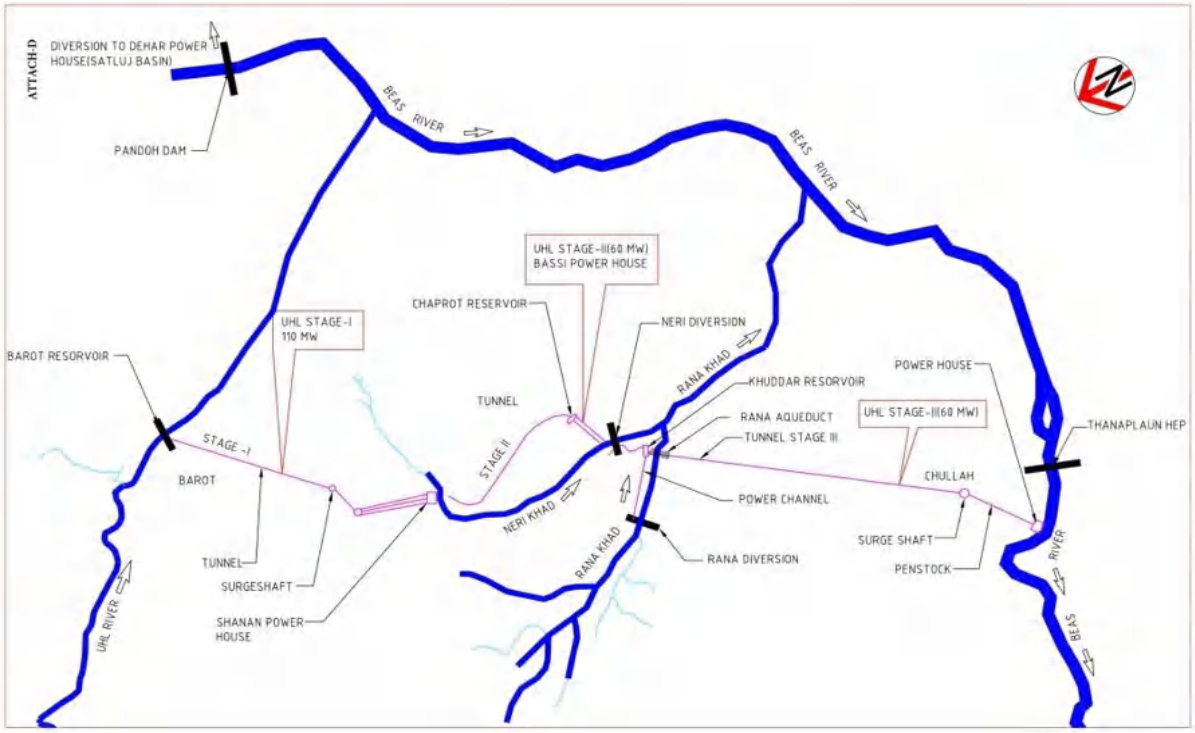


Figure 1 Location map of the Thana Plaun HE project along with the locations of various other projects in the vicinity

Regional Geology

Thana Plaun H.E. Project site is located to the south of the Main Central Thrust (MCT). Almost N-S trending Sundernagar Fault which has displaced MCT significantly occurs north-east to the site. The Neotectonic Kaurik Fault System is defined by a number of half-graben faults that occur east of the site.

Geologically, the project area and its environs are represented by the rocks of the Sirmur Group, Siwalik Group, and Quaternary deposits (alluvial plains). The rocks of the Sirmur Group are represented by Kasauli and Dagshai formations of the Oligocene - Miocene age. The rocks of the Kasauli Formation are represented by thickly bedded micaceous sandstone having minor red and grey clayey bands, whereas the Dagshai Formation is represented by purple-red colored clay, siltstone, and subordinate sandstone having intra-formational conglomerate bands in the

upper parts. These are thrust over the rocks of the upper Siwalik Group along a northerly dipping regional feature termed as Main Boundary Fault (MBF). In the southern part of the area, the Siwalik Group of rocks is separated from the alluvial deposits (Quaternary age) by a northerly dipping Himalayan Frontal Thrust (HFT). The alluvial deposits represent flat to gently southerly sloping country and are dissected by drainage emanating from the Siwalik range. Siwalik Group has been subdivided into Lower, Middle, and Upper Siwalik sub-groups of the Miocene to Pleistocene age. In general, the project site is represented mainly by the sandstone intercalation of light red, brown, or greenish-grey clay and boulder conglomerate.

Seismically, the project area falls in seismic zone V as per the seismic zoning map of India. The project area lies in the vicinity of the major thrust zones, viz. MBT, Drang Thrust, Gambhar Thrust, Sundernagar Fault, and Jawalamukhi Thrust. The studies for seismic design parameters have been carried out by IIT, Roorkee. Based on these studies, the maximum value considered for horizontal peak ground acceleration (PGA) is 0.50g for MCE and 0.29g for DBE for designing the project.

Geology of the Project Area

Physiographically, the project area between the proposed dam site and Tail Race Tunnel (TRT) and further downstream lies in the foothill ranges of the Himalaya and is covered by the rocks of the Middle and Lower Siwalik. The rocks comprise grey-colored, medium to coarse-grained, and massive to medium-bedded sandstone with intercalations of light red, brown, or greenish grey colored clay/claystone, siltstone; and boulder conglomerates. The Quaternary sediments along the rivers and streams (Khads) are represented by recent alluvium. The land surfaces are generally rugged with deep valleys, depressions, and gullets. A fairly good amount of area is covered by river terraces, particularly in reservoir submergence.

In the Detailed Project Report of the project, the area around the proposed dam / underground powerhouse site, surface powerhouse site, parts of HRT, and the reservoir has been mapped on 1:1,000, 1:10,000, and 1:22,000 scales. Rock outcrops have been marked and the boundaries of different quaternary deposits have been delineated. Geological mapping in the project area revealed the presence of various geological units and are briefly presented hereunder: -

Colluvium

Colluvium of variable thickness covers most of the slopes and parts of valley segments. Its estimated thickness varies between 1.0m to ±10.0m. It comprises angular, subangular, and sub-rounded boulders and rock fragments of sandstone mixed with finer rock fraction, silt, and humus. On the slopes, it rests at an angle of

~15°- 40° with a few exceptions due to local variations. On steeper slopes, its thickness is less. It is generally covered with natural grass/bush turfing and a canopy of small trees.

River Borne Material (RBM)

RBM mainly covers the river channel in a linear stretch and comprises mostly rounded, sub-rounded, and sub-angular boulders of sandstone and finer fractions (cobbles, pebbles, sand, and silt). Some boulders of granite gneiss and quartzite which are distantly transported are also present. Its thickness is estimated to vary between ±5m and ±10m but the deepest being of the order of + 30m in the Beas River.

Bed Rock - Sandstone with siltstone/claystone bands

Bedrock covers the entire project area and is often exposed or overlain by an overburden of varying thickness. Mostly the rocky outcrops are fresh but sometimes slightly to moderately weathered (W1-W2). The depth of weathering is anticipated to vary between >1.0-3.0m. The sandstone is grey and buff colored; medium to coarse-grained, often micaceous, thickly bedded, and sometimes slightly friable. Bedding in the area dips at 45° to 70° in the direction of N70° to N80°and in N245° to N 260°with some local variations. This reversal of dips is due to folding. At places, cross-stratification is also noticed. Field observations indicate the rock has moderate to good compressive strength.

Sandstone is massive as the joint planes are widely spaced. Bedding planes are not very clearly defined and have been deduced from the graded bedding and a few pebbly bands. Thin gravelly beds are sometimes noticed in the sandstone. At around 5 km downstream of the dam site, the area is dominated by purple to buff-colored siltstone/ claystone and poorer quality sandstone. Potholes are visible in the sandstone. However, they are of smaller dimensions, generally <50cm in diameter, and not very deep. These are generally formed by the milling action of the river water charged with sand and sediments. At places, these are aligned straight which indicates selective erosion along the weaker discontinuity planes.

Six sets of joint planes including the bedding joint have been reported in the project area. Besides, sub-surface exploration of various project components has been done using 24 boreholes amounting to 1458.5 m of core drilling and eight numbers of drifts totaling 390 m of excavation. The details about these were in the comprehensive report in DPR, Vol-IV, 7.2, and various in-situ tests have been performed and are presented in the Comprehensive report in DPR, Vol-IV, 7.2.2.

Reservoir Survey

The storage Dam of 106.7m height on river Beas will create submergence along the main river and its tributaries, viz. Rana khad and Arnodi khad and their sub-drainages, and, the spread of the reservoir shall cover an area of 3.16 km^2 with FRL of 716 m.

The topography of the area is rugged with sharp crested ridges and narrow valleys. In general, the Beas River has a steep to moderate gradient and its banks are covered by colluvium supporting luxurious vegetation. No major unstable area and/or major structural discontinuity have been observed in the area. Arnodi Khad joins Beas on its left bank, just upstream of the dam axis. Numerous gullies and depressions are present on both banks of the river which are normal features in a mountainous terrain. These gullies are not perennial and have flowing water during rains only. Along Rana Khad, some areas on the left bank and right banks are habitated and cultivated at higher reaches. Village Pipli Panchayat is situated on the left bank of Rana Khad above an elevation of 716m and the area is covered with slope wash material. Most of the habitats and cultivated lands are situated above FRL and will not be inundated by reservoir impounding.

Terrain slopes above the FRL are generally moderate and the estimated thickness of colluvium is of the order of 1 to ±10m and is generally thickly vegetated. The area is mostly devoid of habitation. However, the settlements in the area are far from the FRL. These are few and scattered. Therefore, any significant danger is not envisaged for the settlements.

Figure 2 Panoramic view of the slopes of the reservoir along the Beas River

Sporadic exposures of grey-colored, medium-grained, and generally micaceous sandstone with subordinate siltstone/ claystone bands amid colluvium cover are noticed in the area. Rock is moderately jointed. Some of the areas of the reservoir rim are certainly covered with colluvium, but, its thickness is very shallow. Thus, fluctuations of the reservoir would have a low possibility of mass slumping. Necessary stability measurement should be adopted wherever required as per the site conditions with regular surveillance.

Assessment of the submergence area reveals that no major potential slide zones could get activated during the filling and functioning of the reservoir, leading to the generation of large waves in the reservoir and causing overtopping of the dam. However, it may lead to siltation which has duly been considered in the silt load factor in the reservoir. No occurrence of any mineral of economic importance has been reported.

DIFFERENT STUDIES COMPLETED

As per requirement, the following studies were performed by the respective organizations.

Sr No.	Agency	Study Performed
1	HPPCL	24 exploratory bore holes amounting to 1458.5 m of core drilling and its logging thereof
2	ERS Constructions, M/s Arihat Drillings and SMEC India	Permeability and Lugeon Tests (Water Permeability Test at different Location of the project components)
3	Central Soil and Materials Research Station (CSMRS), New Delhi	Shear Strength Parameters of Rock Mass in Right Bank Dam Axis drift D1 of Thana Plaun HEP.
4	CSMRS, New Delhi	In-situ Deformability Characteristics of Rock Mass by Uniaxial Jacking in Left bank Drift D2 at EL 679.29 m on Dam Axis of Thana Plaun HEP.
5	CSMRS, New Delhi	In-situ Deformability Characteristics of Rock Mass by Uniaxial Jacking in Left bank Drift D5 at EL 650.18 m on Dam Axis of Thana Plaun HEP.
6	CSMRS, New Delhi	In-situ Deformability Characteristics of Rock Mass by Uniaxial Jacking in Power House Drift D7 at EL 657.65 m of Thana Plaun HEP.
7	CSMRS, New Delhi	Deformability Characteristics of Rock Mass in Right Bank Dam Axis Drift of Thana Plaun HEP.
8	CSMRS, New Delhi	Stress Measurement by Hydro-fracturing Test in Power House drift of Thana Plaun HEP.
9	CSMRS, New Delhi	In-situ Shear strength Parameters of Rock Mass in Left bank Drift D5 at EL 650.18 m on Dam Axis of Thana Plaun HEP.
10	Department of Earthquake Engineering,	Earthquake Engineering Studies (Soil Profiling using

	IIT, Roorkee	MASW) of Thana Plaun HEP.
11	Department of Civil Engineering, NIT, HP	Petro-graphic Tests of Rocks
12	Petrology Division, Geological Survey of India, Faridabad	Petro-graphic Analysis of Suspended Sediments of Kunkatar and Kandapattan Area of Thana Plaun HEP.
13	CSMRS, New Delhi	ASR and Petro-graphic Analysis of RBM samples from Quarry Sites of Thana Plaun HEP.
14	CSMRS, New Delhi	Laboratory Investigation of Rock from Thana Plaun HEP.
15	CSMRS, New Delhi	Laboratory Investigation of Rock from Thana Plaun HEP, 2018.
16	Department of Earthquake Eng. IIT, Roorkee	Site Specific Design Earthquake Parameters for Thana Plaun HEP.
17	Department of Earthquake Eng. IIT, Roorkee	Micro-Earthquake studies around Thana Plaun HEP.
18	Geological Survey of India, Chandigarh	Preconstruction Stage Geo-Technical Investigations of Thana Plaun HEP.

These studies indicate that there is not any concern that adversely affects the said project, however, the results of the tests should be utilized for the design and construction of the various components of the project.

After detailed deliberation with the project personnel and reviewing various reports, it has been noted that the following necessary approval has been obtained from the concerned authority:-

Sr No.	Authority	Dated
1	Directorate of Barrage & Canal Design (N&W), CWC	27.02.2018
2	Thermal Civil Design Division, CEA	08.09.2020
3	Construction Machinery Consultancy and Plant & Machinery Directorate, CWC	11.12.2019
4	CMDD (N&W) Directorate, CWC	01.08.2019
5	Construction Power by Hydro Project Appraisal Division, Ministry of Power	27.02.2019
6	CSMRS, Department of Water Resources, RD&GR, Ministry of Water Resources	09.09.2019
7	Defence Clearance, Ministry of Defence	03.12.2020
8	E& M Works by Hydro Project Appraisal Division, Ministry of Power	03.02.2020
9	NCSDP, F.E & S.A Directorate, CWC	16.10.2020
10	Directorate of Gate Design (N&W), CWC	16.10.2019
11	EPE Division, DGCO, GSI	26.09.2017
12	Hard Cost Estimates, Hydro Project Appraisal Division, Ministry of Power	10.09.2020
13	HCD (N&W) Directorate, CWC	05.07.2019
14	Hydro Engineering and Technology Development Division, CEA	29.10.2019
15	Hard Cost Phasing, Hydro Project Appraisal Division, CEA, Ministry of Power	28.01.2021
16	Hydrology (N), Directorate, CWC	06.03.2018
17	Instrumentation Directorate, Central Dam Safety Organization, CWC	07.02.2020
18	Indus Wing, Ministry of Water Resources, River development and Ganga	27.02.2018

	Rejuvenation	
19	Inter State Matters-2 Directorate, CWC	11.05.2018
20	Legal Division, CEA	29.06.2021
21	Power System Planning and Appraisal-I Division, CEA	10.06.2020
22	Hydro Electric Potential Reassessment Division, CEA	18.01.2017
23	BOQ & Construction Schedule, Thermal Civil Design Division, CEA	16.10.2019
24	Zero Date, Thermal Civil Design Division, CEA	14.01.2021
25	Cost Appraisal (HWF) Directorate, CWC	15.06.2020
26	Financial and Commercial Appraisal Division, CEA	24.02.2021
27	**Final Concurrence by Central Electricity Authority**	**07.09.2021**

Landslide and related geohazard assessment

Landslides and related hazards are common and have been noted to increase in the Himalaya during recent times, greatly affecting the human development and infrastructures located along its path. One recent example of destruction by landslides and its cascading effect is the Feb 2021 Rishigange-Dhauliganga Chamoli disaster destroying the 13.2 MW Rishiganga hydel project near Raini, and the Barrage site of the under-construction 520 MW Tapovan-Vishnugad Hydel project of the National Thermal Power Corporation (NTPC). In this context, it is necessary to understand any such kind of possible disaster in the future for the said project. Therefore, a landslide susceptibility map of the upper Beas Valley has been prepared using the XGBoost machine learning (ML) algorithm. The methodology for the preparation of a landslide susceptibility map (LSM) involves the (i) preparation of datasets: - inventory of landslides and the thematic maps of various conditioning factors of landslides. A total of 13 possible conditioning factors namely elevation, the inclination of the slope, slope aspect, plan curvature, profile curvature, topographic wetness index (TWI), Geomorphology, lithology, Land use and land cover (LULC), rainfall, and distance to drainage, road, and thrusts for the occurrence of landslides in the area were selected (ii) collinearity test to understand the independency of the various conditioning factors of landslides, (iii) training and optimization of the model, (iv) preparation of the landslide susceptibility map (v) validation of the model (vi) sensitivity analysis to understand the sensitivity of the model with respect to each conditioning factor.

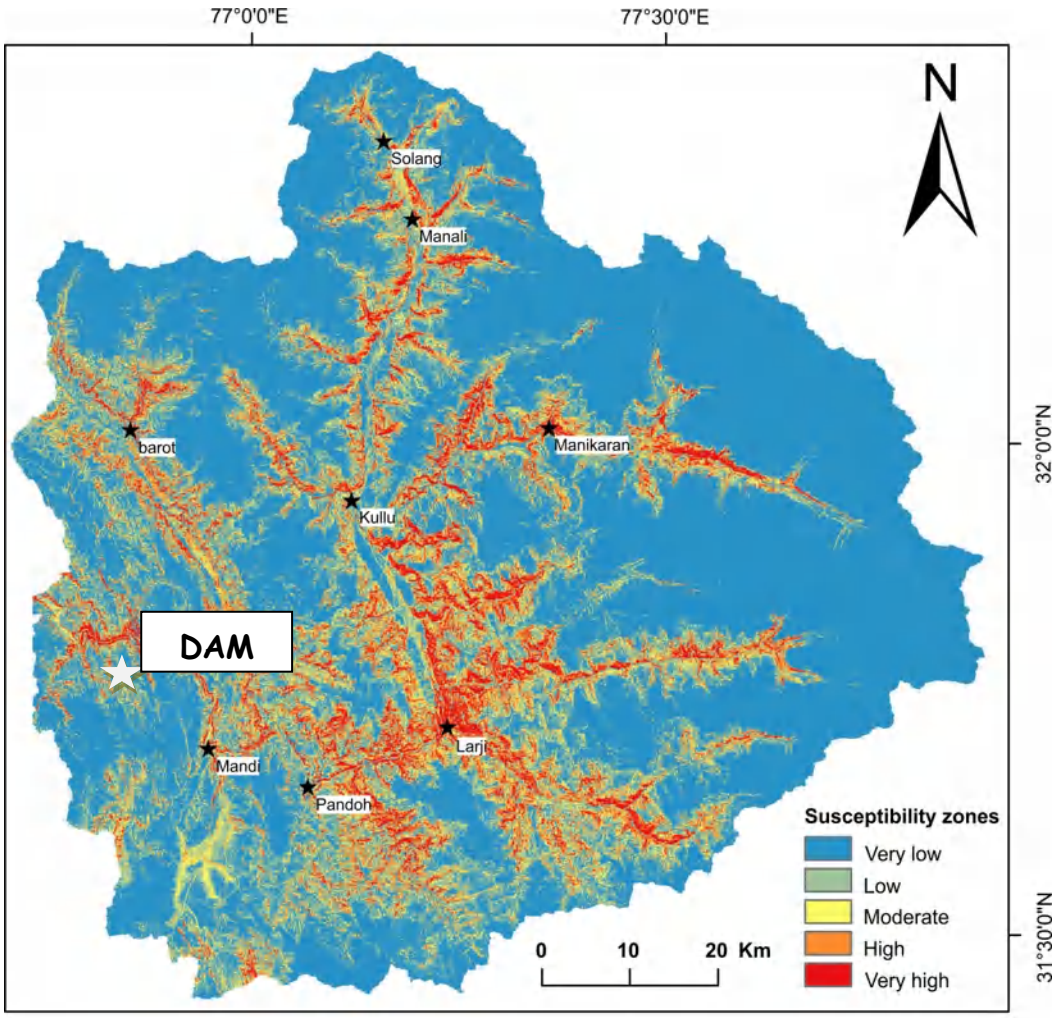


Figure 3 Landslide susceptibility mapping of the upper Beas valley using XGBoost machine learning algorithm

LSM map prepared using optimized XGBoost algorithm of the ML technique indicates that the most dominant factors for the occurrence of landslides in the area are the inclination of slope, elevation, distance to road, and drainage, with a higher number of landslides in 31˚-50˚ slope, 2001-3000 m elevation. The study further indicates that the inclination of the slope, distance to the road, and elevation are the most sensitive factors. Conditioning factors such as distance to thrust, Topographic Wetness Index, and slope aspect have lower relative importance in occurrence than factors like distance to drainage, and profile curvature, yet are more sensitive as they had a high change in landslide susceptibility index relative to other factors. The accuracy of this map as achieved by hyperparameter optimization is ~91%. Still, there are a few limitations on the accuracy of input data and the selection of the causative factors of landslides in the area. For example, there are great variations in lithological characteristics at the local scale but these were not accounted in the lithological map used in the present study.

Though there are several isolated landslide hotspots for the occurrence of landslides in the LSM, still the formation of a landslide in the upstream of the dam in the valley is ruled out, as the valley width in the area is quite high. Thus, the adverse effect of the cascading impact of landslides in terms of flash flooding is minimal. Following is the list of 20 HEP that have been running successfully or under construction upstream of the proposed Thana Plaun HE project site.

Sr.No.	Name of Project	Capacity (MW)	Developer	Status
1	Beas Sutlej Link	990	Bhakra Beas Management Board	Commissioned
2	Parbati-IIIHEP	520	NHPC Limited	Commissioned
3	Allain Duhangan HEP	192	AD Hydro Power Ltd.	Commissioned
4	Larji HEP	126	HPPCL	Commissioned
5	Uhl-I(Shanan)HEP	110	Punjab State Power Corporation	Commissioned
6	Malana-IIHEP	100	Everest Power Pvt. Ltd.	Commissioned
7	Sainj HEP	100	HPPCL	Commissioned
8	Malana-IHEP	86	Malana Power Company Ltd.	Commissioned
9	Uhl-II(Bassi)HEP	66	HPSEB	Commissioned
10	Baragaon SHEP	24	Kanchanjunga Hydro Power Ltd.	Commissioned
11	Patikari SHEP	16	Patikari Hydro Electric Project Ltd.	Commissioned
12	Toss SHEP	10	Toss Mini Hydel Power Project	Commissioned
13	Beas Kund SHEP	9	Kapil Mohan and Associates	Commissioned
14	Sarbari-IISHEP	5.4	DSL Hydro wattL td.	Commissioned
15	Balargha SHEP	9	Sandhya Hydro Power Projects	Commissioned
16	Parbati-IIHEP	800	NHPC Limited	Under Construction
17	UhlIII HEP	100	HPSEB	Under Construction
18	Lambadug HEP	25	KU Hydro Power Pvt. Ltd.	Under Construction
19	LowerUhl SHEP	13	Trident Power Systems Ltd.	Under Construction
20	Fozal SHEP	9	Fozal Power Pvt. Ltd.	Under Construction

CONCLUSIONS

Different studies have been undertaken to complete the detailed project report of the Thana Plaun HEP. The reviewing and vetting of these studies, along with the observations of the site visit indicate the following: -

- The entire layout of the project along with the dam site was selected based on the favorable topography and geometry of the gorge. Explorations have revealed nominal stripping and thus it is considered the best option for a concrete gravity dam

- Geological mapping at the project site exhibits favorable geology and does not indicate any adverse structural unit, like a major fault or shear zone. Further, the powerhouse cavity orientation has been planned in a favorable

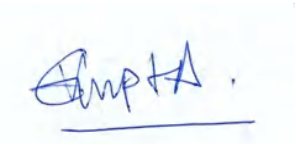
orientation with respect to the geological discontinuities and keeping in view the engineering obligations.

- Subsurface drilling and drifting in the underground powerhouse area have not revealed any major adverse geological features, thereby minimizing the possibility of geological surprises during construction. Nevertheless, geological surprises are common in the Himalaya.

- The rim of the reservoir has been evaluated to be stable, however, there are a few isolated slope failure locations as in Himalayan hills. The landslide susceptibility map of the upper Beas Valley indicates the possibility of the occurrence of landslides, however, the formation of the major landslide dam in upstream of the dam and subsequently its cascading effect in terms of its breaching is minimal. The rim protection measures as depicted in the environment management plan (EMP) should be adopted.

- There are about 36 major & minor hydropower projects upstream of the proposed Thana Plaun HEP and in the past > 40 years no major disaster has been reported.

In view of the above, the proposed site is considered suitable for the Thana Plaun HEP



(Vikram Gupta)

ANNEXURE- II

2022

MINING PLAN

OF MINOR MINERAL LEASE
FOR SAND, STONE & BAJRI
KHASRA NO.3185, 3187/1, 4/1 & 108
MEASURING 7.7259 HECTARE
MAUZA TATOLI PARDANA, NARAINGARH & THATHI ,
TEHSIL –DHARAMPUR
DISTT – MANDI (H.P.)

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

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.

INDEX

MAP INDEX

Declaration
Certificate of RQP

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

राजकीय शाखा,
खनिज विभाग शिमला
Geological Wing
Deptt. of Industries
Shimla
APPROVED
With Comments
आदेश के साथ अनुमोदित
Order Letter No. उद्योग-खनि(खान-4)खनिज-539/17-1650
Dated
दिनांक 23/5/23

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

GM/AGM/DM(Sr.)

29/5/

MINING PLAN
OF MINOR MINERAL LEASE FOR SAND, STONE & BAJRI SITUATED IN KHASRA NO. 3185, 3187/1, 4/1 & 108, MEASURING 7.7259 HECTARE MAUZA TATOLI PARDANA, NARAINGARH & THATHI, TEHSIL –DHARAMPUR, DISTT – MANDI (H.P.)

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' 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-539/2017-11944 dated 06/03/2019 and extended for further period of one year vide letter No. Udyog-Bhu(Khani-4) Laghu-539/2017-6853 dated 09/11/2021 .

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' 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 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

Malot 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 6.5 Km. from Dhrampur 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 Sh. C.S Negi, Retired Senior Surveyor, Geological Wing, Department of Industries, resident of Negi Lodge (West), Indernagar, Dalli Shimla, for the R Q P.

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	Survey of India
Surveyed in	1989-90, upgraded 2005
Sheet No.	H43E9
Scale	1:50,000
Edition	First

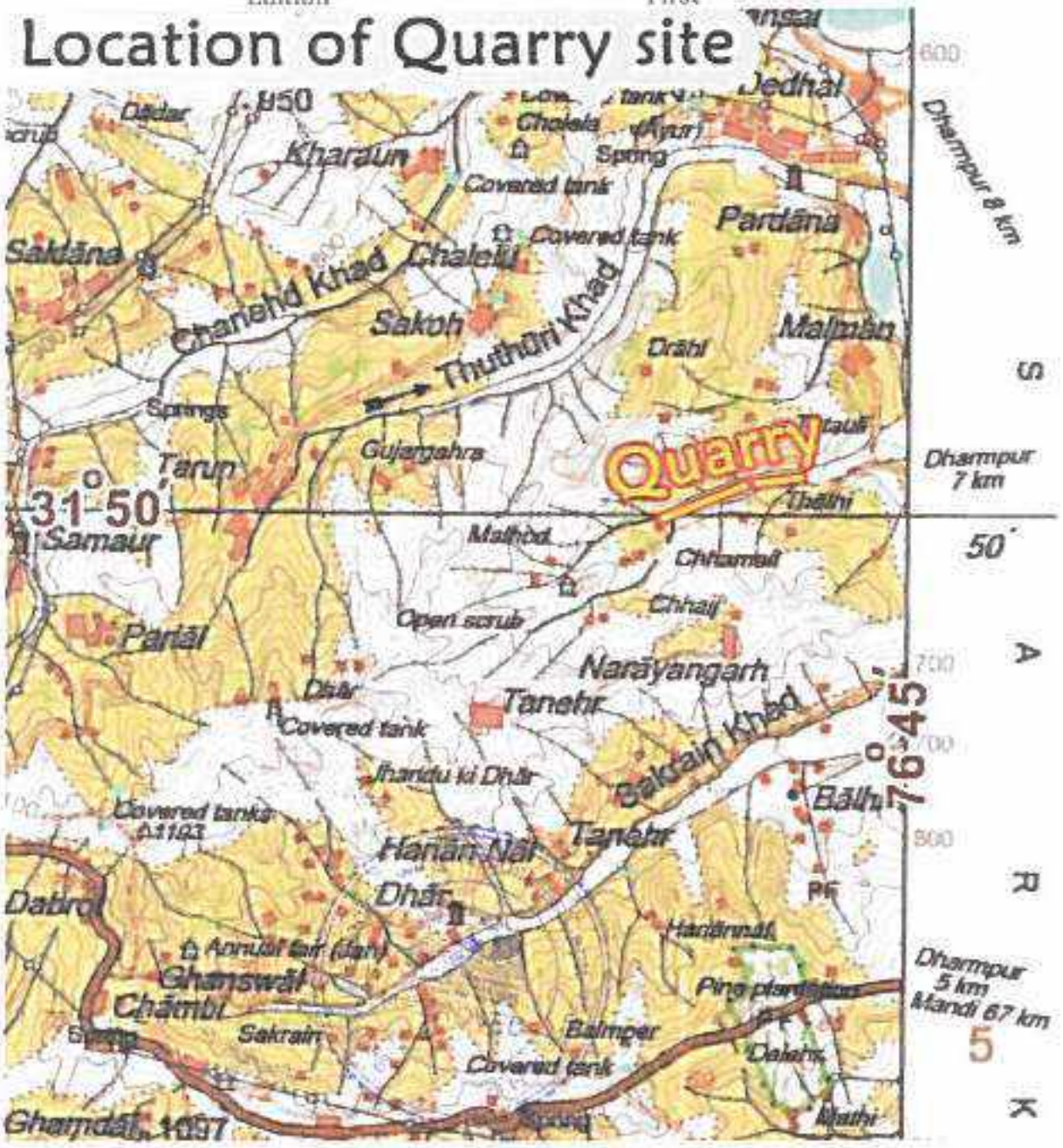


Figure 1: Location of the Mining Lease area.

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 boundary pillars (calculated).

Pillar	Latitude	Longitude
A	31° 49' 58.16"	76° 44' 16.66"
B	31° 49' 59.69"	76° 44' 14.16"
C	31° 50' 01.27"	76° 44' 18.58"
D	31° 50' 02.31"	76° 44' 24.50"
E	31° 50' 05.47"	76° 44' 39.49"
F	31° 50' 05.68"	76° 44' 42.55"
G	31° 50' 09.62"	76° 44' 50.25"
H	31° 50' 05.49"	76° 44' 53.94"
I	31° 50' 04.60"	76° 44' 53.77"
J	31° 50' 04.50"	76° 44' 50.88"
K	31° 50' 02.78"	76° 44' 45.18"
L	31° 50' 03.16"	76° 44' 34.94"
M	31° 50' 02.60"	76° 44' 32.73"
N	31° 50' 00.01"	76° 44' 28.56"
O	31° 49' 59.65"	76° 44' 20.64"
P	31° 49' 58.84"	76° 44' 20.68"

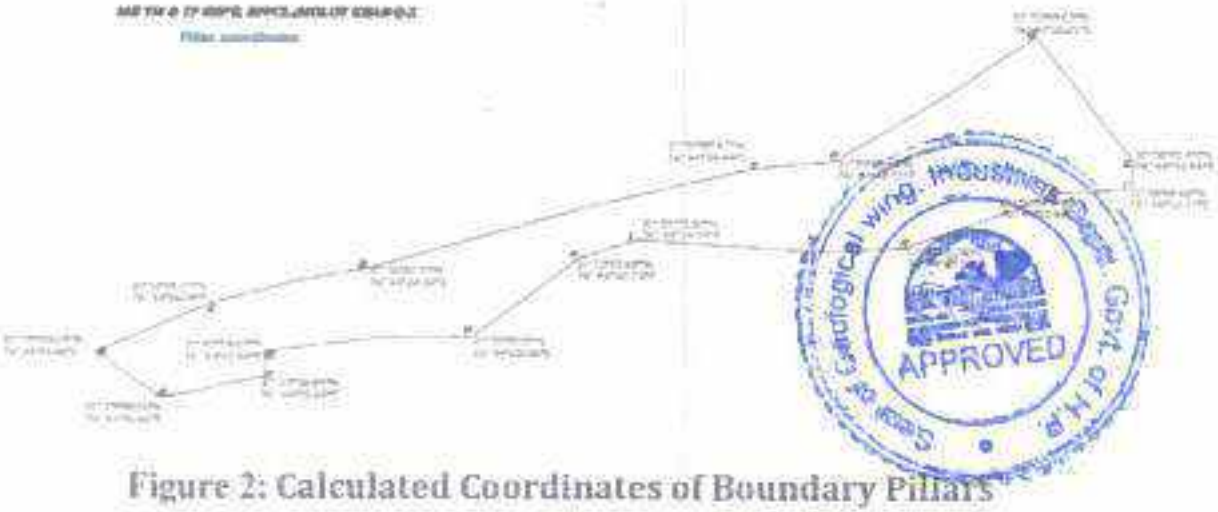


Figure 2: Calculated Coordinates of Boundary Pillars

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	3185	2.9053	Government	Gair mumkin khad	Tatoli Pardana
2	3187/1	0.9576			
3	4/1	0.9576			Thathi
4	108	2.9054		Gair mumkin Nali	Naraingarh
TOTAL		7.7259 HECTARES			

2.3 Address & Detail of Lease

	Village: -	Tatoli Pardana, Naraingarh & Thathi
	Patwar circle:	Tanehad
	Post Office: -	Tanehad
	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	0.10
2	Roadside	Dharampur	7
3		Kotli	50
4		Mandi (District Offices)	72
5		Shimla (State Hq)	172
		Airport	175
6		Bunter (Airport)	130

7		Joginderngar Metre gauge Rly Stn.	55
8		Sarkaghat	28
9		Dharamsala	95

2.5 Approach to the Area:

The leased site is part of Riverbed and is at 6.5 km from Dharampur via Dharampur- Seoh Road, which is approx. 100 m from the quarry site by a Tatoli Pardana 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 Malot Khad region is as given below in the figure -4.

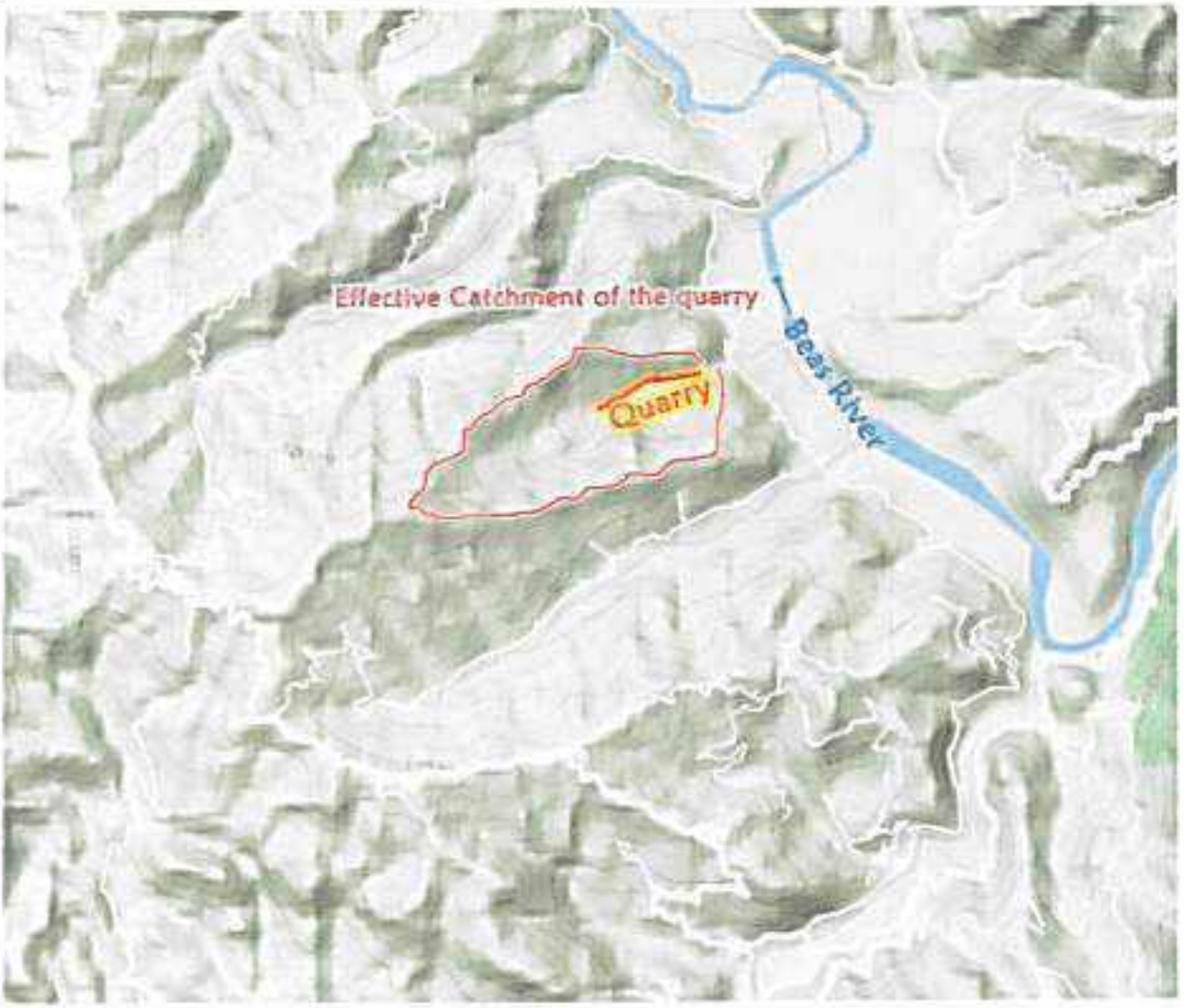


Figure 4: The terrain map of the Malot Khad region.

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 Malot Khad is 695 Meters above MSL.
- The lowest contour of the leased-out area in Malot Khad is 647 Meters above MSL.

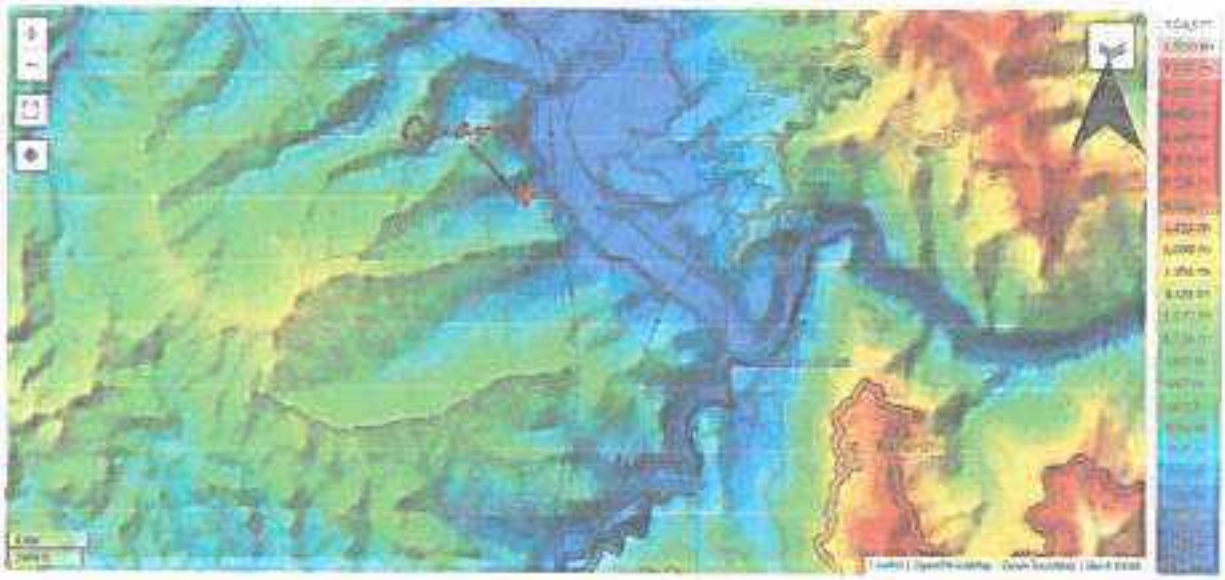


Figure 5: Terrain Map of the Area.

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

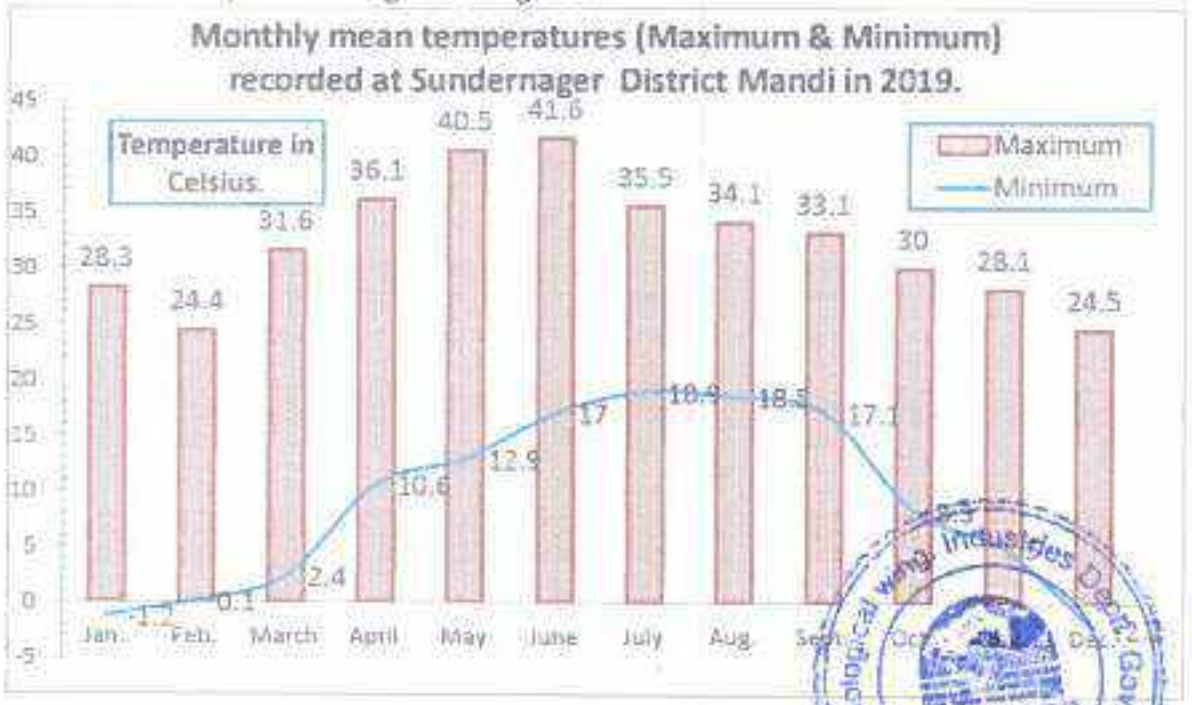
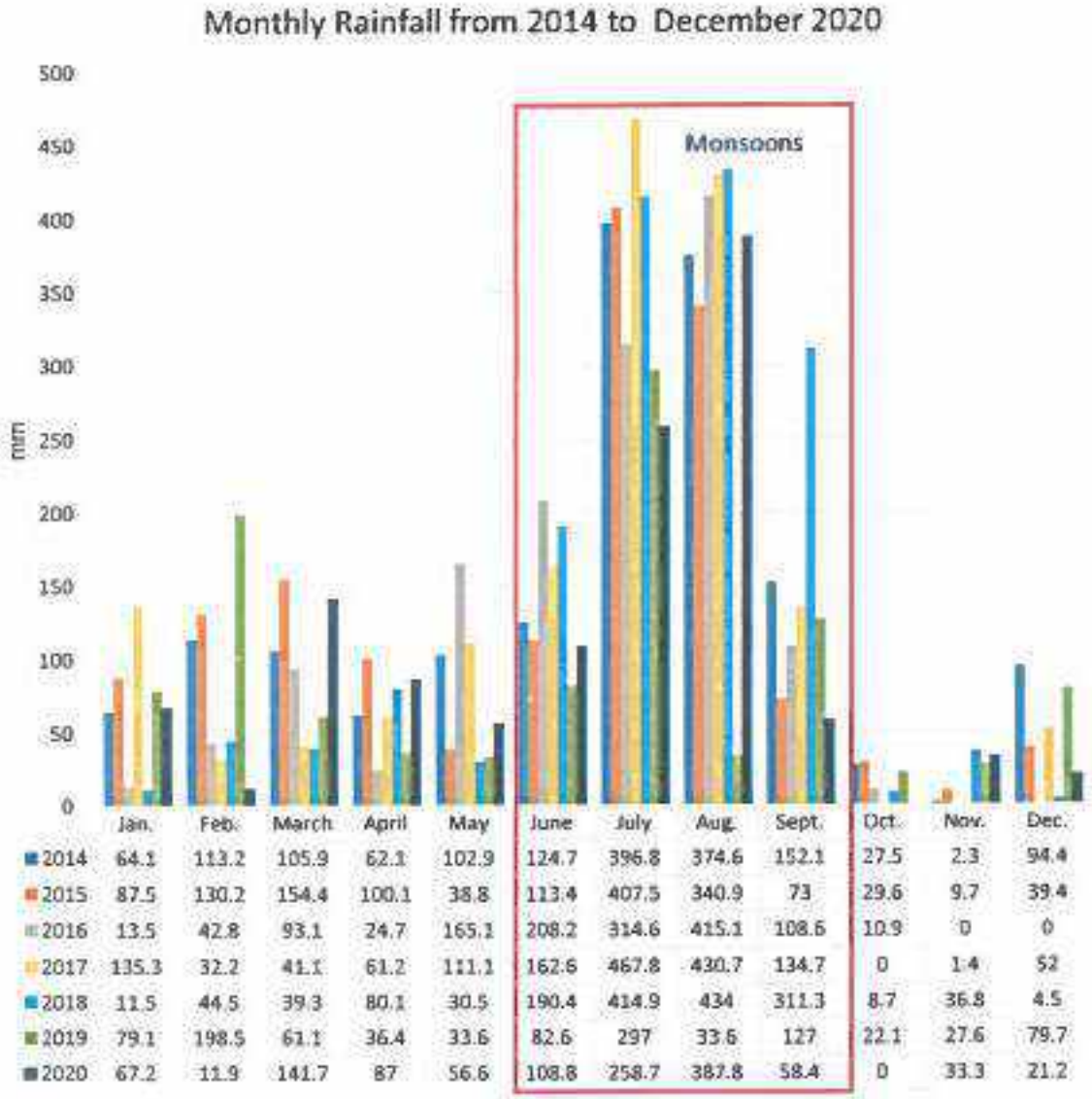


Figure 6: Mean monthly maximum and minimum temperature recorded at IMD station at Sundernager.

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 bed of Malot Khad tributary of Beas River and accessibility to the quarry site is through a kutcha road from Dharmpur- Seog Rural 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 Malot Khad, a primary tributary of Beas River. Malot Khad originates at a height of 1118 meter above mean sea level, from a peak northwest of Dudhla 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 604 Metres above MSL (lies in the Survey of India, toposheet No H43E9). The total length is about 3.31 Km. (The total catchment of the Malot Khad lies on survey of India Topo-sheet Nos H43E9

The general analysis of the drainage system of Malot Khad is given below in table 5 (as per 1: 50000 scale)

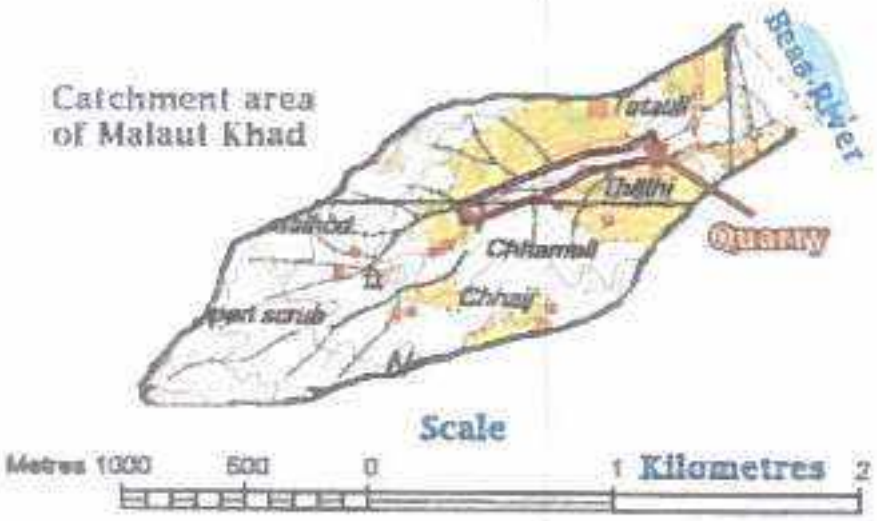


Figure 8: Catchment of Malot Khad.

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.

Basic Geometry of the catchment is as: -

Area of the Catchment = 2.38 Sq. Km
Perimeter of the Catchment = 8.65 Km
Length of the river 3.31 Km

Average width of valley 0.75 Km
Width of the catchment at maximum 1 km
From various analysis of the drainage the Malot 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.

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

Malot Khad – Primary tributary of Beas River.

1.3 Drainage System

Beas River

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

Figure 9: Effective Catchment area of Malot Khad.

Figure 10: Khad bed profile.

1.4 Type of Drainage

Dendritic (Figure 8)

1.5 Origin of River/Stream

Malot Khad originates at a height of 1118 meter above mean sea level, from 31° 49' 34.94" N 76° 43' 27.0" E (origin lies in the Survey of India, toposheet No H43E9). The general flow is S to N.

The attitude at confluence with Beas River is 604 Metres above MSL (lies in the Survey of India, toposheet No H43E9.

1.6 Attitude at Origin

1118 metres above MSL

1.7 Width of River at the place of Mining

47 to 80 Metres

1.8 The annual deposition at the place of mining

6 to 8 Cm, at different location, in the Malot Khad.

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 20 to 34 cm X 16 to 34 cm X 18 to 30 cm (length X breath X height) (Photo1)

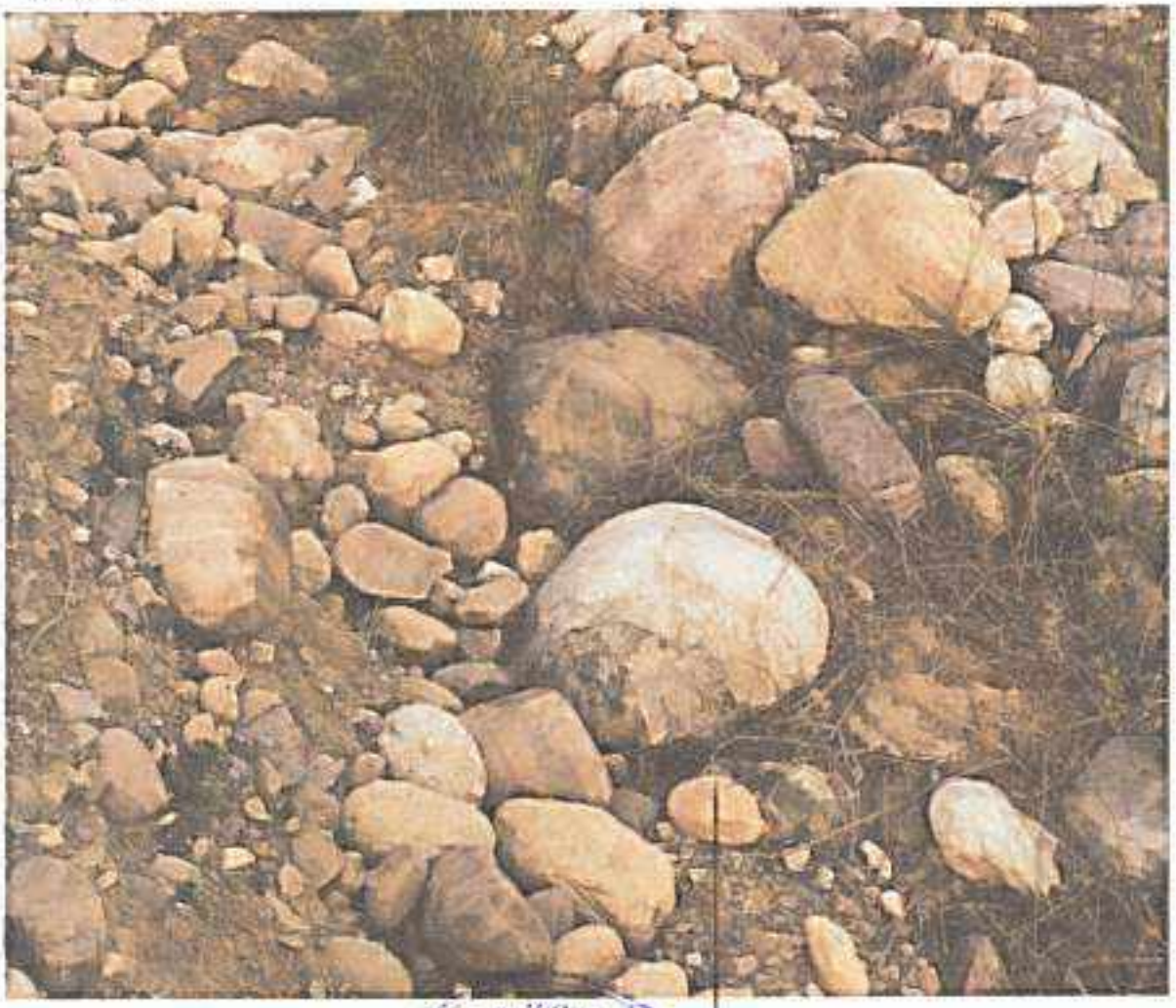


Photo 1:Showing the competency of river in leased area

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

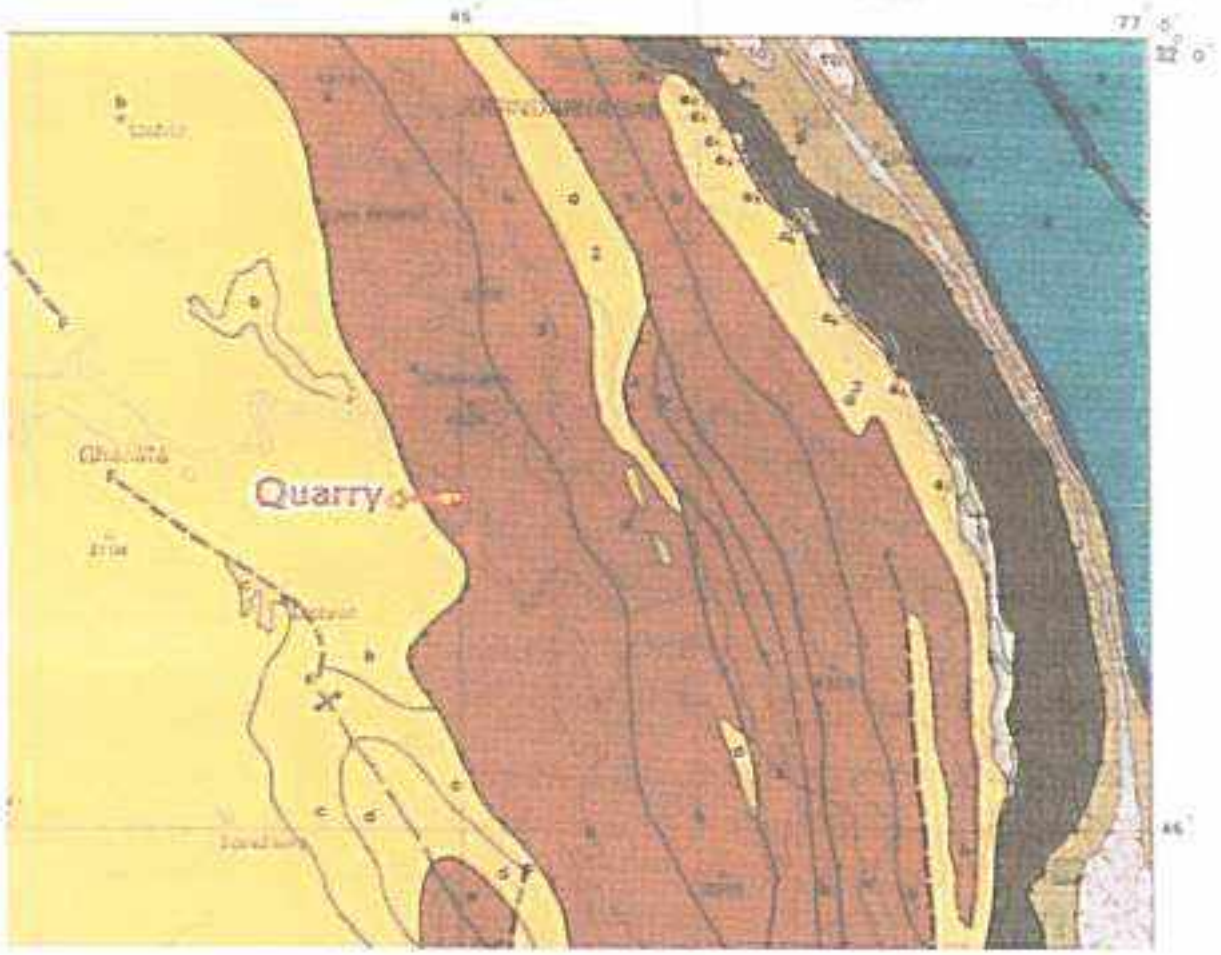
2.1 Regional Geology

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 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 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 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, siltstone, 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 Dagshai/ Dagshai Formation; red nodular clay, grey/ green sandstone; d. Subathu/ Kakara Series grey/ green splintery shale, sandstone and limestone bands	Subathu Group	Oligocene - Lower Eocene

Figure 11:Geological Map of the Area

Table: Stratigraphy of the Malot 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 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.

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 interbedded with micaceous sandstone and clay-beds. The sediments were buried from 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 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 Malot 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 Malot 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 Malot 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 the deposits and tertiary formations consisting of sandstone, claystone, and boulder beds.

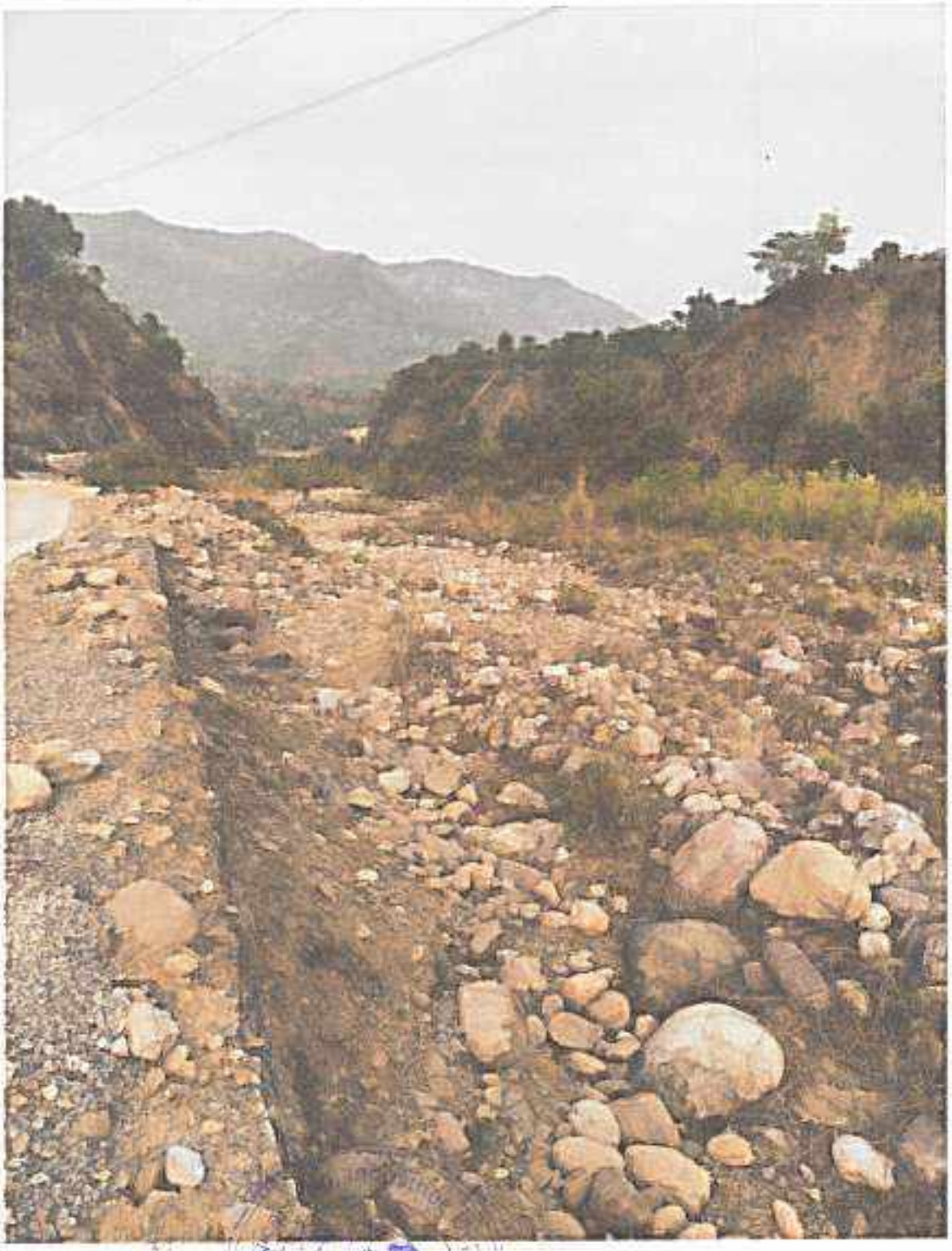


Photo 3: Nature of Banks showing wire crat protection wall along the rural road.

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 caried 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.*

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:

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

1	Stone	42%
2	Gravel / Bajri	35%
3	Sand, silt & clay	23%

3.3 Estimate of Geological Reserve

The entire block falls within the river corridor. Thus, the mining leased area of 77259 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 869163. metric tons as shown in the chart.

Geological Reserves			
Geological Reserves	**Thickness in metres**	**leased Area (Square Metres)**	**Reserves Rounded off (In tonnes)**
Proved	**5**	**77239**	**869150**
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 47 to 80 meters; thus, no mining is proposed in the area up to 5 to 8 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 13, table 3 and figures 14.

- ➢ ***The part of the area, i.e., 40800 square metres of lease area, is mineable as it falls within the river corridor, leaving out the safety zone provided along the banks.***

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
77259	40800	38556	32130	[illegible]	[illegible]

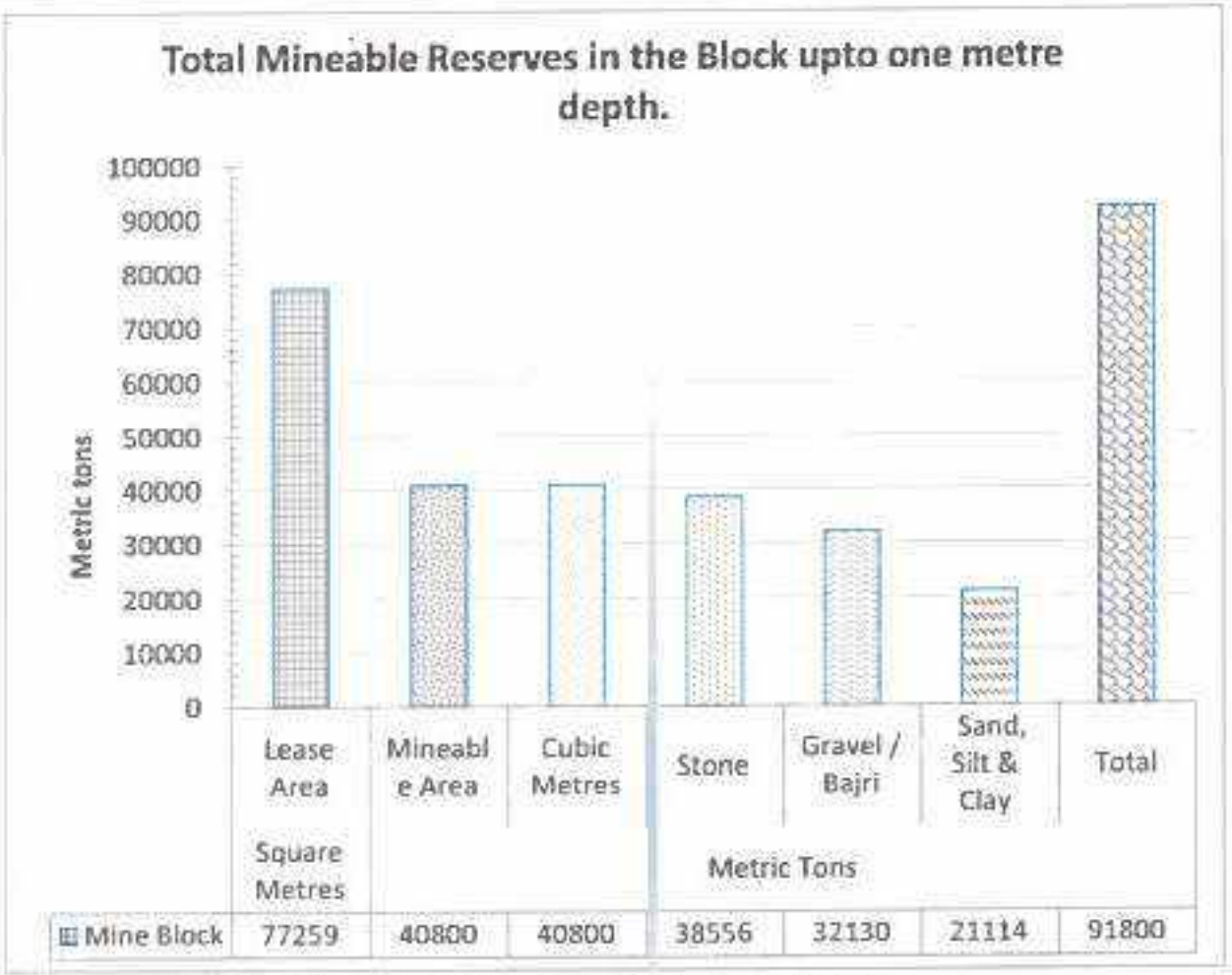


Figure 14: Mineable Reserve up to One Metre depth

Thus, the safe mine-able block of 40800 square metres contains 91800 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 91800 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 15 shows the proposed production of materials in five years.

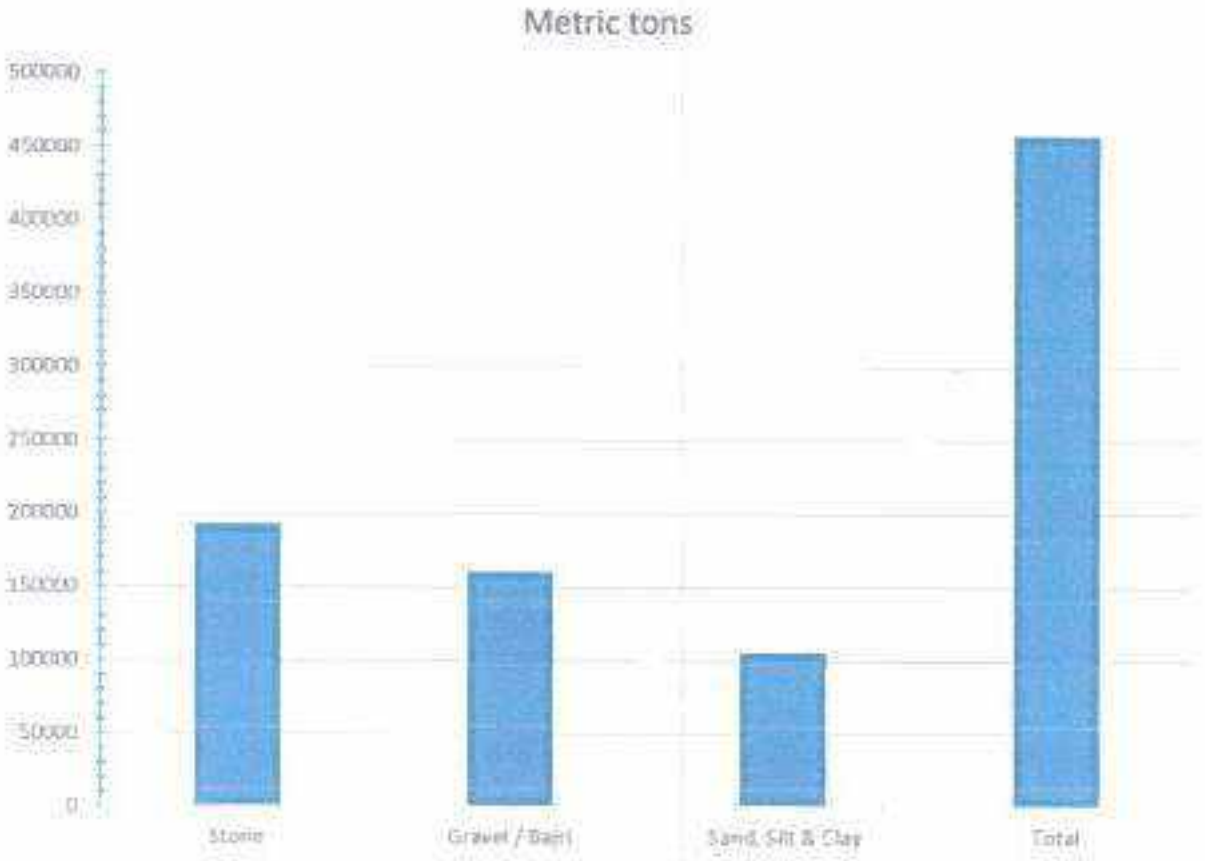


Figure 15:Proposed production of total material in five years

4 MINE DEVELOPMENT AND PLAN OF PROGRESSIVE MINING

The mining activity will be manual and to some extent 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 340 tonnes of material in a day 85 to 100 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 employed. 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

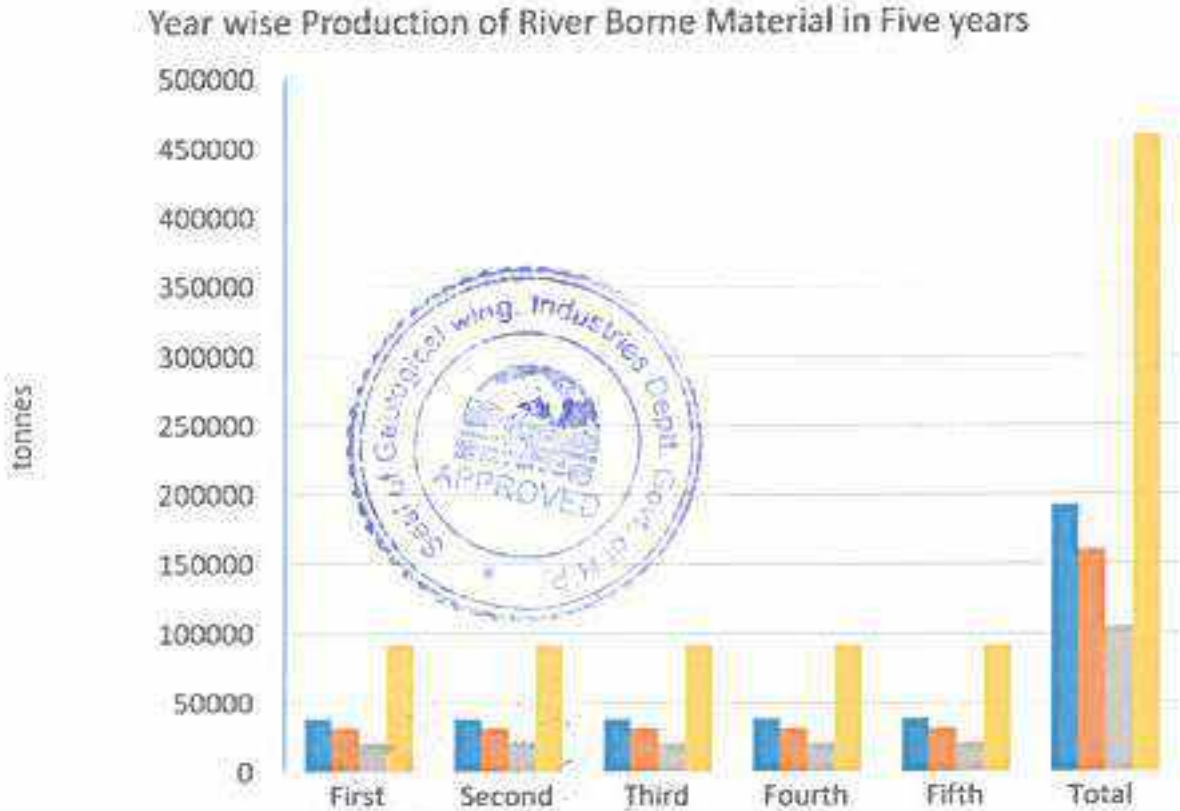


Figure 16:Year wise Availability of Materials (in Metric tons).

Table 4 Year wise production of materials.

Year	Stone	Gravel / Bajri	Sand, Silt & Clay	Total
First	38556	32130	21114	91800
Second	38556	32130	21114	91800
Third	38556	32130	21114	91800
Fourth	38556	32130	21114	91800
Fifth	38556	32130	21114	91800
Total	192780	160650	105570	459000

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 91800 tonnes of material is proposed to be mined from 40800 square meters of safe mining area out of 77259 square metres of leased block.
  - ➢ 38556 tonnes of stone and 132130 metric tons of bajri will be produced and dispatched to dedicated stone crushers.
  - ➢ 21114 tonnes of sand with inseparable silt & clay will be produced and dispatched to construction sites of the project.
  - ► About 37 percent of the leased Area falls outside the river corridor hence plantation can be undertaken in the 1st year at P1.
  - ► More than 63 percent of the leased Area falls within the river corridor, *in situ* rocks form the both the banks, therefore no retaining walls are proposed for its protection. However, 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.

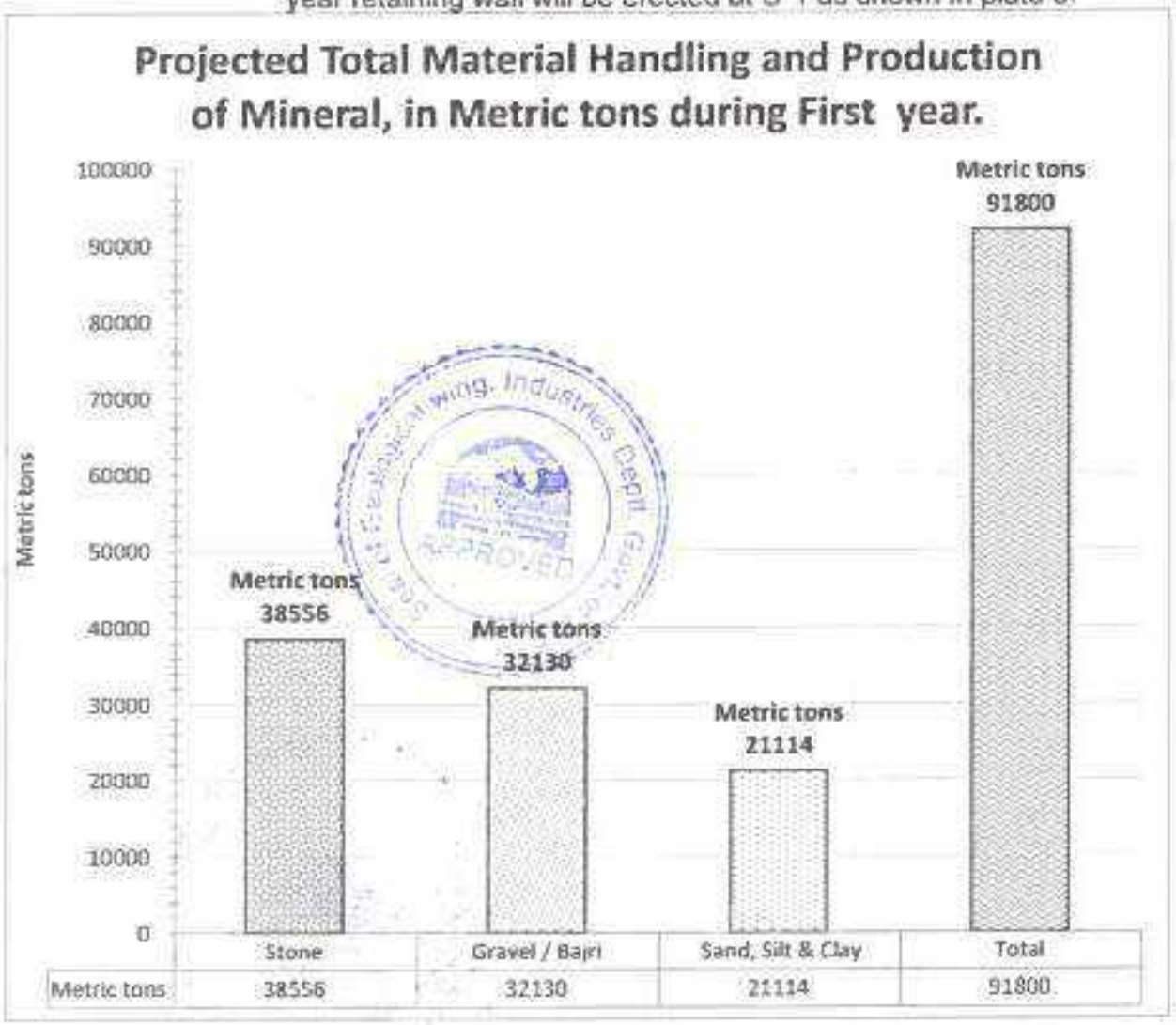


Figure 17- Proposed Production and Material Handling in the First Year of Mining.

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

During 2nd year of development and production programme:

- ✓ Mining of 91800 tonnes of material is proposed to be mined from 40800 square meters of safe mining area out of 77259 square metres of leased block.
  - 38556 tonnes of stone and 132130 metric tons of bajri will be produced and dispatched to dedicated stone crushers.
  - 21114 tonnes of sand with inseparable silt & clay will be produced and dispatched to construction sites of the project.
  - ► About 37 percent of the leased Area falls outside the river corridor hence plantation can be undertaken in the 2nd year at P2.
  - ► More than 63 percent of the leased Area falls within the river corridor, *in situ* rocks form the both the banks, therefore no retaining walls are proposed for its protection. However, 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.

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 91800 tonnes of material is proposed to be mined from 40800 square meters of safe mining area out of 77259 square metres of leased block.
  - ➢ 38556 tonnes of stone and 132130 metric tons of bajri will be produced and dispatched to dedicated stone crushers.
  - ➢ 21114 tonnes of sand with inseparable silt & clay will be produced and dispatched to construction sites of the project.
  - ► About 37 percent of the leased Area falls outside the river corridor hence plantation can be undertaken in the 3rd year at P3.
  - ► More than 63 percent of the leased Area falls within the river corridor, *in situ* rocks form the both the banks, therefore no retaining walls are proposed for its protection. However, 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.

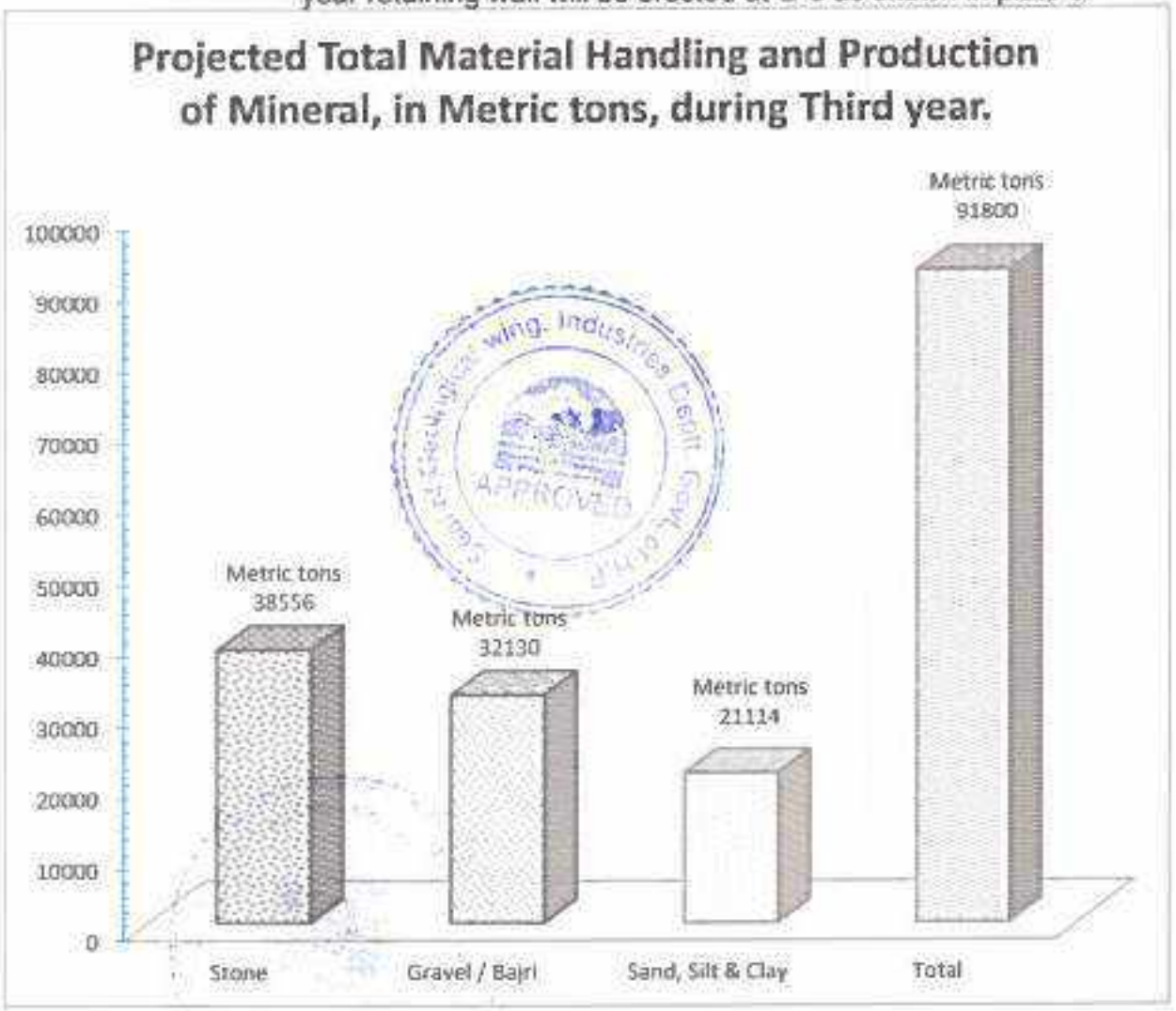


Figure 19- Proposed Production and Material Handling in the Third Year of Mining.

4.2 d Development and Production at end of fourth Year.

During 4th year of development and production programme:

- ✓ Mining of 91800 tonnes of material is proposed to be mined from 40800 square meters of safe mining area out of 77259 square metres of leased block.
  - 38556 tonnes of stone and 132130 metric tons of bajri will be produced and dispatched to dedicated stone crushers.
  - 21114 tonnes of sand with inseparable silt & clay will be produced and dispatched to construction sites of the project.
- ► About 37 percent of the leased Area falls outside the river corridor hence plantation can be undertaken in the 4th year at P4.
- ► More than 63 percent of the leased Area falls within the river corridor, *in situ* rocks form the both the banks, therefore no retaining walls are proposed for its protection. However, 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-5 as shown in plate 3.

Figure 20- 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 91800 tonnes of material is proposed to be mined from 40800 square meters of safe mining area out of 77259 square metres of leased block.
  - ➢ 38556 tonnes of stone and 132130 metric tons of bajri will be produced and dispatched to dedicated stone crushers.
  - ➢ 21114 tonnes of sand with inseparable silt & clay will be produced and dispatched to construction sites of the project.
  - ► About 37 percent of the leased Area falls outside the river corridor hence plantation can be undertaken in the 5th year at P5.
  - ► More than 63 percent of the leased Area falls within the river corridor, *in situ* rocks form the both the banks, therefore no retaining walls are proposed for its protection. However, 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.

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

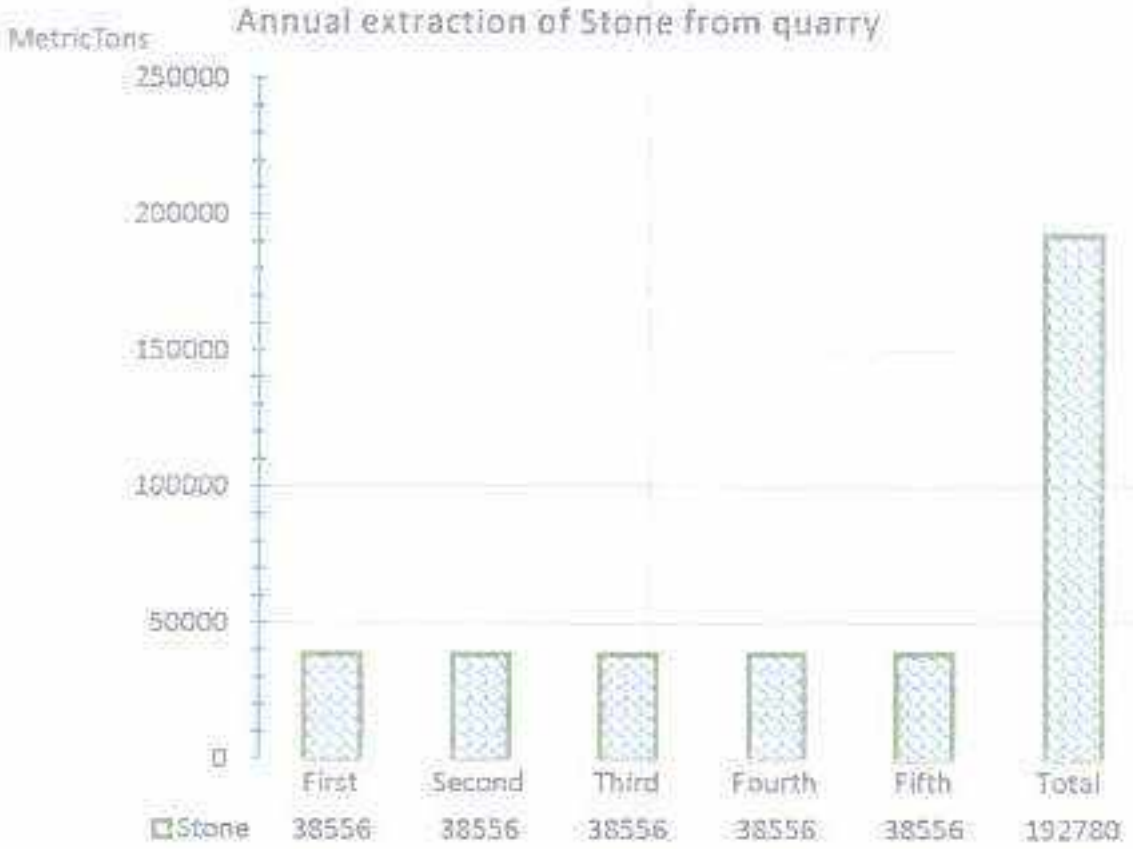


Figure 22: Year wise production of Stone.

Figure 23: Annual Production of Bajri

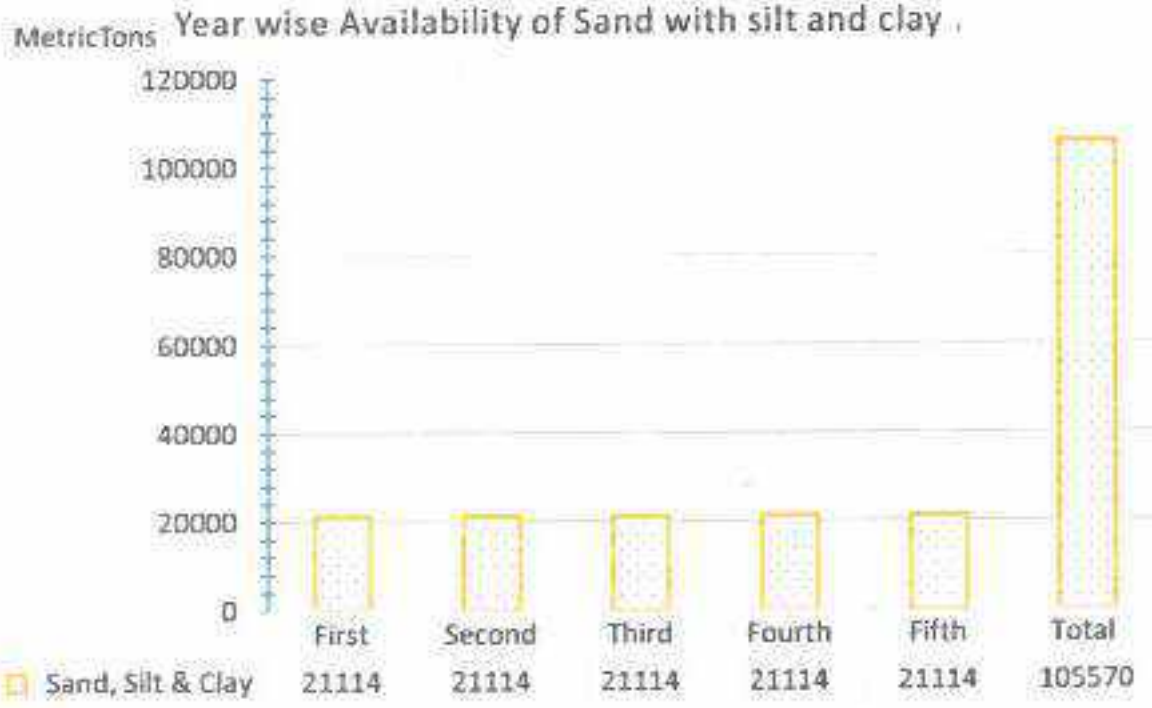


Figure 24: Annual production of sand along with silt & clay.

4.4 Detail of road Transport

The maximum total extraction of minerals stone, sand and bajri for use in the Project would be 91800 tonnes or 340 metric tonnes per day, considering 270 working dry days. Thus, about 38 tipper truck trips would be required to move the material from quarry to crusher / construction sites. The track through River is about 100 metres along the leased area to roadside. The evacuation route is shown in figure 25.

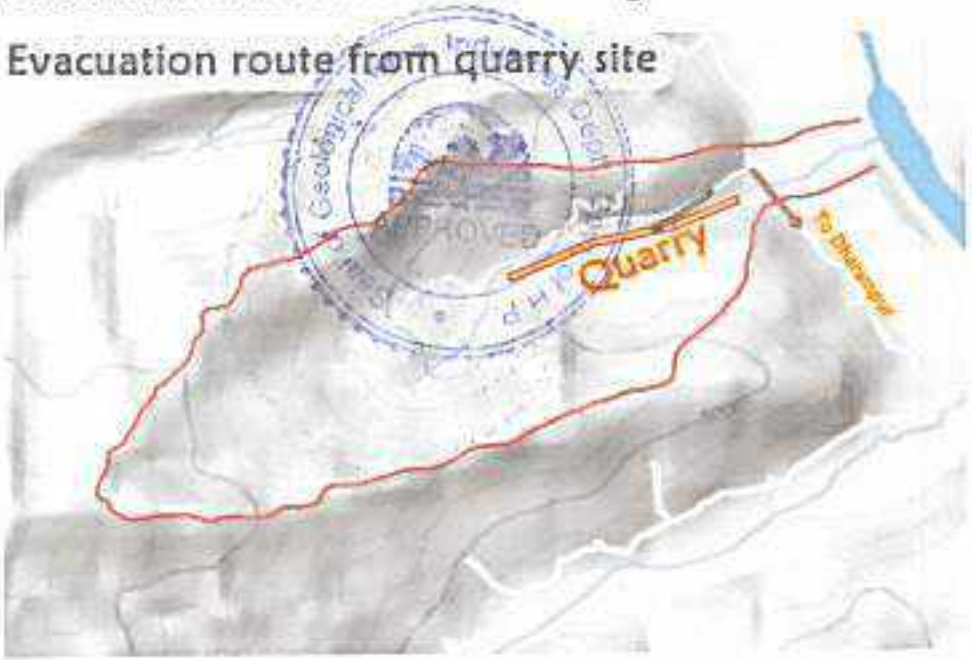


Figure 25. Evacuation route Map

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.

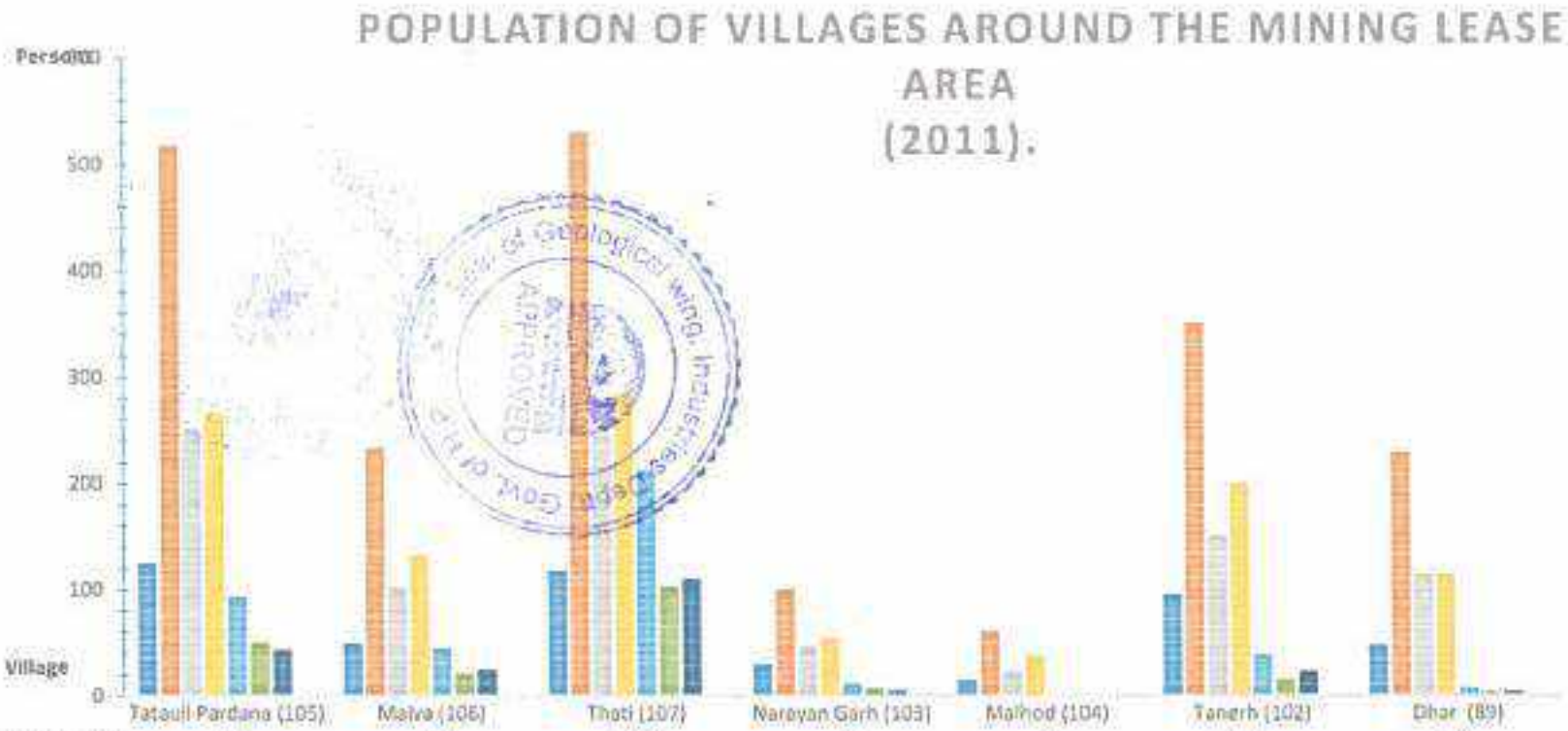
The base line information of the existing environment was collected from various sources such as

- ✓ 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

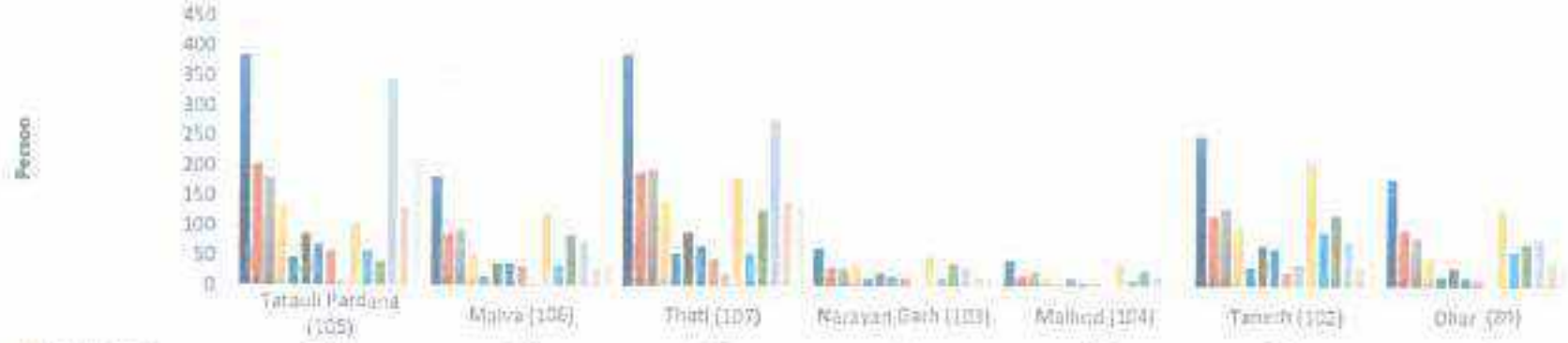
The total population of the surrounding area, as per the 2011 Census is given below in the figure 26. Education wise and employment wise break of population in the surrounding villages is given in figure 27. The population details of Mandi District and Sub-Tehsil Thirampur is given in figure 28.



	Tatauli Pardana (105)	Malva (106)	Thoti (107)	Narayan Garh (103)	Malhod (104)	Tanerh (102)	Dhar (89)
Total House Hold	125	50	118	30	15	96	48
Population	518	234	531	100	61	352	229
Male	252	102	246	46	23	152	114
Female	266	132	285	54	38	200	115
Schedule Caste	94	45	213	12	0	39	8
SC_Male	51	21	103	7	0	16	4
SC_Female	43	24	110	5	0	23	4
Schedule Tribe	0	0	0	0	0	0	0

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

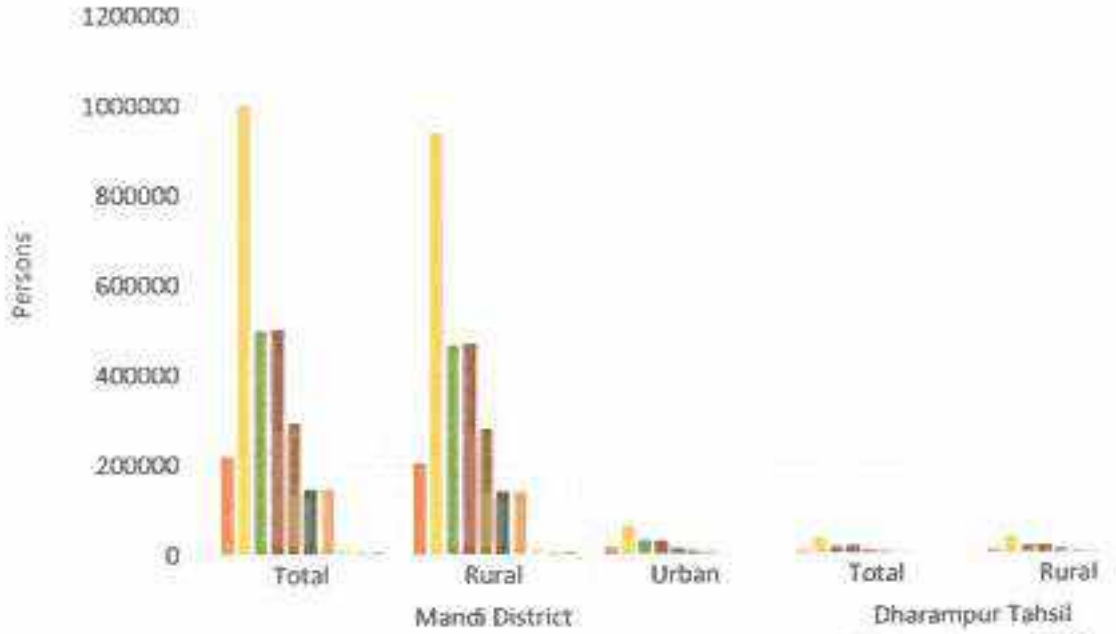
Working Categorisation of Population of surrounding villages of lease area, Tehsil Dharampur, District Mandi - (Census 2011).



	Tatauli Pardona (105)	Malva (106)	Thati (107)	Narayan Garh (103)	Malhod (104)	Tanesh (102)	Dhar (89)
Total Literate	384	181	387	69	43	251	178
Male Literate	204	87	191	32	18	119	95
Female Literate	180	94	196	37	25	132	83
Total Illiterate	134	53	144	37	18	101	91
Male Illiterate	48	15	55	14	5	33	19
Female Illiterate	86	38	89	23	13	68	32
Total Workers	69	39	66	17	7	64	19
Male Workers	59	34	46	15	7	25	13
Female Workers	10	5	22	2	0	39	3
Total Marginal Workers	202	121	183	51	32	211	133
Marginal Workers (Male)	80	36	57	14	11	92	60
Marginal Workers (Female)	42	85	126	37	28	119	73
Non-Workers	347	74	280	32	17	77	80
Non-Workers (Male)	133	32	141	17	5	35	41
Non-Workers (Female)	214	42	137	15	12	42	39

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).



	Mandi District			Dharampur Tahsil	
	Total	Rural	Urban	Total	Rural
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 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 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 29 there is moderately high percentage of *unemployed (44.79%)* and *underemployed (41.383%)* people in the area despite moderately high level of literacy, (73.43% literates, figure 30) of literacy.

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

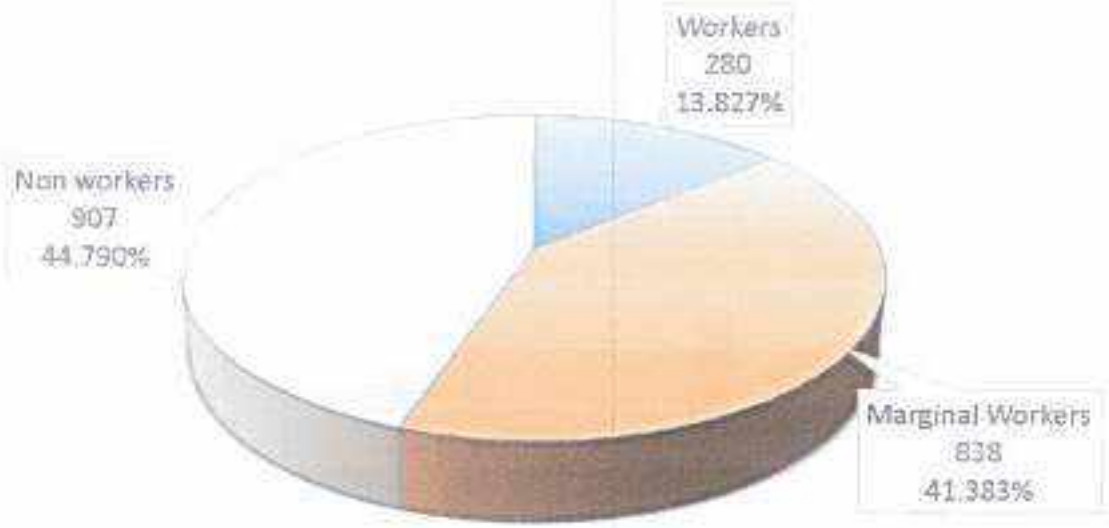


Figure 29: Employment percentage in adjoining villages.

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

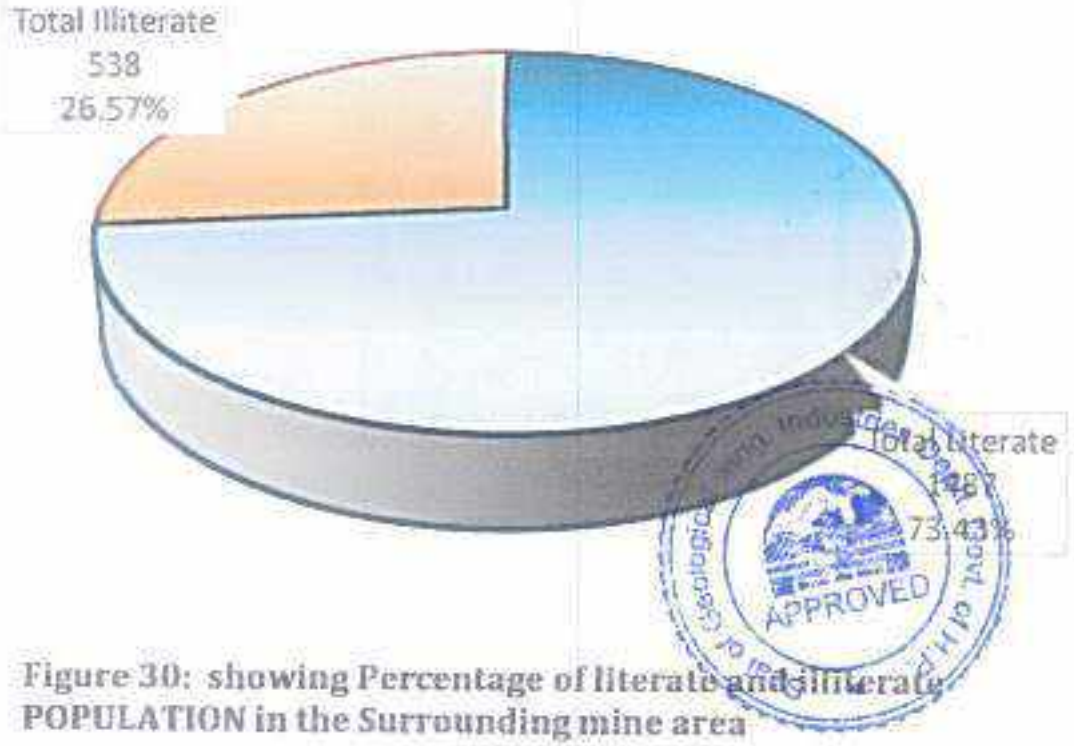


Figure 30: showing Percentage of literate and illiterate POPULATION in the Surrounding mine area

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

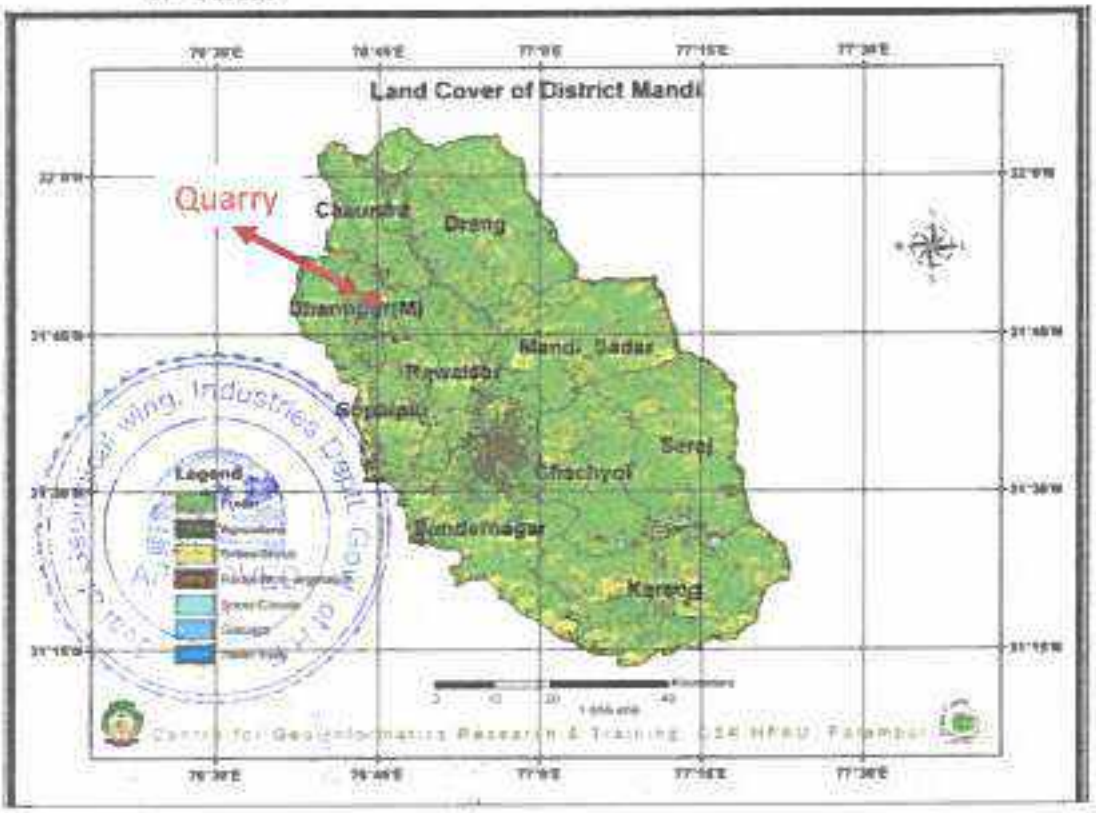


Figure 31: Showing General Land Use Pattern of the District Mandi.

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

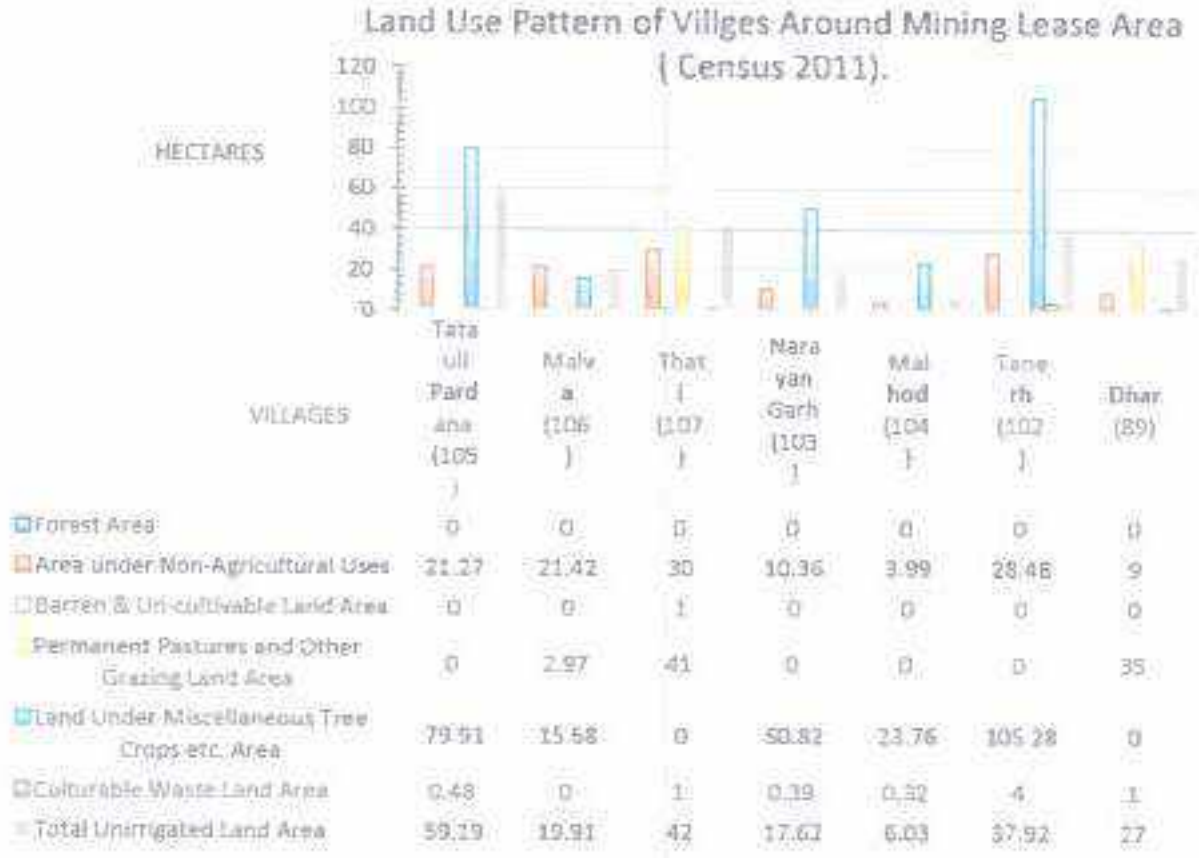


Figure 32: Showing Land Use Pattern of villages around the mining lease area.

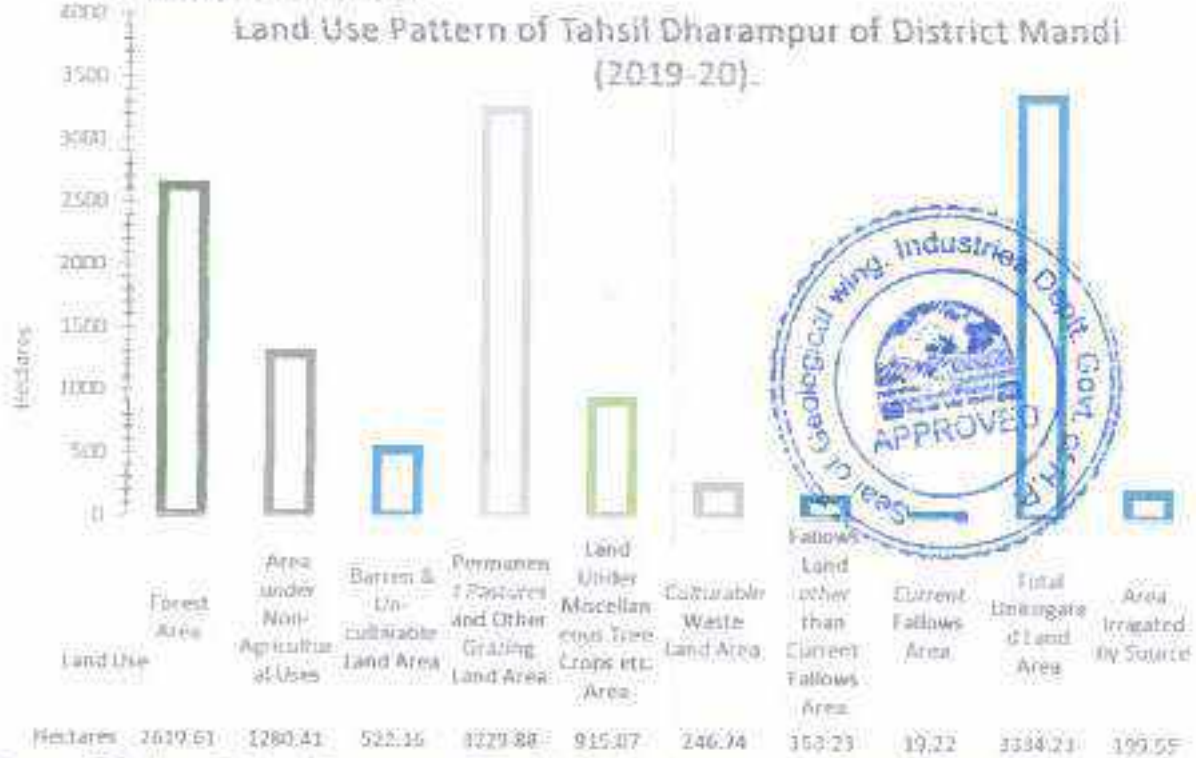


Figure 33: Land Use Pattern of Tahsil Dharmpur of District Mandi.

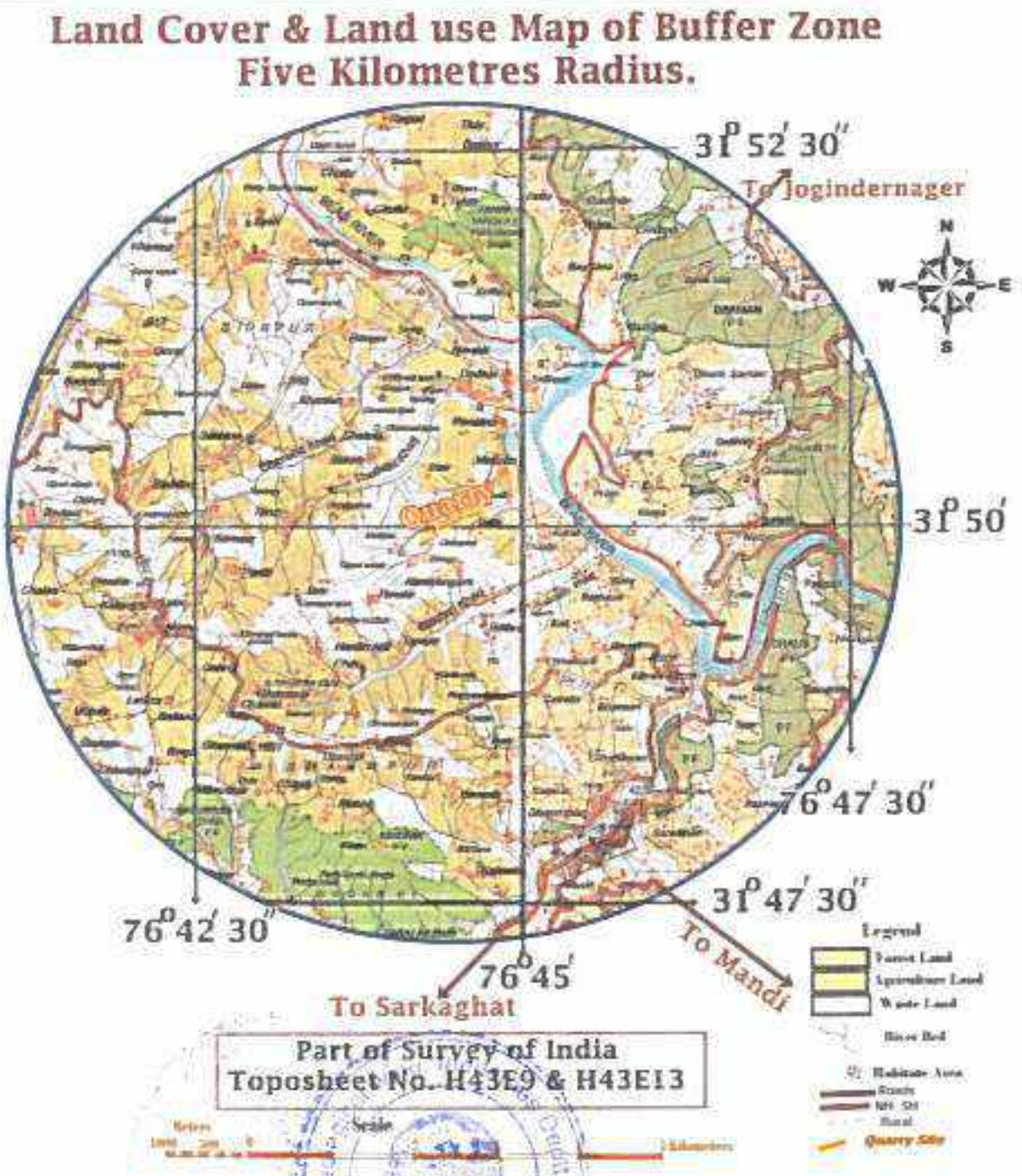


Figure 34: Showing the Five kms Radius Buffer zone.

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 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: -35.

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

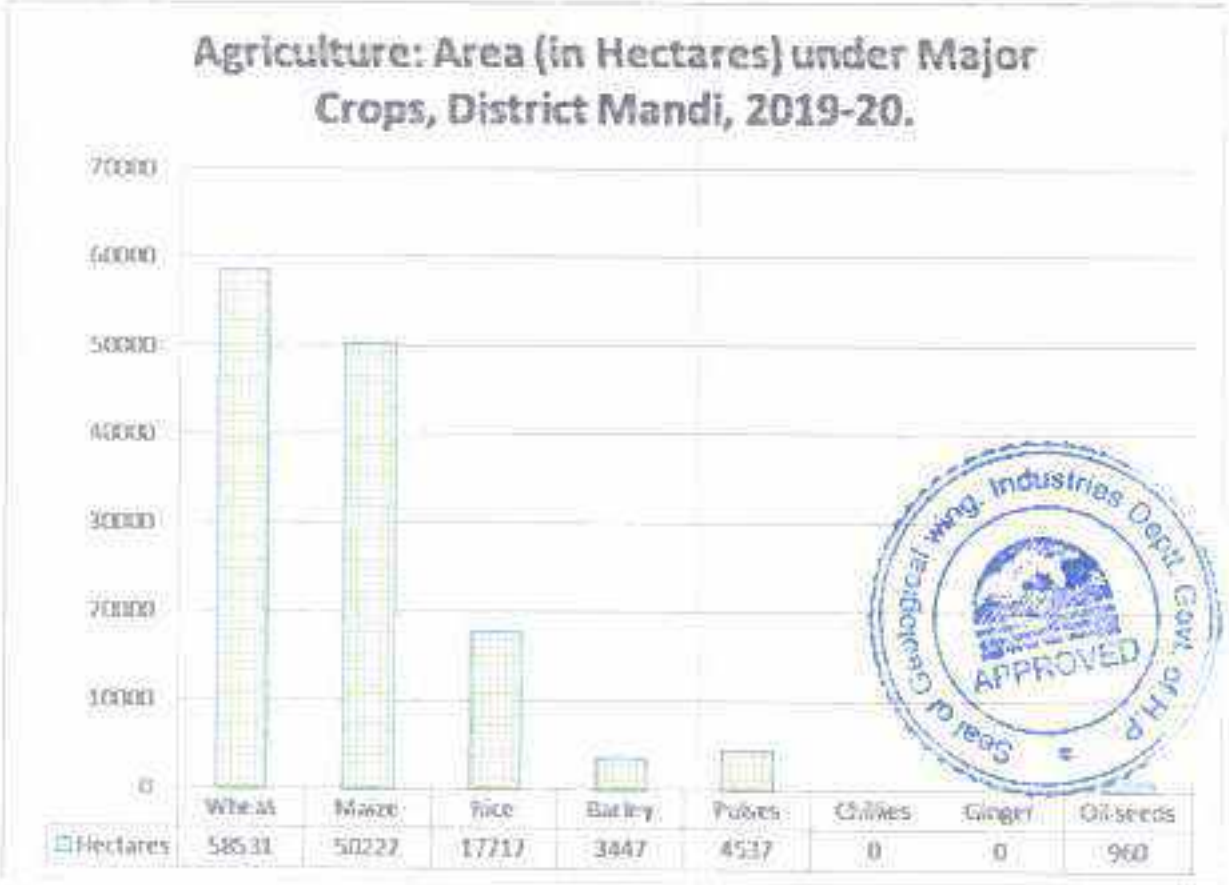


Figure 35:: Showing area under different crops in Mandi District

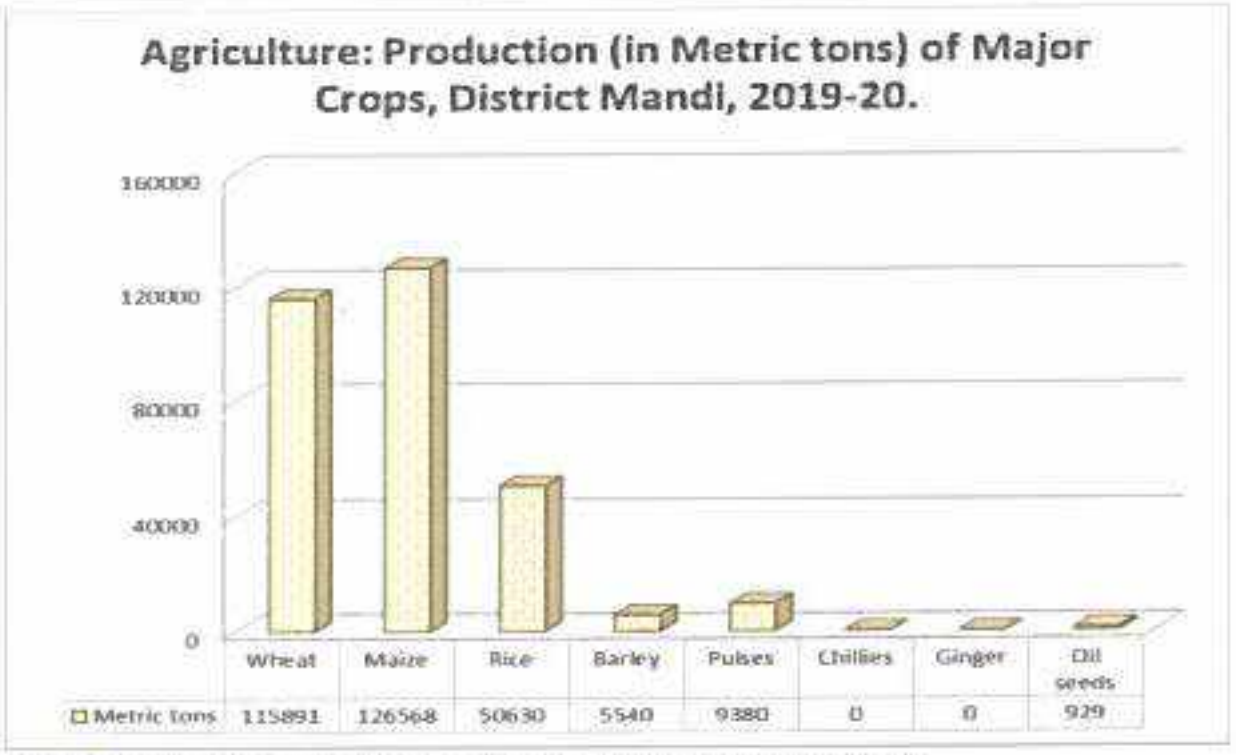


Figure 36 Showing production of each crop in District Mandi.

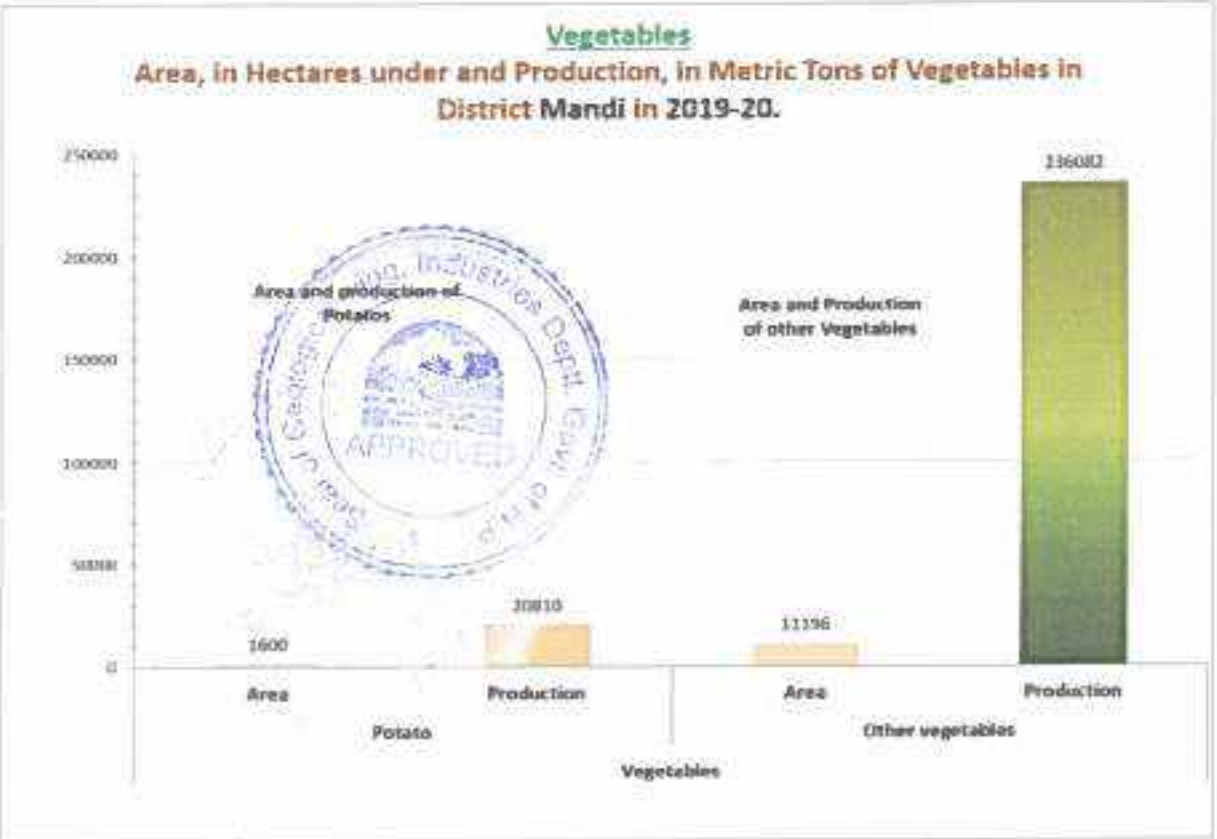


Figure 37: Showing area under vegetable, in Hectare and Production, in Metric tons, of District Mandi.

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	220
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: -38. The population of the Buffaloes and Cattle in District Mandi is given in the figure: -39.

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

Figure 38: Livestock population of District Mandi.

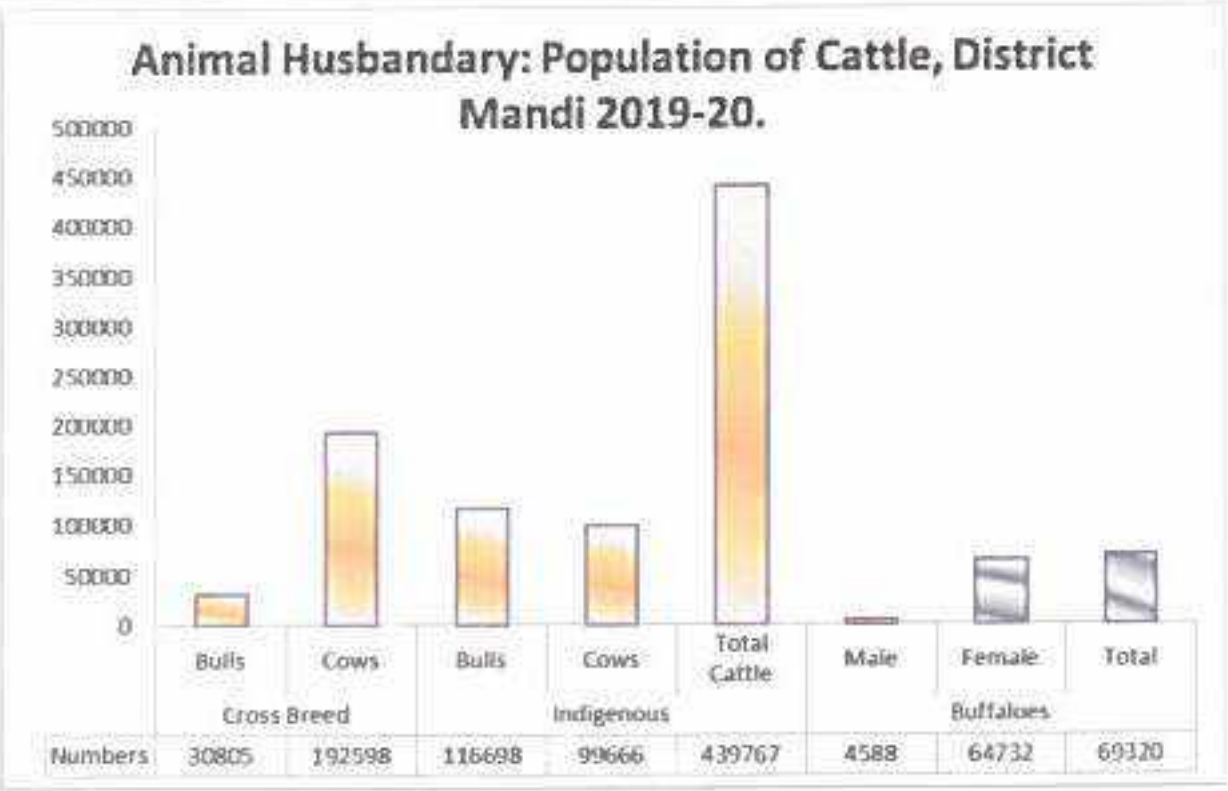


Figure 39: Showing Population of Cattle Buffaloes in District Mandi.

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 trought 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 trought fishing.

No perennial stream passes through the area under consideration.

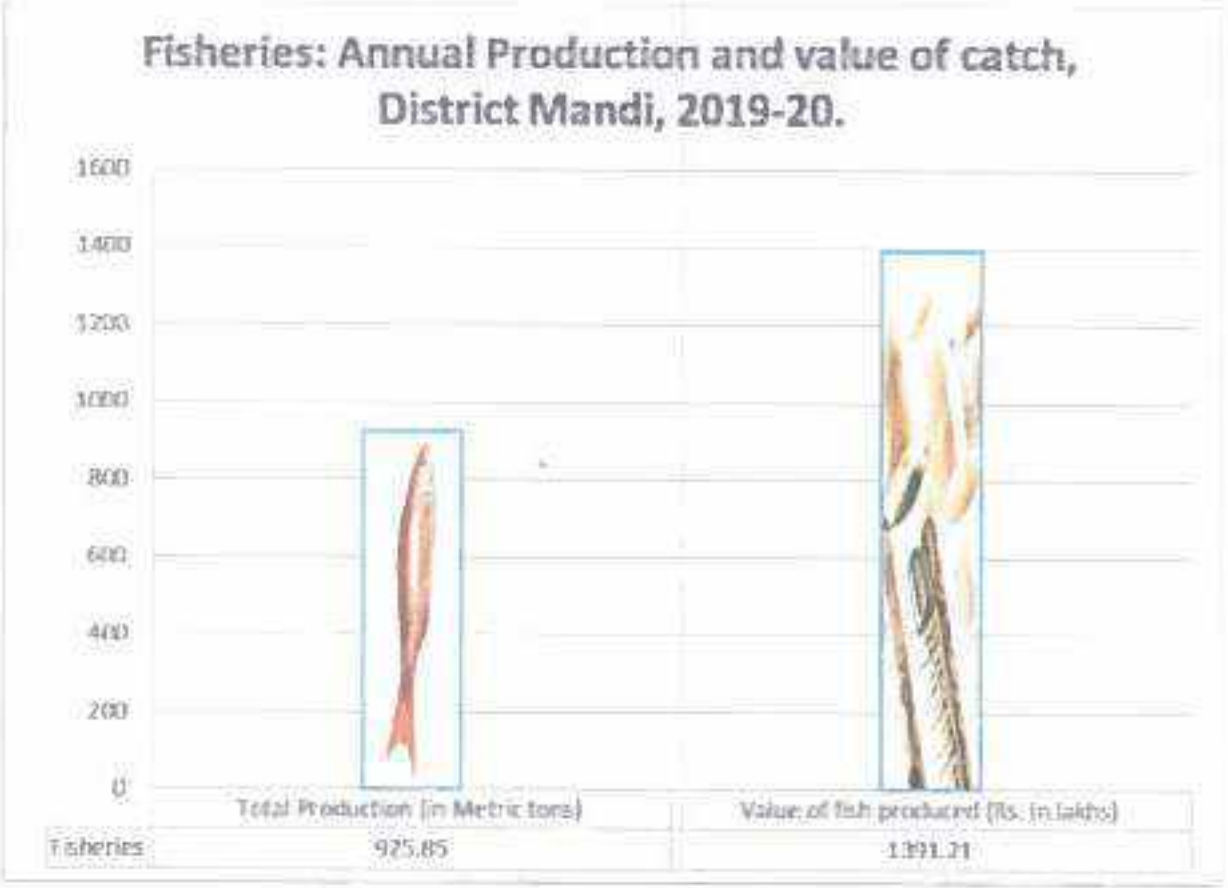


Figure 40: Showing Fish catch / production and its sale value in 2016-17.

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 (Bombex malabaricum),
Mango (Magniferaindica)
Tun (Cedrela toona)
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 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**
Milvus migrants	Vulture	Cheel, Gidh, Eell
Eudynamys scolopacco	Koel	Koel
Columbia livia	Pigeon	Kabuttar
Coracias bengalensis	Blue jay	Nilkantha

Columa livia	Hawk	Baj
Francolius francolinus	Black partridge	Kala Tittar
Francolius pondicerians	Grey partridge	Safed Tittar
Pavo cristatus	Peacock	Mor
Coturnix coturnix	Common quail	Bater
Alectoris graeca	Chakor	Chakor
Corvus splendens	Crow	Kanwa
Prattacula Karneri	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	Chori- Pinja
Passer domesticus	*House sparrow*	Chirya
Carduelis spinoides	Himalayan Green Finch	Tota

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

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 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**

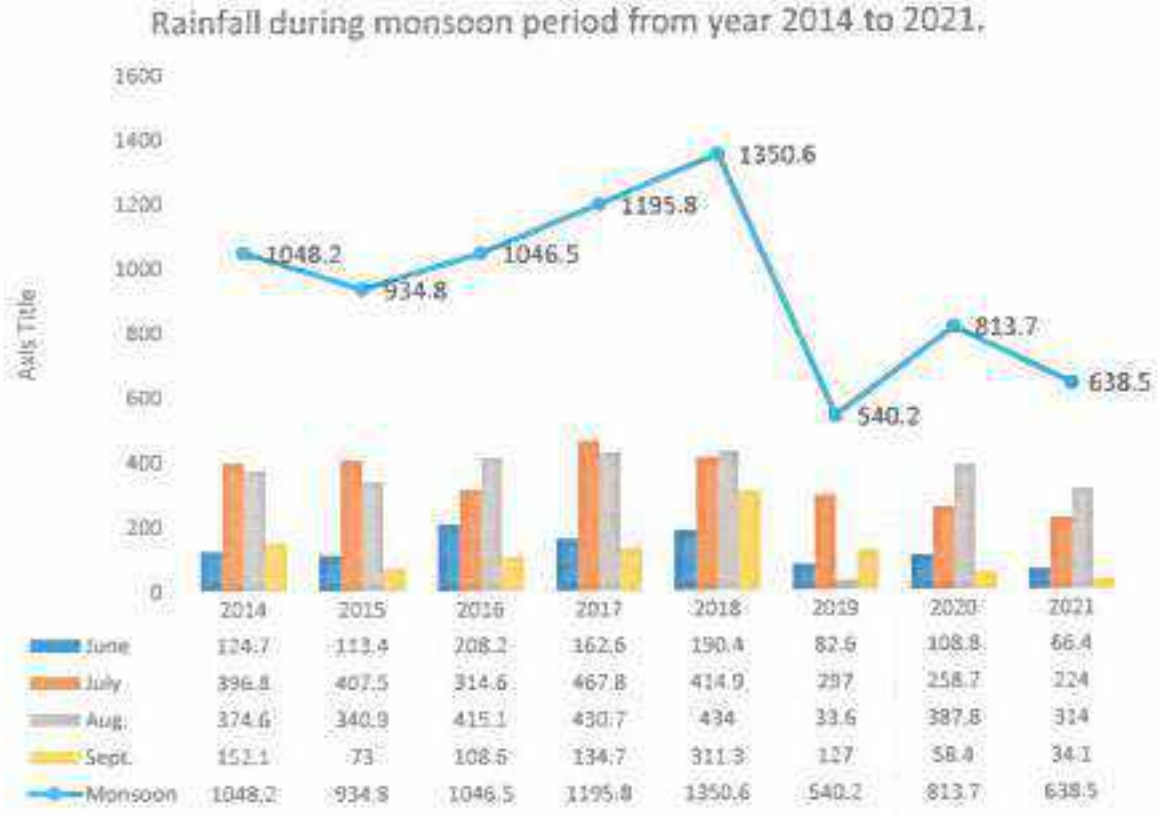


Figure 41:Yearly monsoon Rainfall from year 2014 to 2021.

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 695 metre above mean sea level.
- The lowest point is at 647 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 4080 sq.m. area of 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 river banks.
- 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 340 metric tons of stone, Bajri and sand with silt-clay per day.
- 38 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. 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 85 to 100 persons (if only 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 – Seog rural road is about 200m through the Khad track. The mined material is transported through tracks made in the Khad. About 340 metric tonnes of material shall be transported per day with an average of 38 tipper truck trips. The movement of 38 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 695 metre above mean sea level.
- The lowest point is at 647 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 8 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 topspil is required to be removed, or disposed of.

1.4. Preventive Check dams

Considering the rocky condition of riverbanks, no check walls are required to be constructed. There is a rural road passing along the Khad for some distance leading to village Thathi. H.P.P.W.D. have constructed crat wire wall for its protection. More, check/retaining walls have been suggested to be erected at vulnerable points mainly along rural road C1 to C5. The total length may extend to 250 metres costing about Rs.50000/=.

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	100	5	2000
Second	150	15	7000
Third	150	15	8000
Fourth	200	20	10000
Fifth	250	25	15000
Total	850	80	42000

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 about 7 m. 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. 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 and JCB operators	9
Unskilled workers	85

Thus, total generation of Employment will be to a tune of 95 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 Malot Khad, for Stone, bajri and sand situated in Khasra No. 3185, 3187/1, 4/1 and 108 measuring 7.7259 Hectares, FALLING Mauza/Mohal Tatoli Pardana, Naraingarh & Thathi, 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

Thakur

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 Nos. 3185, 3187/1, 4/1 & 108, measuring 7.7259 Hectares, Mauza – Tatoli Pardana, Naraingarh & Thathi, 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.

Industries Deptt. Govt. of H.P. APPROVED Seal of Competent Authority

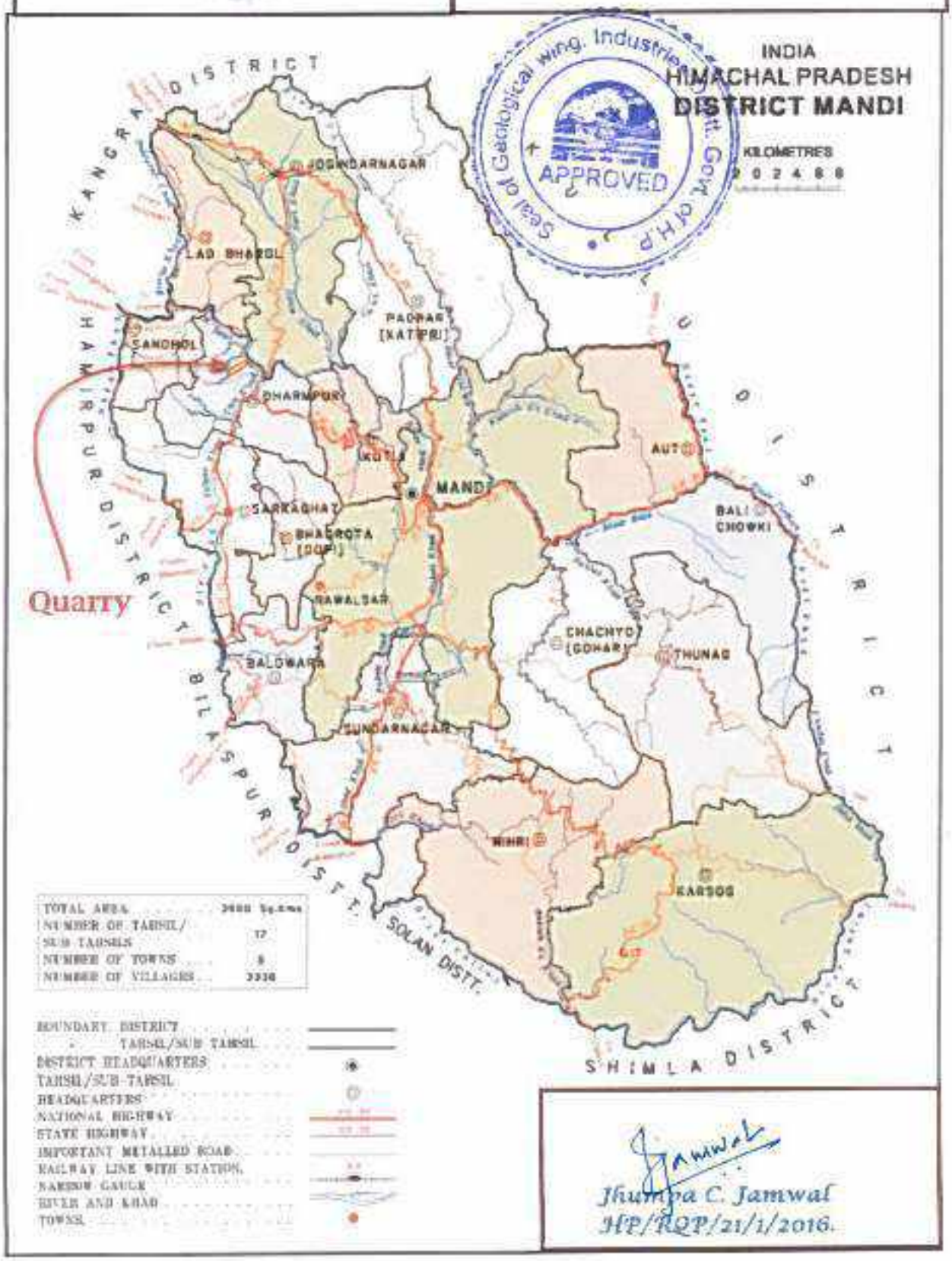
Date
Place: Shimla

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

Plate 1

Saklain Khad Quarry

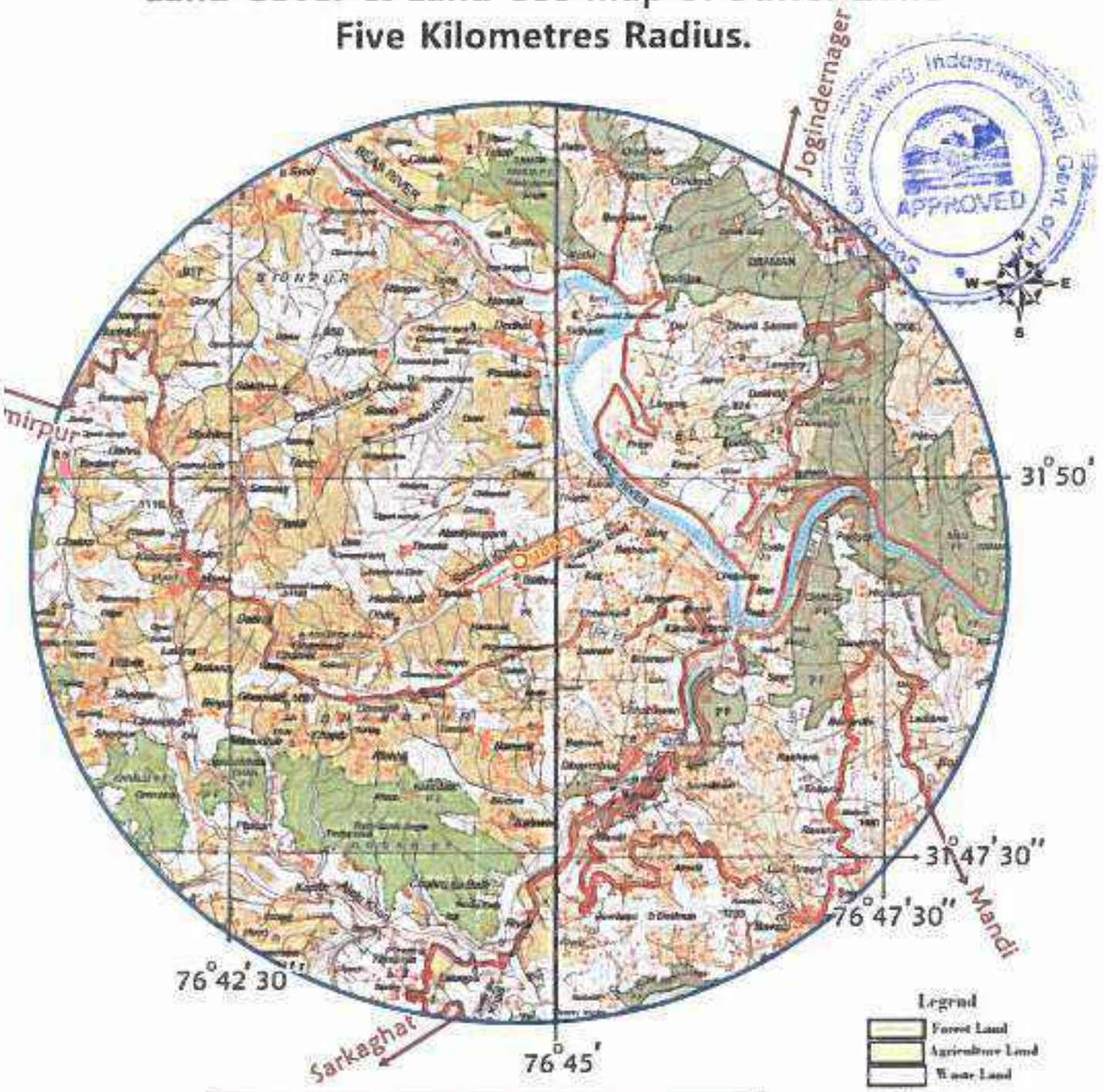
Lessee
General Manager
Triveni Mahadev & Thana Plaun HEP's,
Himachal Pradesh Power Corp.Ltd.,
Tehsil Kotli, Distt Mandi,
HP-175003



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

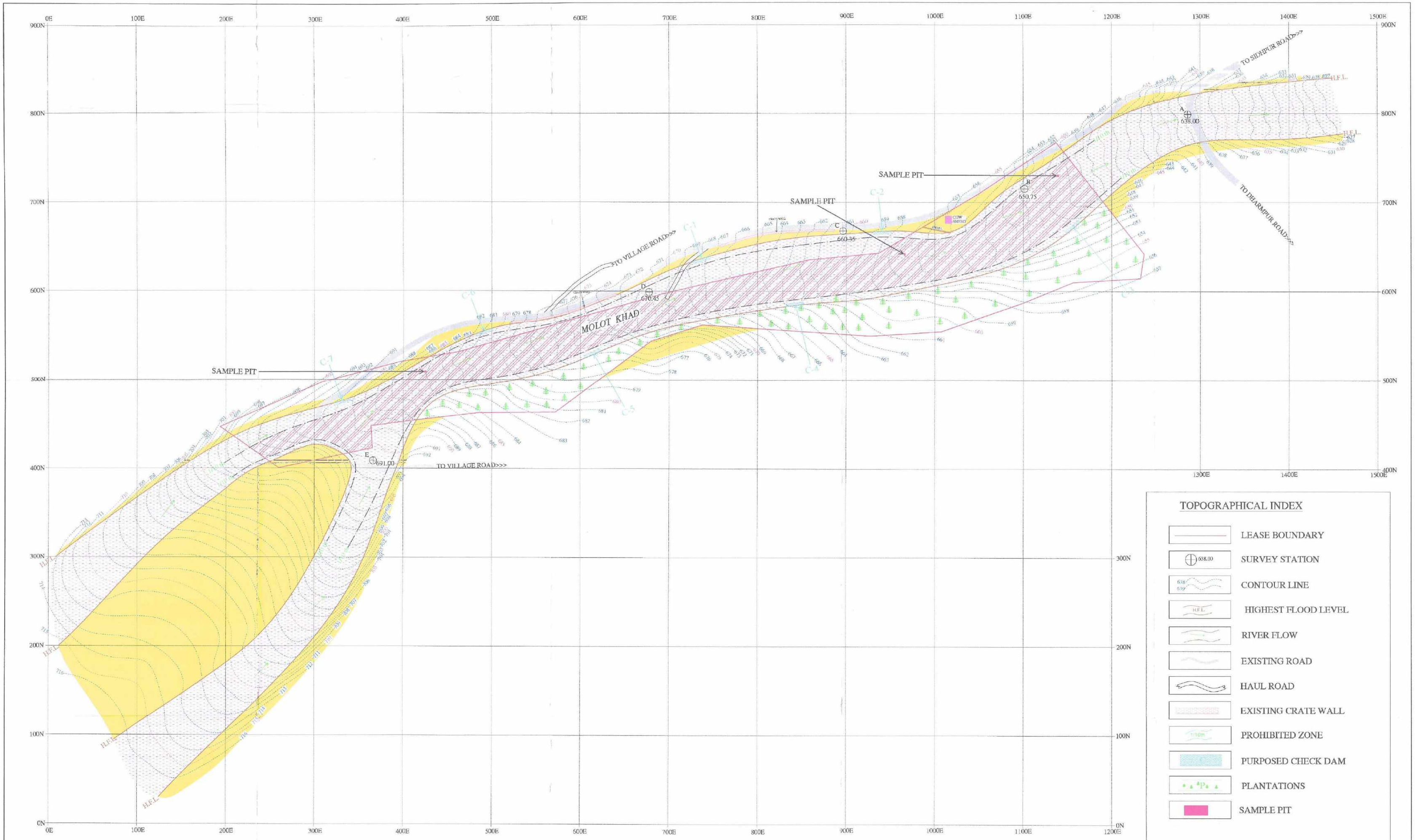
Plate 4

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



Part of Survey of India
Toposheet Nos. H43E9 & H43E13

Lessee The General Manager Triveni Mahadev & Thana Plaun HEP's, Himachal Pradesh Power Corp.Ltd., Tehsil Kotli, Distt. Mandi.	Jhumpa C. Jamwal HP/ROP/21/1/2016.



TOPOGRAPHICAL INDEX

- LEASE BOUNDARY
- 638.00 SURVEY STATION
- CONTOUR LINE
- H.F.L. HIGHEST FLOOD LEVEL
- RIVER FLOW
- EXISTING ROAD
- HAUL ROAD
- EXISTING CRATE WALL
- PROHIBITED ZONE
- PURPOSED CHECK DAM
- PLANTATIONS
- SAMPLE PIT

GEOLOGICAL INDEX

- CHANNEL DEPOSIT
- TERRACE DEPOSIT
- WORKING AREA

M/S TM & TP HEP'S, HPPCL.(MOLOT KHAD Q-3.

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°50'10.57" E-76°44'55.92"

B N-31°50'07.70" E-76°44'48.66"

C N-31°50'05.97" E-76°44'40.95"

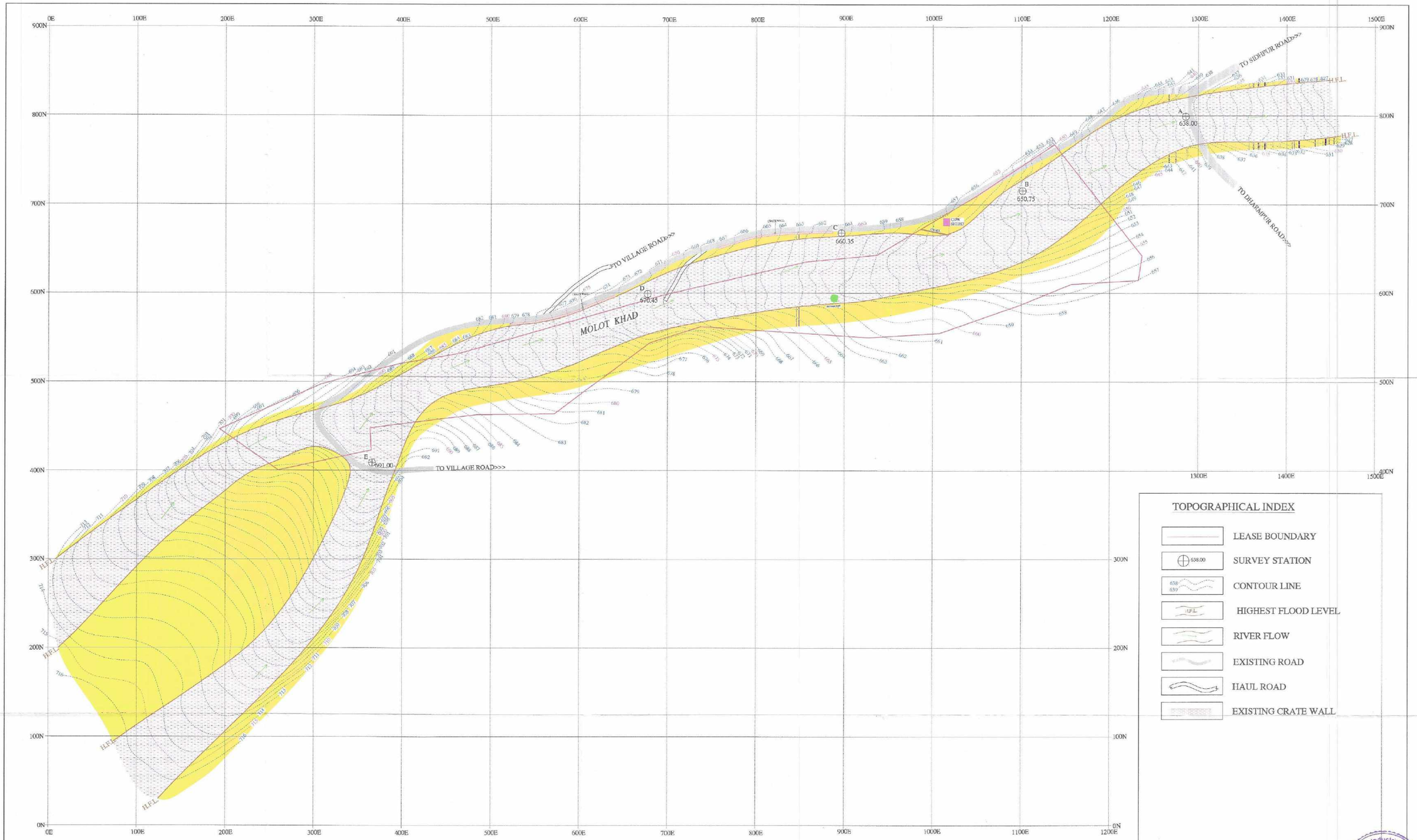
NORTH: -

CERTIFIED THAT THE PLAN IS CORRECT.

JMT/A C. JAMWAL
No. HG/RQP/21/1/2016

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

Plate No. III.



TOPOGRAPHICAL INDEX

- LEASE BOUNDARY
- SURVEY STATION (638.00)
- CONTOUR LINE (638 / 639)
- HIGHEST FLOOD LEVEL (H.F.L.)
- RIVER FLOW
- EXISTING ROAD
- HAUL ROAD
- EXISTING CRATE WALL

GEOLOGICAL INDEX

- CHANNEL DEPOSIT
- TERRACE DEPOSIT

M/S TM & TP HEP'S, HPPCL.(MOLOT KHAD Q-3.	
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 AND SURFACE FEATURES.

COORDINATES : -

A N-31°50'10.57" E-76°44'55.92"

B N-31°50'07.70" E-76°44'48.66"

C N-31°50'05.97" E-76°44'40.95"

NORTH: -

CERTIFIED THAT THE PLAN IS CORRECT.

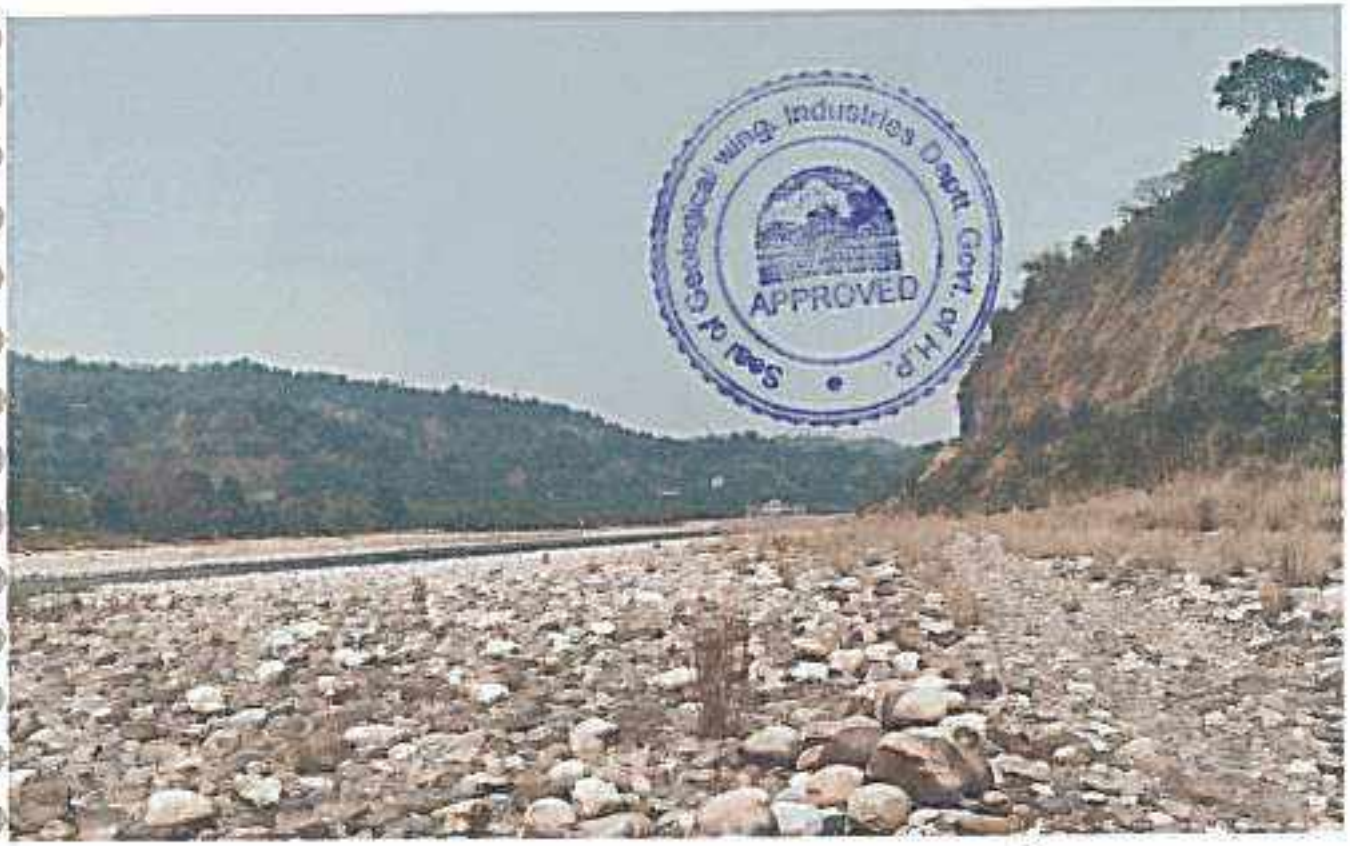
JHUMMA C. JAMWAL
No. HP/RQP/21/1/2015

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

Plate No. II.

MINING PLAN

MINOR MINERAL LEASE FOR STONE , SAND & BAJRI, SITUATED IN KHASRA No.2721/1, 4.1207 HECTARES, MAUZA PRAIN, TEHSIL JOGINDERNAGER, DISTRICT MANDI, HIMACHAL PRADESH



LETTER OF INTENT ISSUED IN FAVOUR OF THE GENERAL MANAGER TRIVENI MAHADEV & THANA PLAUN HEP'S, HIMACHAL PRADESH POWER CORP. LTD., TEHSIL KOTLI, DISTT. MANDI. HIMACHAL PRADESH.

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

2023

INDEX

MAP INDEX

Declaration
Certificate of RQP

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

सामकोण शाखा,
उद्योग विभाग शिमला
Geological wing
Dept. of Industries
Shimla
APPROVED
Area Conditions
वर्गी के लिए अनुमोदित
Advt. Letter No. UDY(G)-Bhu (Kham-4) Lagha-538/19-121
Dated.
Shimla 23/5/23

Geologist Incharge
Geology Wing
Deptt. of Industries Shimla-1

962
29-05-23

GM/AGM/DM (Env)

29/05/

MINING PLAN
OF MINOR MINERAL LEASE FOR SAND, STONE & BAJRI SITUATED IN KHASRA No. 2721/1, MEASURING 4-1207 HECTARE MAUZA PRAIN, TEHSIL –JOGINDERNAGER, DISTT – MANDI (H.P.)
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' 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-538/2017-11940 dated 06/03/2019 and extended for further period of one year vide letter No. Udyog-Bhu(Khani-4) Laghu-538/2017-6730 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 run off river dam 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 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

The quarry lease area is located at about 36 Km. from Jogindernager. The area can be approached through a rural road branching from SH 19.

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 Corporation 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	Survey of India
Surveyed in	1989-90, upgraded 2005
Sheet No.	H43E13
Scale	1:50,000
Edition	First

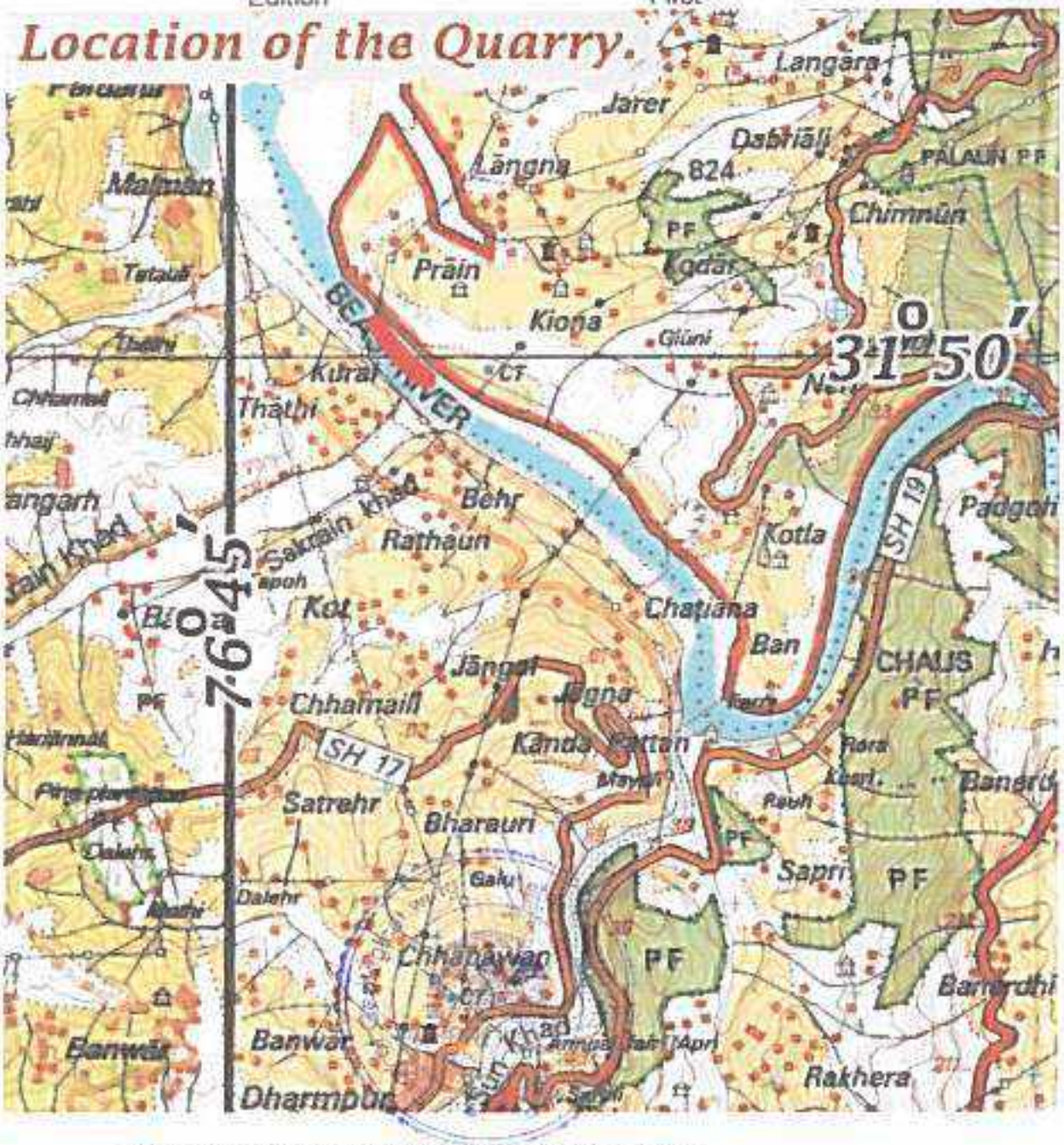


Figure 1: Location of the Mining Lease area.

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 (Calculated)

A	31° 50' 11.58"	76° 45' 20.30"
B	31° 50' 08.24"	76° 45' 25.04"
C	31° 50' 00.77"	76° 45' 30.10"
D	31° 49' 58.31"	76° 45' 34.61"
E	31° 49' 56.18"	76° 45' 33.57"
F	31° 49' 58.96"	76° 45' 28.27"
G	31° 50' 06.82"	76° 45' 22.62"
H	31° 50' 1026"	76° 45' 18.08"

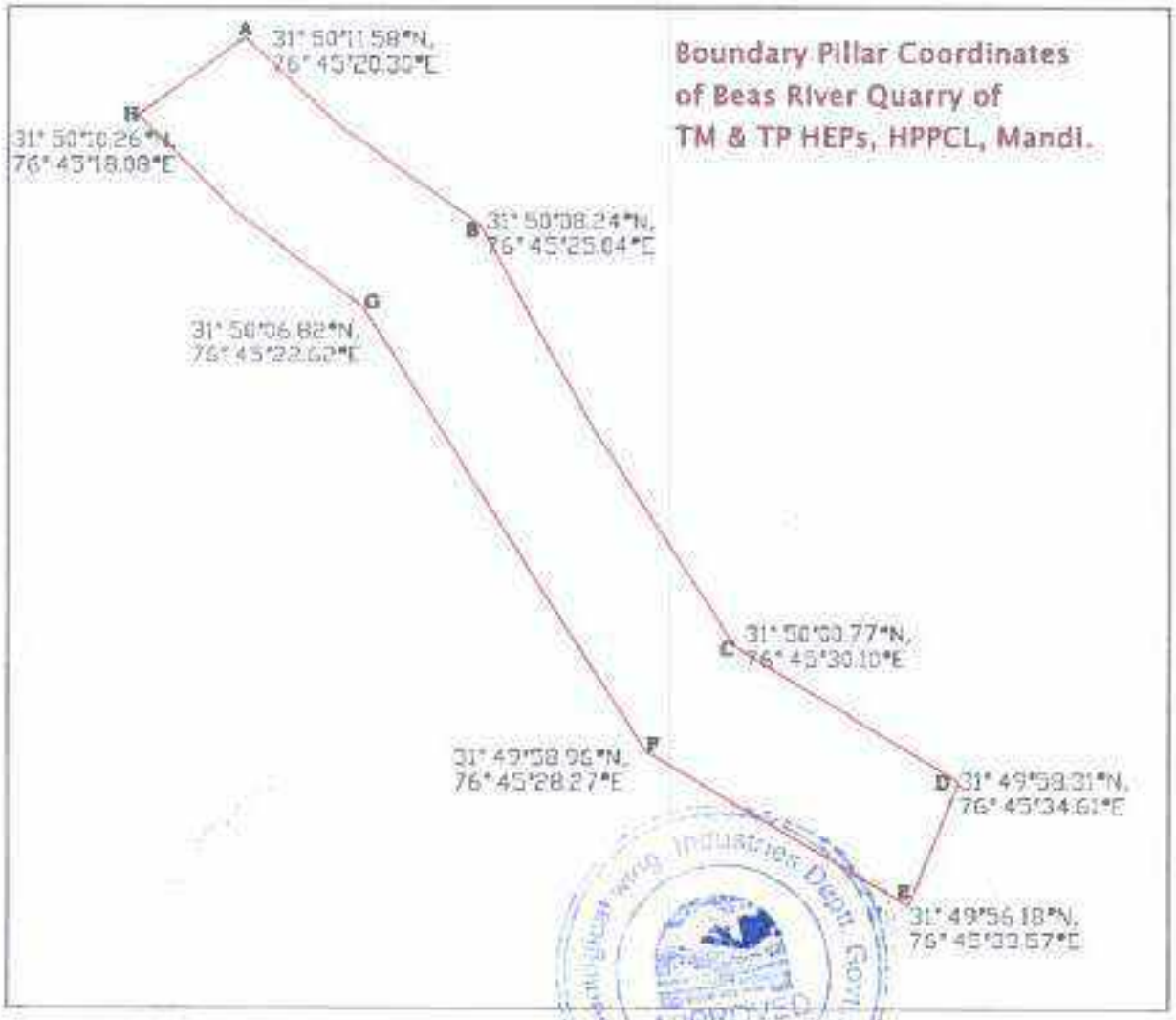


Figure 2: Calculated Coordinates of Boundary Pillars

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

Khasra Number	Area Hectares	Owner of Land	Kism	Mauza/mohal
2721/1	4.1207	Government	Gair mumkin Darya	Prain
TOTAL			4.1207 HECTARES	

2.3 Address & Detail of Lease

	Village: -	Prain
	Patwar circle:	Langna
	Post Office: -	Langna
	Tahsil: -	Jogindernager
	District: -	Mandi
Administrative Office	Sub-Divisional Office (Civil): -	Jogindernager
	Divisional Office (Forest): -	Jogindernager
	Range Office (Forest): -	Joglndenager
	Assistant Engineer (IPH): -	Langna
	Assistant Engineer (PWD): -	Langna
	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	0.10
2	Roadside	Joginder Nager	36
3		Mandi (District Offices)	74
4		Shimla (State Hq)	171
5		Dharmsala	92
		Gaggal (Airport)	96
6		Dharampur	23
7		Sarkaghat	36
8		Sujanpur Tira	64

2.5 Approach to the Area.

The leased site is part of Riverbed and is at 0.1 km from Rural Road leading to SH 19. Joginder Nager via SH 19 is 36 kms from the quarry site. The SH 19 connects to NH 3 near Dharampur leading to Mandi at 74 Km from Quarry site.

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: -

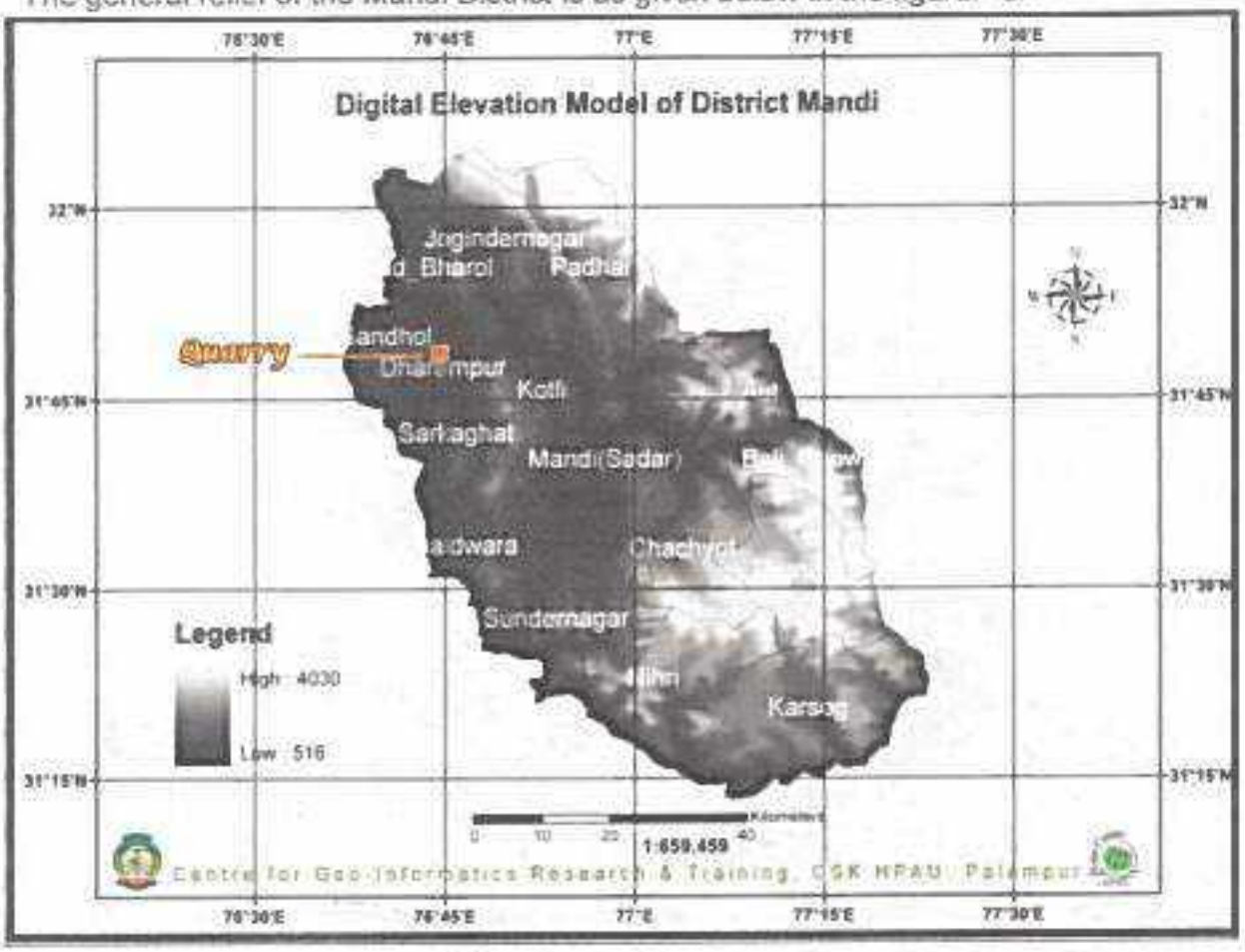


Figure 4: The Digital elevation map of the Mandi district.

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 609 Meters above MSL,
- The lowest contour of the leased-out area in Beas River is 605 Meters above MSL,

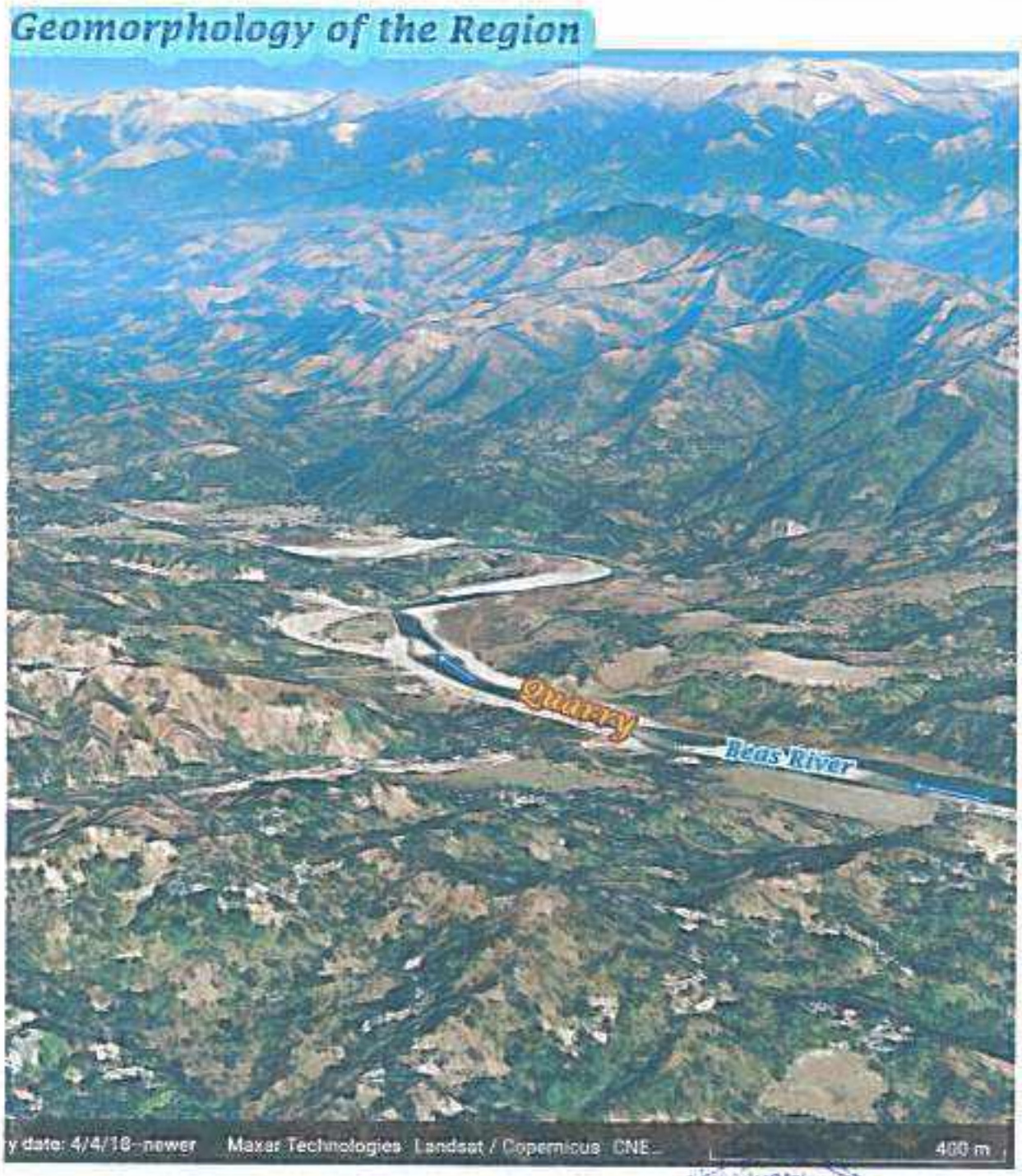


Figure 5: Terrain Map of the Area.

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.

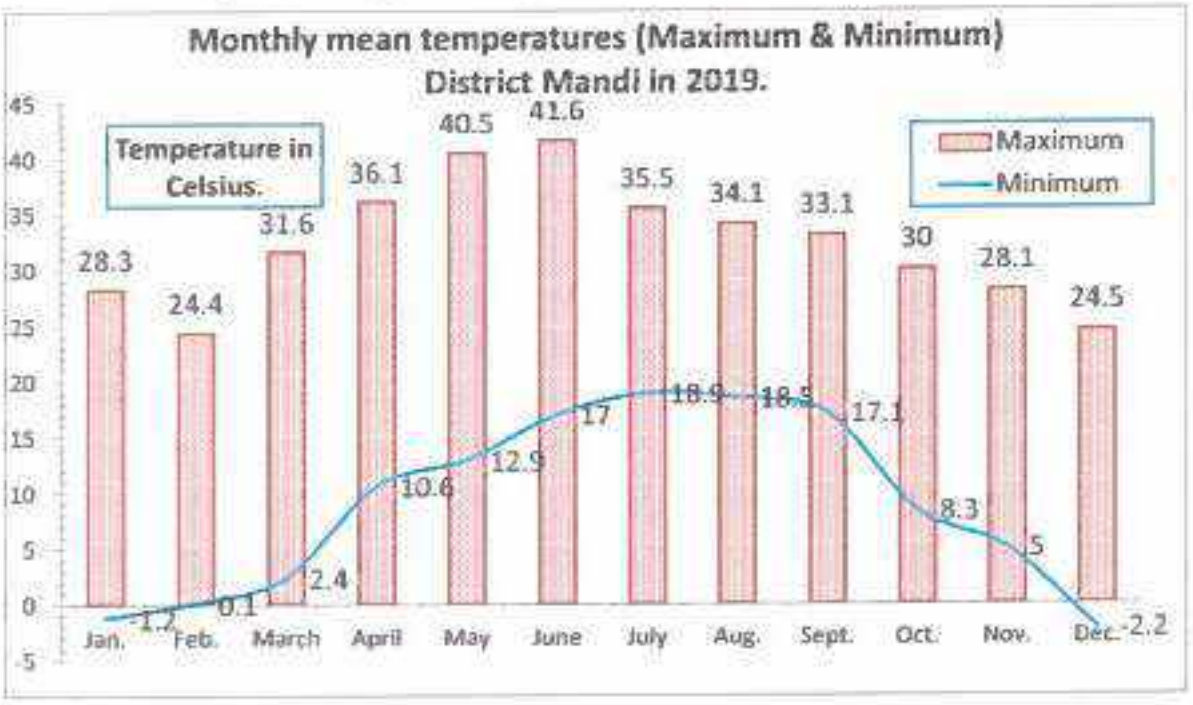
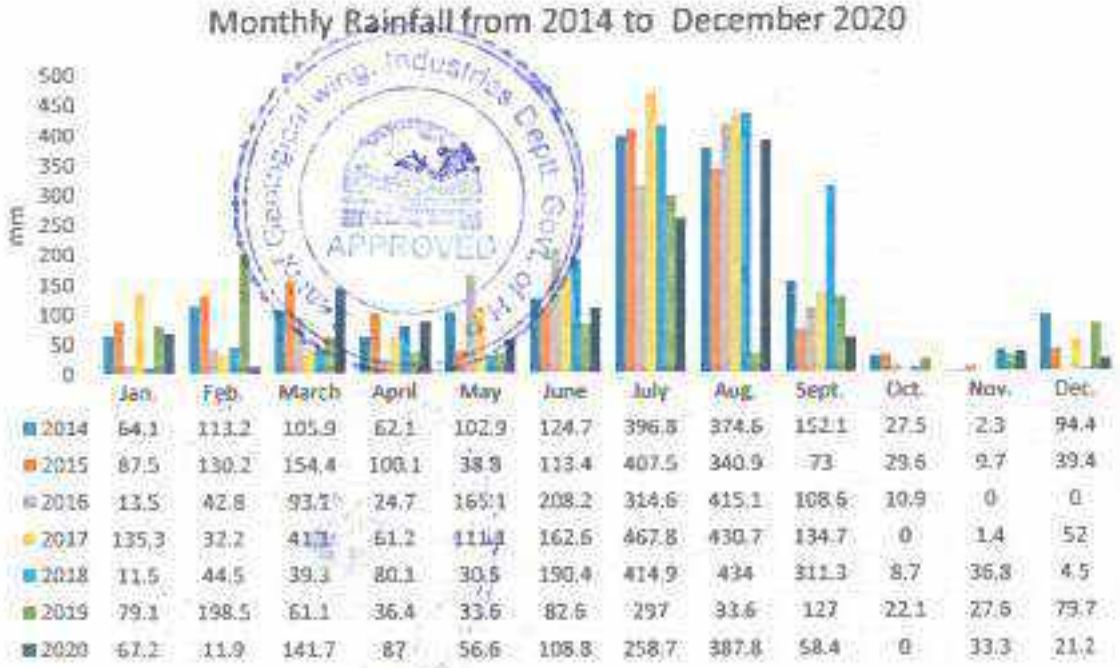


Figure 6: Mean monthly maximum and minimum temperature recorded at IMD station at Sundernagar.

3.4 Rainfall

Rain fall data of Mandi district is depicted in figure 6.



	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.

In addition to District Mandi, the catchment area of Beas River up stream of the

quarry falls in districts of Kullu, Hamirpur and Kangra, monsoon rainfall of these districts is given in figure 8.

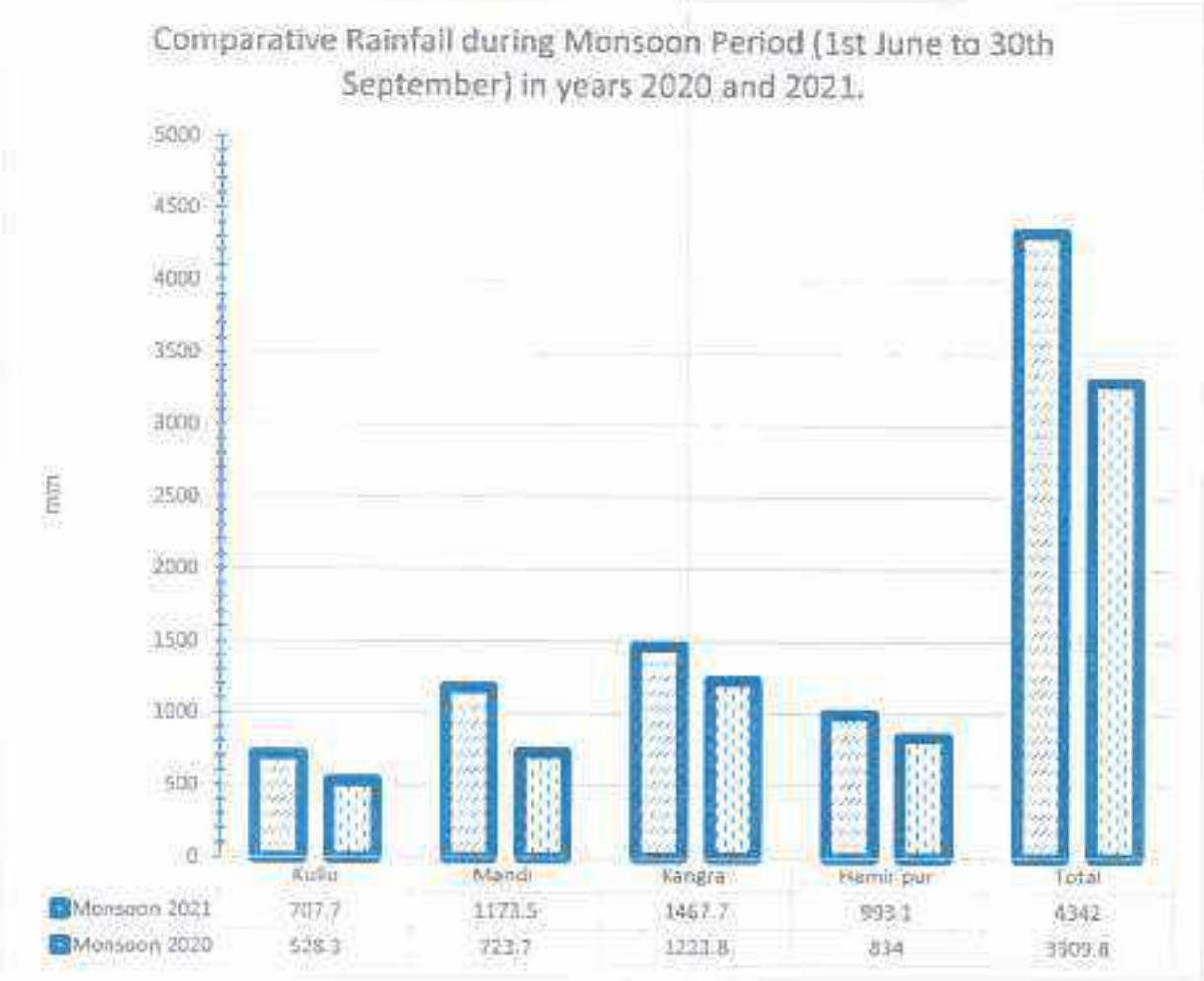


Figure 8: Monsoon rainfall in the catchment districts.

3.5 Any other important feature

The mining lease area falls in riverbed of Beas River and accessibility to the quarry site is through a kutcha road.

2.6 Description of mining area.

Mining area falls in river corridor of Beas River. It is richly endowed with river borne material as it falls in the young stage of the river.

PART I

(1) Description of the area in which the mining lease is situated.

1.1 General

The Lease is situated in the Beas River. Beas River originate at an altitude of 5871 metres above mean sea level at Beas Kund.

Its main tributaries are the Parbati, the Spin and Malana nala in the East; and the Solang, the Manalsu, the Sujoin, the Phojal and the Sarvati Streams in the West. In Kangra, it is joined by Binwa, Neugal, Banganga, Gaj, Dehr and Chakki from North, and Kunah, Maseh, Khairan and Man from the South.

At Bajaura, it enters Mandi district situated on its left bank. In Mandi district, its own Northern feeders are Hansa, Tirthan, Bakhli, Jiuni, Suketi, Panddi, Son and Bather. The northern and Eastern tributaries of the Beas are perennial, and snow fed, while Southern are seasonal. Its flow is utmost during monsoon months. At Pandoh, in Mandi district, the waters of the Beas have been diverted through a big tunnel to join the Satluj. It flows for 256 km. in Himachal Pradesh.

Beas river enters in the Kangra District just at the confluence of Binu Khad with Beas at an elevation of about 636 metre above mean sea level and it flows along the border of Kangra and Hamirpur district up to Nadaun in Hamirpur and then it flows in the Kangra District. The total length of the Beas River in Kangra district is about 123 Km

The catchments of the Beas River have been divided in sub catchments by the Central Ground water Board as shown in figure 7 and table 3.

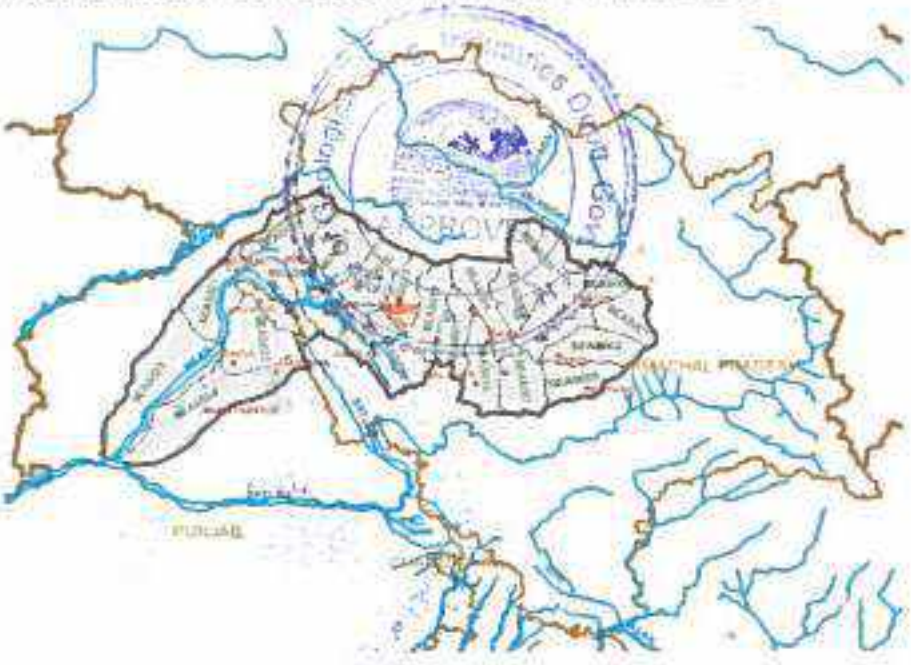


Figure 9: Catchment & sub-Catchments

1.2 Name of River/ Stream and its gradient in which the Lease is situated

Beas River.

1.3 Drainage System

Beas River

1.4 Type of Drainage

Dendritic

1.5 Origin of River/Stream

Beas River originate at an altitude of 5871 meters above mean sea level at Beas Kund.

1.6 Altitude at Origin

5871 metres above mean sea level at Beas Kund.

Figure 10: Catchment of Beas River in Himachal Pradesh.

1.7 Geometry of the catchment of the river

- Number of tributaries = 62
- Stream order up to Lease area = 5
- Maximum length of water shed = 217 km
- Maximum breadth of water shed = 100 Km
- Length breadth ratio = 1: 2, Higher the ratio, higher is the asymmetry of water shed.

Profile of Riverbed

- Highest point = 6558 M
- Elevation at Lease area = 1609 M
- Total length of River = 315 Km
- Total Elevation Loss = 5408 M
- Average Slope = 14.1 % i.e about 6.3°
- Slope angle at Lease area = about 20°.
- Cycle of erosion at Lease area is Mature.

1.8: The annual deposition at the place of mining:

The area being part of the river which receives annual rainfall, the mining pits will get replenished during the rainy (monsoons) season. *Though at the mining lease site the river is at young stage but as an abundant precaution, keeping in view the variation in rainfall particularly highest rainfall, which generally causes floods, the factor of eight 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 eight 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.*

Figure 11: River Profile of Beas

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

The general competency at the mining area is eight to ten Kg approx. The largest boulders vary 24 to 130 cm X 36 to 120 cm X 30 to 100 cm (length X Width X height). However, the size of the boulders found in the river is more dependent upon the size available in the boulder conglomerate beds in the catchment area than the actual competency of the flow of the river.

Photo 1
Competency of
the River

1.10 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.

1.11 Altitude of the area is

- The highest contour of lease area is 609 Metres above Mean Sea Level,
- The lowest contour of the lease area is 605 Metres above Mean Sea Level.

1.12 Description of ground water table:

The mining lease area is part of river course. Beas River is a perennial river; therefore, the water flow remains throughout the year. However, water level of surface water as well as ground water table vary from post monsoon to pre-monsoon period. The ground water table vary from surface to 1.5 metres BGL depending upon, season, elevation, and distance from surface flowing water.

2.0 GEOLOGY

2.1 Regional Geology.

The Himalayan Mountain system roughly surrounds the northern India. The mountain ranges extend for over 2400 km length from west to east. Geology of the Himalayas is extremely complex as it represents a site of continental collision. The collision of the Indian Plate and the Eurasian Plate led to joining of the two continents along a suture zone represented by a lineament. Two rivers – Indus in the west and Tsangpo in the east flow along this lineament which is also known as Indus suture zone. We will study the geology of the terrain between the Indus suture zone in the north and the Indo-Gangetic alluvial plains in the south.

Tectonically the Himalayas can be divided into four roughly parallel zones. From north to south the zones are:

- Tethyan Himalayas
- Central Crystalline Zone
- Lesser Himalayas
- **Error! Hyperlink reference not valid.**

The Central Crystalline Zone is made of Precambrian basement rocks mixed with granitic intrusions of Tertiary age. This zone has the highest mountain ranges of the Himalayas. This zone separates the northern Tethyan Himalayas from the southern Lesser Himalayas. These two zones contain sedimentary rocks of Palaeozoic-Mesozoic ages deposited over Precambrian basement.

Whereas the Tethyan Himalayas consists of a fairly continuous succession rich in fossils, the Lesser Himalayas host rocks with scanty fossil records and with gaps in between. The Outer Himalayas forms a separate geological unit consisting of Quaternary sedimentary rocks originating from the rising Himalayas.

Each of these zones displays a highly complex geology disturbed by the Himalayan Mountain building processes. The geology of the Lesser Himalayas is particularly difficult to decipher because it contains several thrust sheets or nappes and is generally devoid of fossils.

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 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 stromatolites) 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 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 Pleione and Holocene age.

2.2 Geology of area

The local geology & stratigraphy of the area is given in the figure 6. The rocks in the surrounding area belong to the Tertiary formations.

2.3 Local Geology of the leased area

The leased area forms a part of the riverbed covered with boulders, cobbles, pebbles, river born bajri, and sand and clay deposit of Channel alluvium. The rocks in the catchments of Beas River is of in the upstream side, in the effective catchment belongs mainly to Kullu group, Larji Group, Rampur group, Vaikrita group and tertiary group. The area is comprising predominantly the quartzite Boulders, Sand and river born bajri of catchment rocks. The rock nears the quarry area belong to tertiary formations.

The boulders are white, spotted white, greenish white, pink, purple and dark green in color.

2.4Nature of the Boulder/ Cobble/ Sand

The area lies within the regular course of the Beas River 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 is more than five metres.

During the monsoon, the riverbed replenishes by the eroded rocks from the pre tertiary Formations. Due to sudden decrease in the carrying capacity and competency of the river after monsoon floods, the annual deposition of six to eight cm is received.

2.5 The Nature of the rock along the bank

The rocks along the bank belong to tertiary formations consisting of claystone, sandstone, and conglomerate.

Geological Map of the Quarry Region.

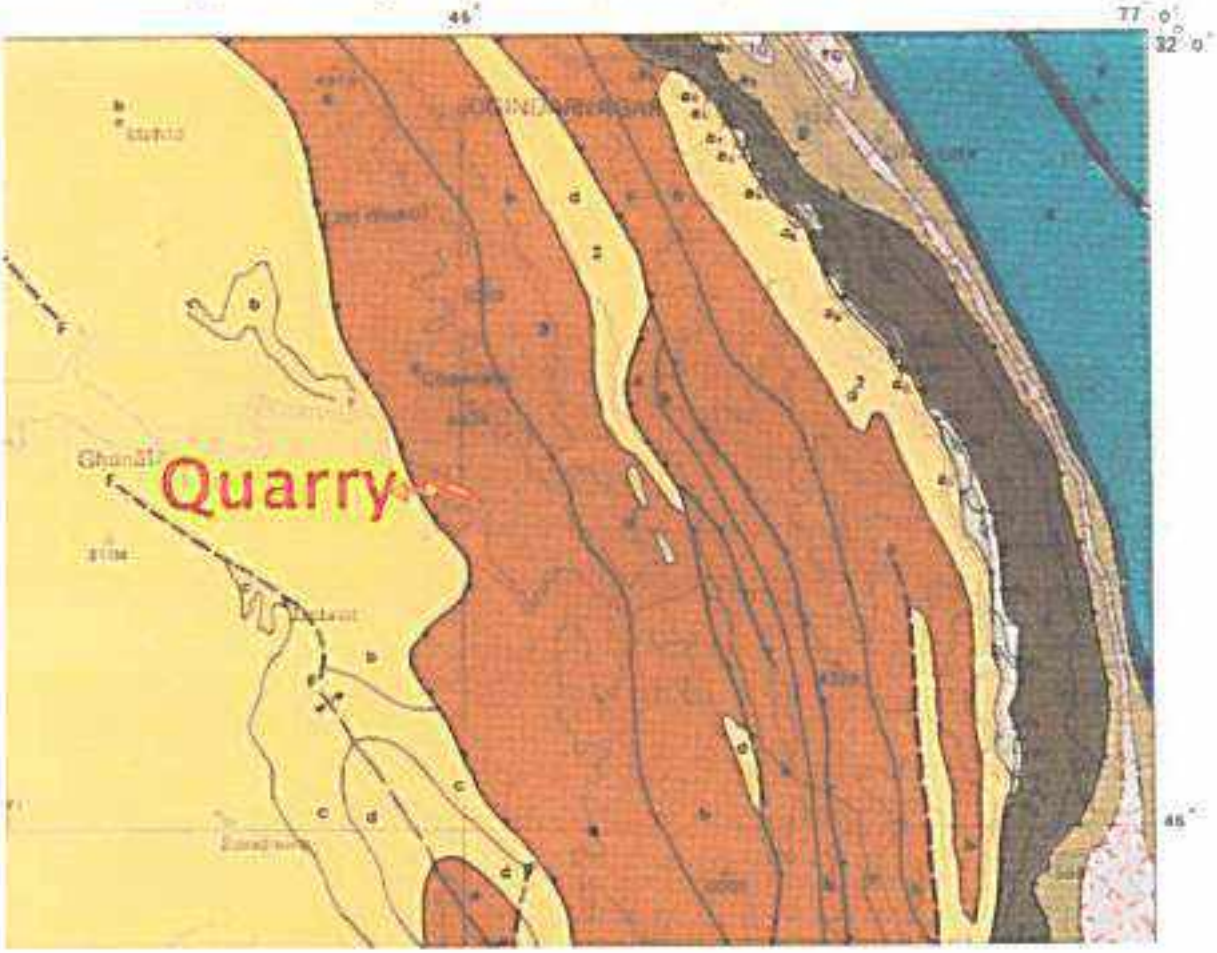


Figure 12: Geological Map of the surrounding lease area.

Photo 2: Nature of the Boulder/ Cobble/ Sand in the Beas River.

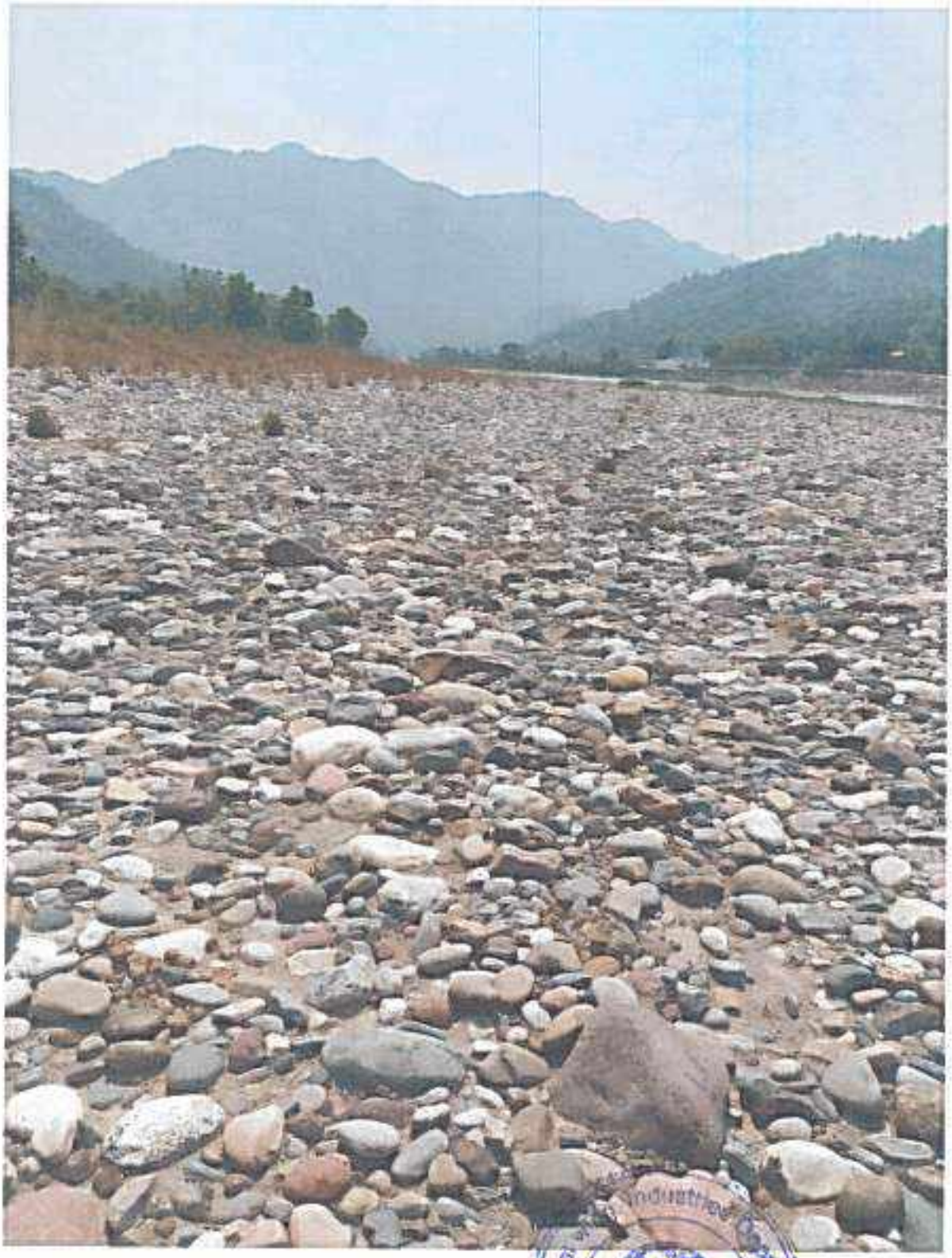


Photo 3: Part of quarry Area.

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2.5 The Nature of the rock along the bank

The rocks along the bank belong to tertiary formations consisting of claystone, sandstone, and conglomerate.

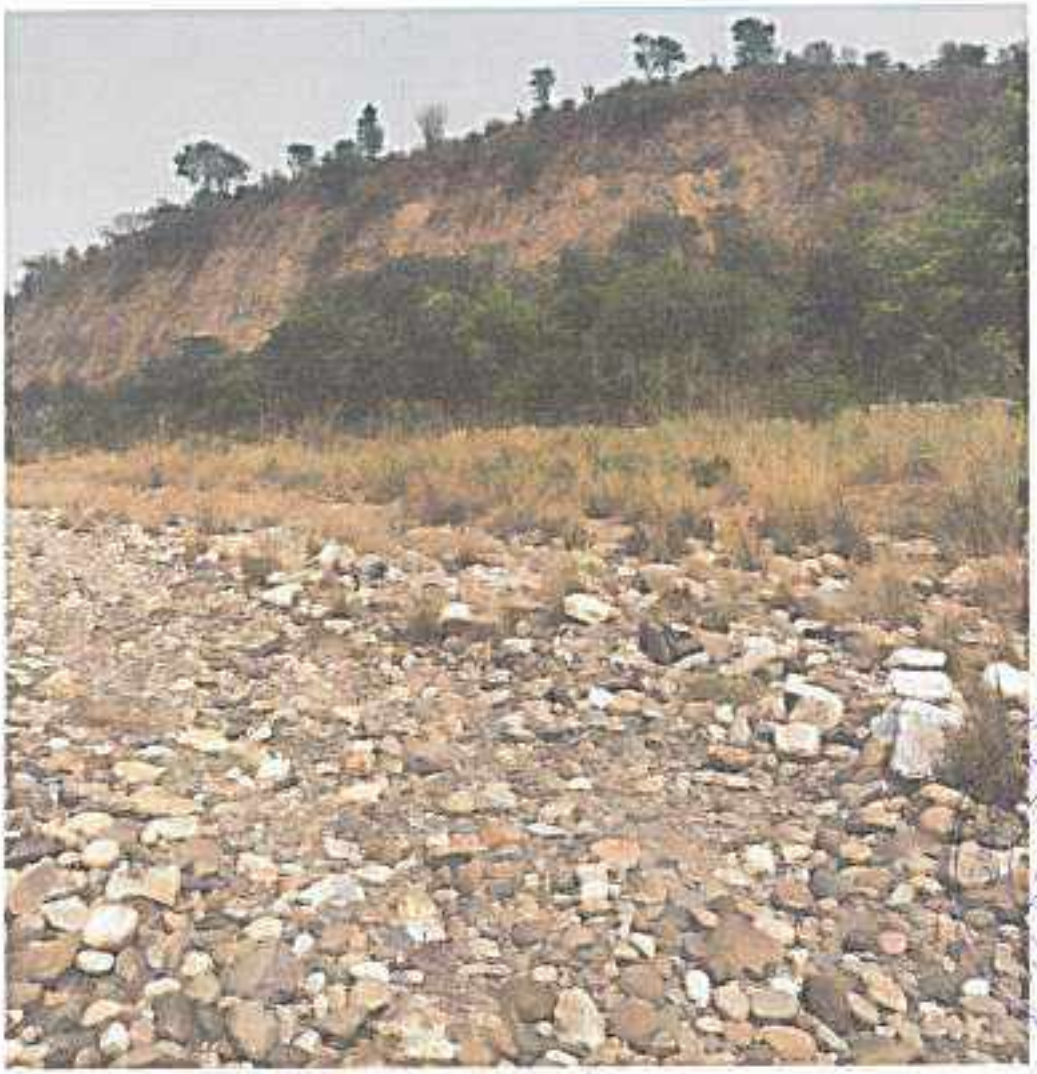


Photo 4Nature rocks near banks

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 eight 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 eight 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:

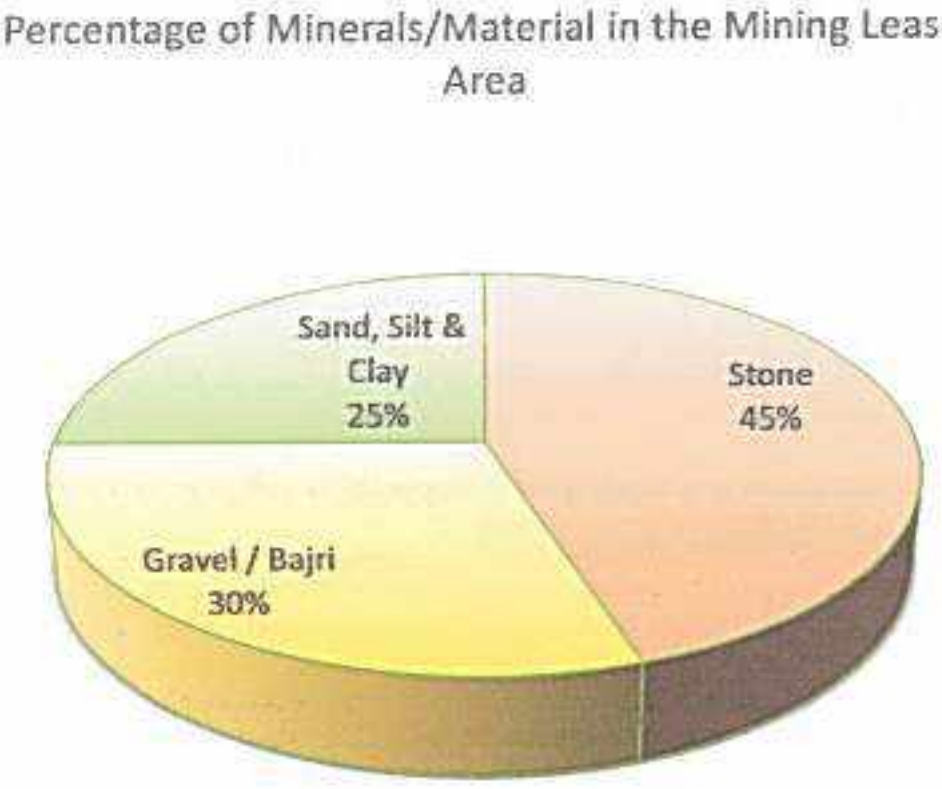


Figure 13: Percentage of each category of mineral present in the leased area.

1	Stone	45%
2	Gravel / Bajri	30%
3	Sand, silt & clay	25%

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 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 463579, metric tons as shown in the chart.

Geological Reserves

Geological Reserves	Thickness, in metres	leased Area (Square Metres)	Reserves Rounded off (In tonnes)
Proved	5	41287	463530
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 195 to 230 meters; thus, no mining is proposed in the area up to 20 to 23 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., 32500 square metres of lease area, is mineable as it falls within the river corridor, leaving out the safety zone provided along the banks.***

Figure 14: Mineable area.

Table 7 Mineable reserves in the block

Leased Area Sq. metres	Mineable Area Sq. Metres	Stone	Gravel / Bajri	Sand, Silt & Clay	Total
41207	32500	32906	31937	15282	48825

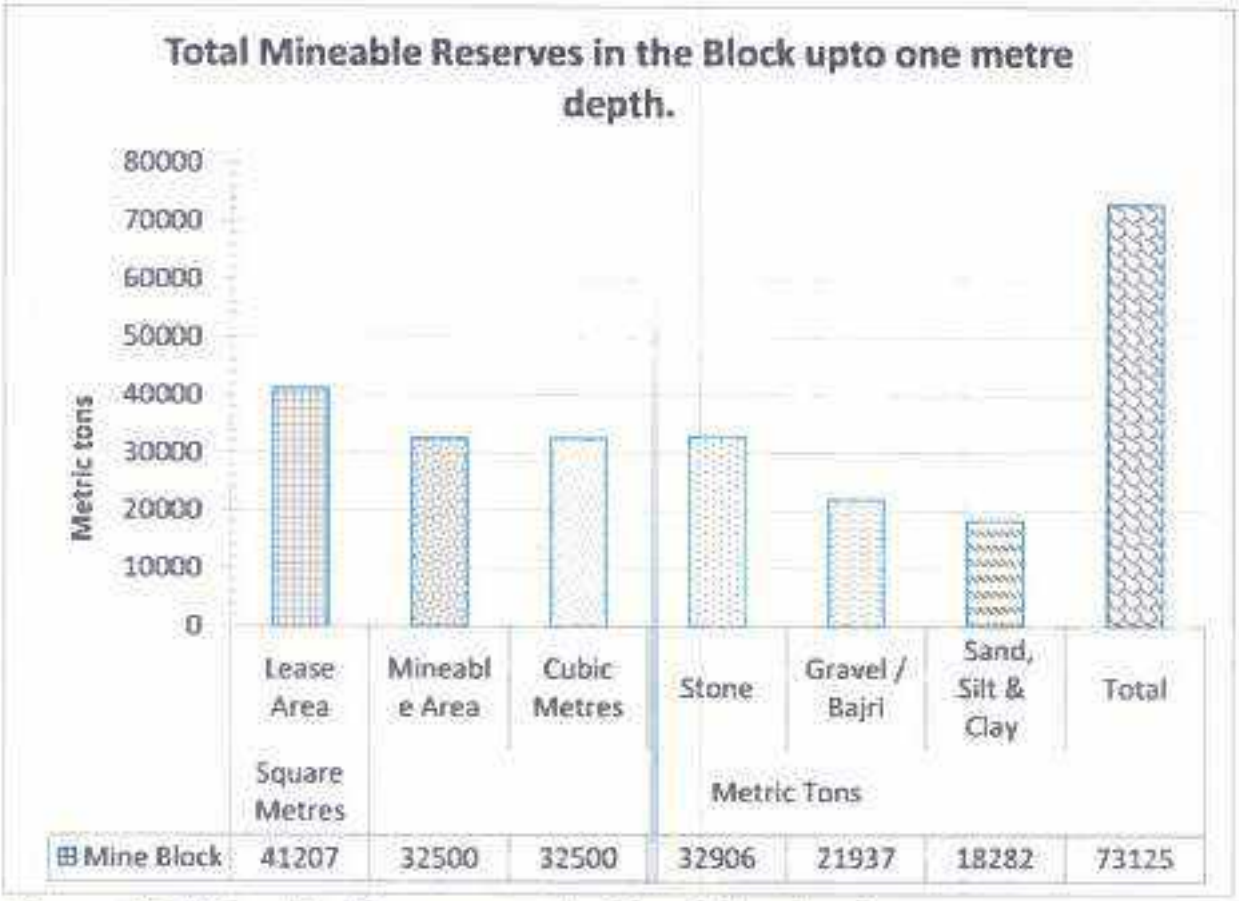


Figure 15: Mineable Reserve up to One Metre depth

Thus, the safe mine-able block of 32500 square metres contains 32500 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 boulder/stones 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 73125 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 figure16. ***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 17 shows the proposed production of materials in five years.

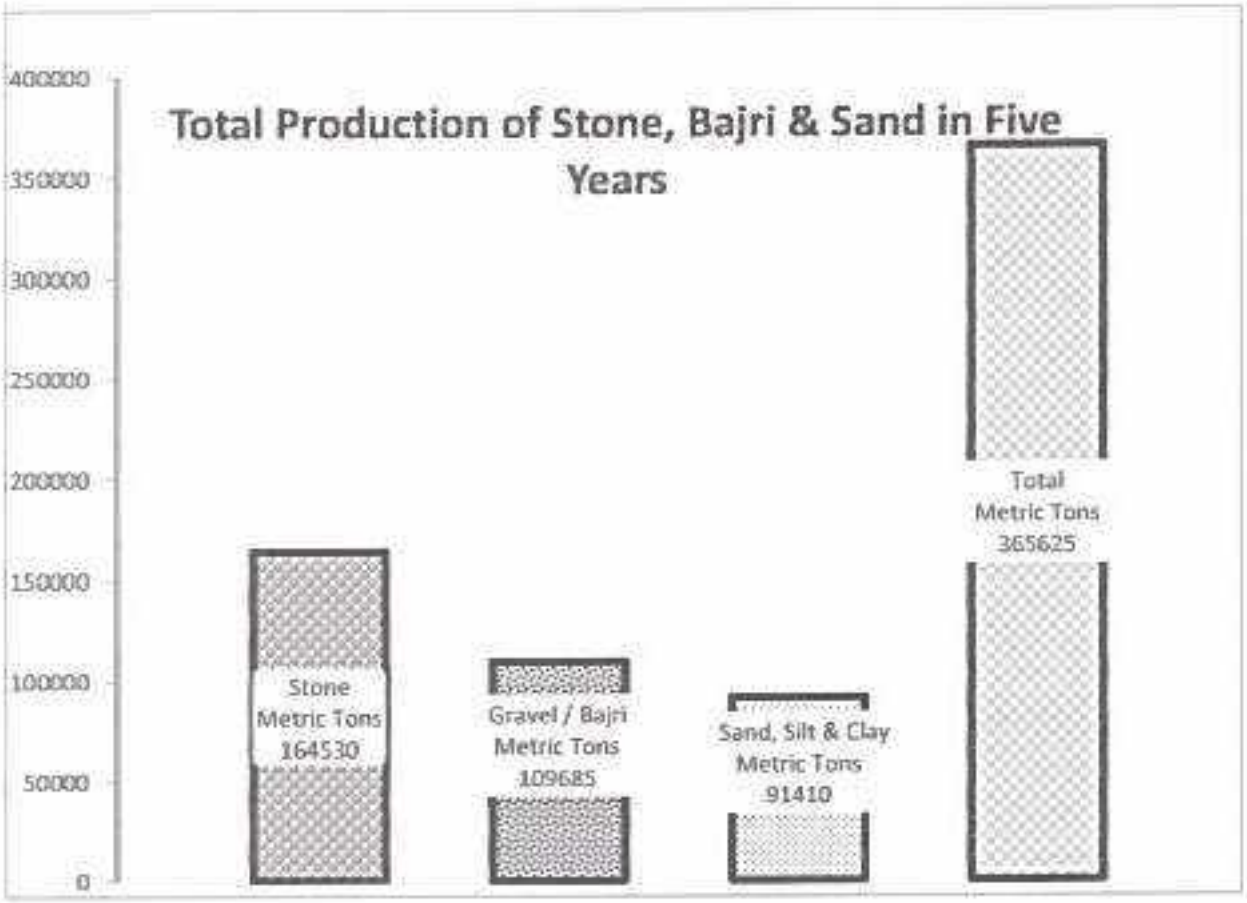


Figure 16:Proposed production of total material in five years

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

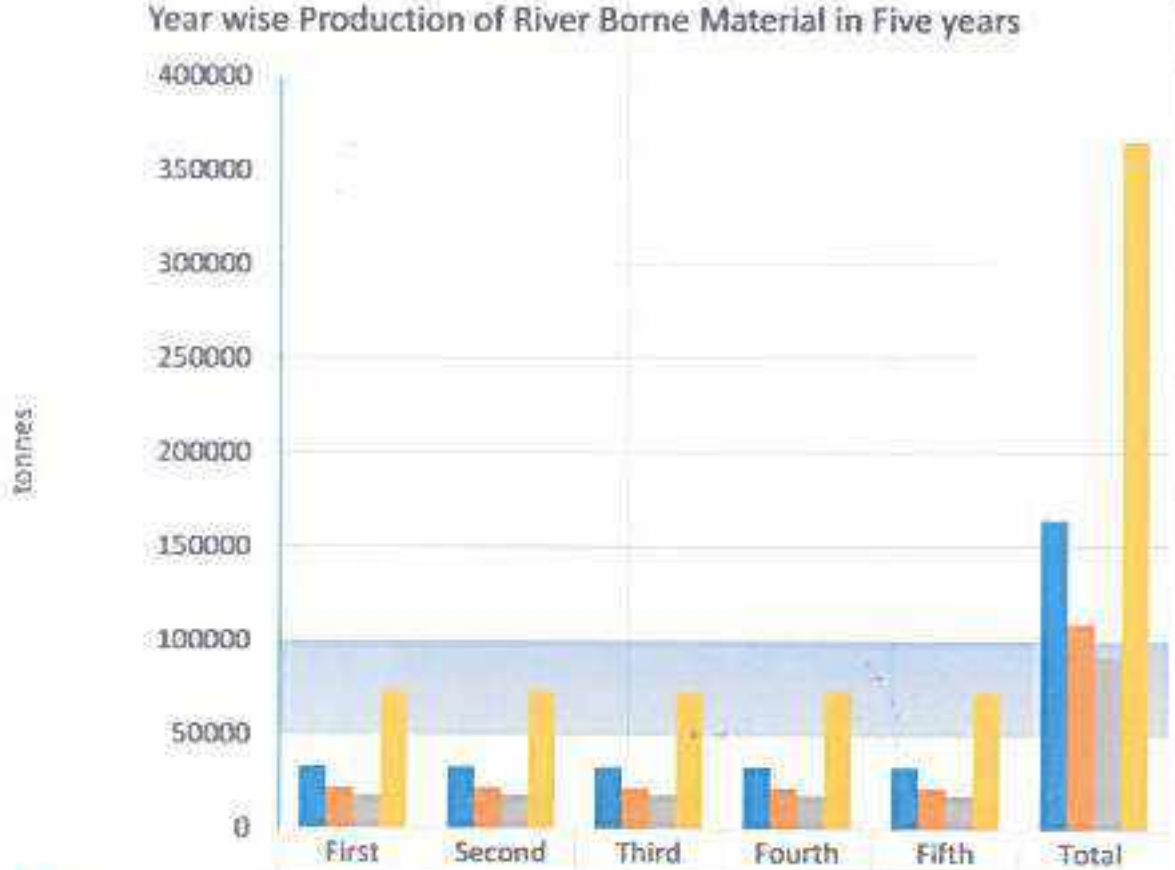
- No blasting is required.
- Only manual/semi mechanically extraction of RBM (River Borne Material) will be undertaken.

- 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	32906	32906	32906	32906	32906	164530
Gravel / Bajri	21937	21937	21937	21937	21937	109685
Sand, Silt & Clay	18282	18282	18282	18282	18282	91410
Total	73125	73125	73125	73125	73125	365625

Figure 17:Year wise Availability of Material (in Metric tons).

Table 3 Year wise production of materials.

Year	Stone	Gravel / Bajri	Sand, Silt & Clay	Total
First	32906	21937	18282	73125
Second	32906	21937	18282	73125
Third	32906	21937	18282	73125
Fourth	32906	21937	18282	73125
Fifth	32906	21937	18282	73125
Total	164530	109685	91410	365625

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 18, 19, 20, 21, & 22.

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

- ✓ Mining 73125 tonnes of material is proposed to be mined from 32500 square meters of safe mining area out of 41207 square metres of leased block.
  - ➢ 32906 tonnes of stone and 21937 metric tons of bajri will be produced and dispatched to dedicated stone crushers.
  - ➢ 18282 tonnes of sand with inseparable silt & clay will be produced and dispatched to construction sites of the project.
  - ► About 1-2 percent of the leased Area suitable for plantation falls outside the river corridor which will be planted in the first year and properly looked after subsequently.
  - ► The entire lease area falls within the river corridor, therefore some retaining walls (C-1 in first year) would be erected outside the lease area near *in situ* rocks on left bank.

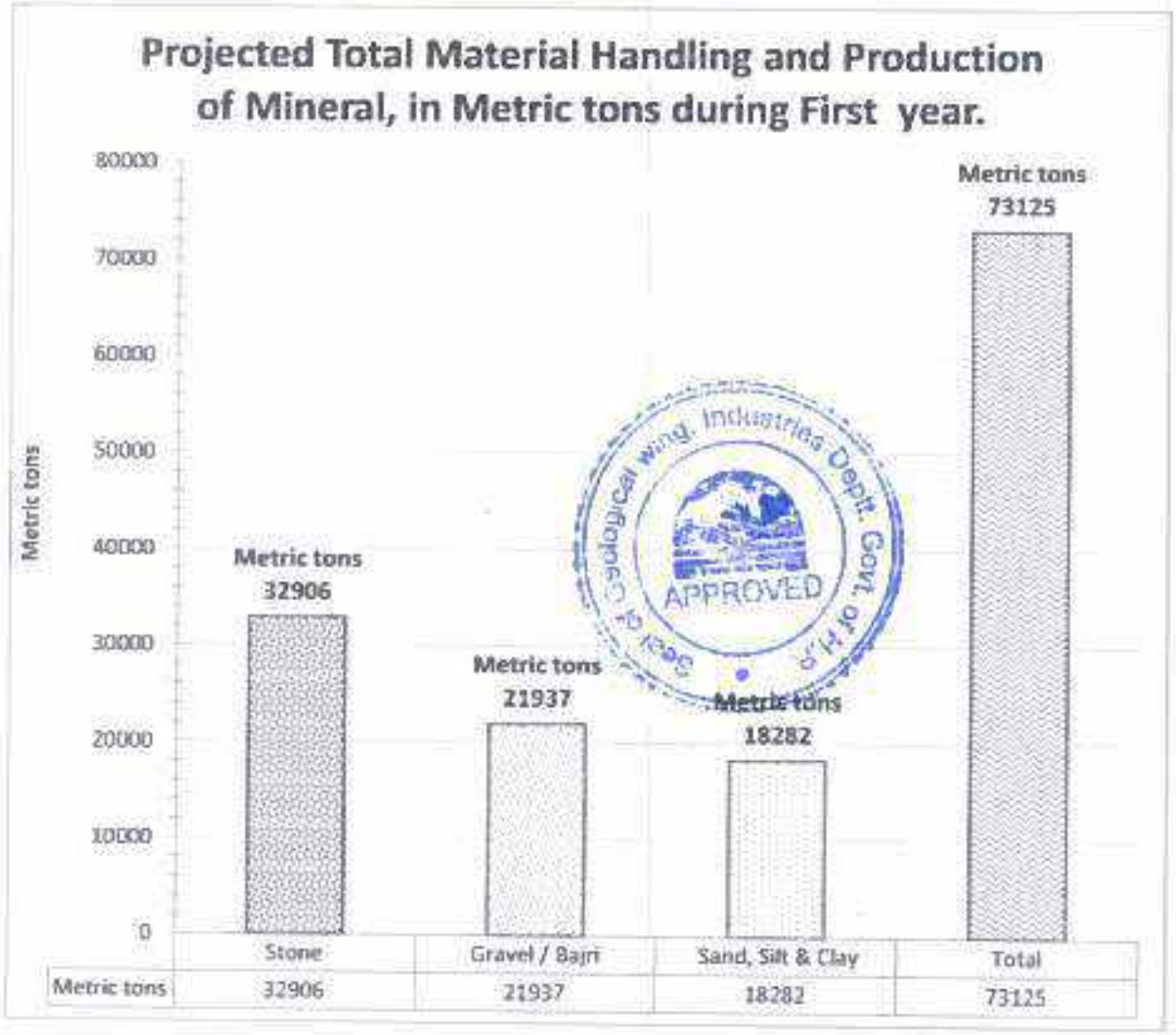


Figure 18- Proposed Production and Material Handling in the First Year of Mining.

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

During 2nd year of development and production programme:

- ✓ Mining 73125 tonnes of material is proposed to be mined from 32500 square meters of safe mining area out of 41207 square metres of leased block.
  - ➢ 32906 tonnes of stone and 21937 metric tons of bajri will be produced and dispatched to dedicated stone crushers.
  - ➢ 18282 tonnes of sand with inseparable silt & clay will be produced and dispatched to construction sites of the project.
  - ► About 1-2 percent of the leased Area suitable for plantation falls outside the river corridor which will be planted in the first year and properly looked after subsequently.
  - ► The entire lease area falls within the river corridor, therefore some retaining walls (C-2 in second year) would be erected outside the lease area near *in situ* rocks on left bank.

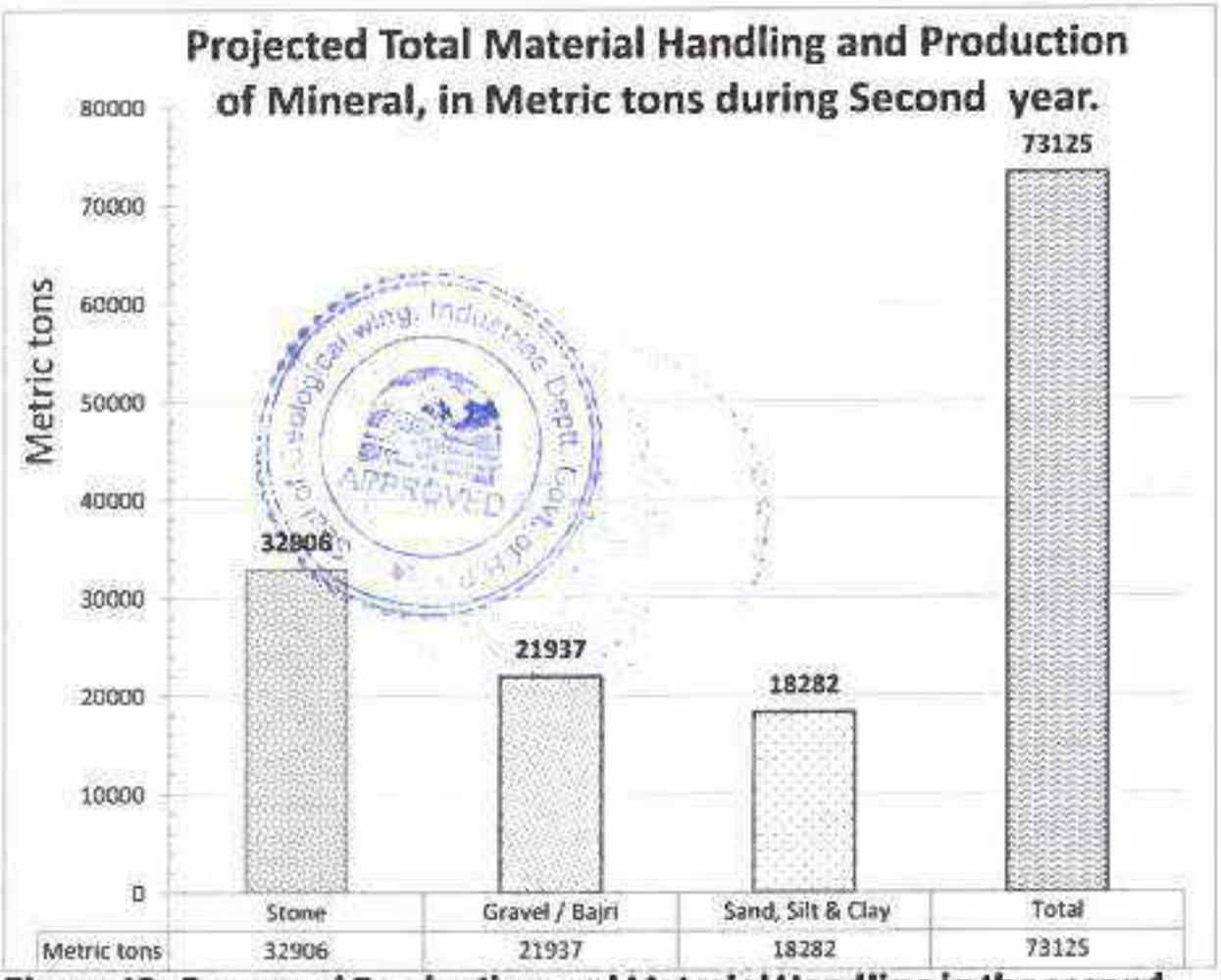


Figure 19- Proposed Production and Material Handling in the second Year of Mining.

4.2 c Development and Production at end of third Tear.

During 3rd year of development and production programme:

- ✓ Mining 73125 tonnes of material is proposed to be mined from 32500 square meters of safe mining area out of 41207 square metres of leased block.
  - ➢ 32906 tonnes of stone and 21937 metric tons of bajri will be produced and dispatched to dedicated stone crushers.
  - ➢ 18282 tonnes of sand with inseparable silt & clay will be produced and dispatched to construction sites of the project.
  - ► About 1-2 percent of the leased Area suitable for plantation falls outside the river corridor which will be planted in the first year and properly looked after subsequently.
  - ► The entire lease area falls within the river corridor, therefore some retaining walls (C-3 in third year) would be erected outside the lease area near *in situ* rocks on left bank.

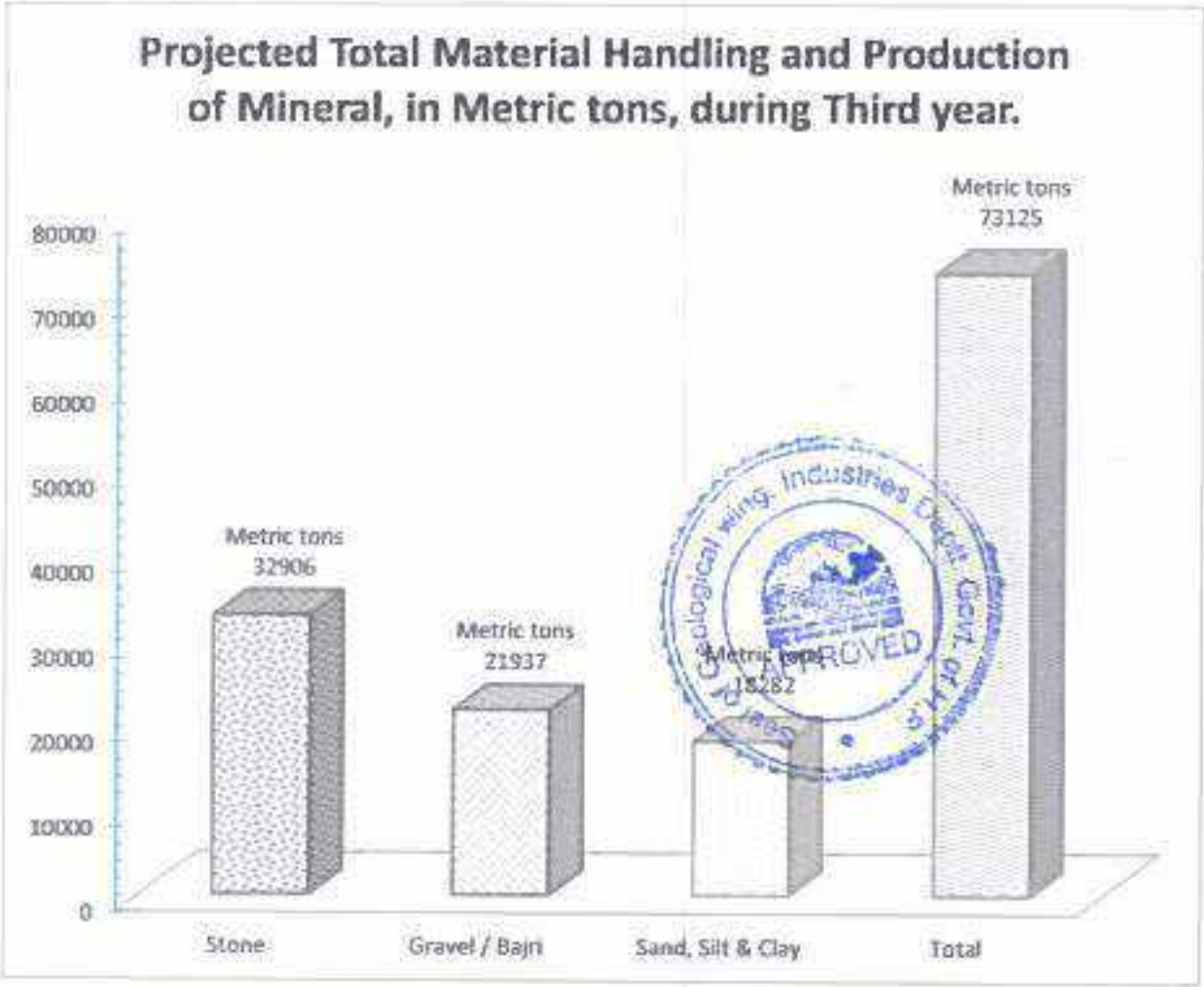


Figure 20- Proposed Production and Material Handling in the Third Year of Mining.

4.2 d Development and Production at end of fourth Year.

During 4th year of development and production programme:

- ✓ Mining 73125 tonnes of material is proposed to be mined from 32500 square meters of safe mining area out of 41207 square metres of leased block.
  - ➢ 32906 tonnes of stone and 21937 metric tons of bajri will be produced and dispatched to dedicated stone crushers.
  - ➢ 18282 tonnes of sand with inseparable silt & clay will be produced and dispatched to construction sites of the project.
  - ► About 1-2 percent of the leased Area suitable for plantation falls outside the river corridor which will be planted in the first year and properly looked after subsequently.
  - ► The entire lease area falls within the river corridor, therefore some retaining walls (C-4 in fourth year) would be erected outside the lease area near *in situ* rocks on left bank.

Figure 21- 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 73125 tonnes of material is proposed to be mined from 32500 square meters of safe mining area out of 41207 square metres of leased block.
  - ➢ 32906 tonnes of stone and 21937 metric tons of bajri will be produced and dispatched to dedicated stone crushers.
  - ➢ 18282 tonnes of sand with inseparable silt & clay will be produced and dispatched to construction sites of the project.
  - ► About 1-2 percent of the leased Area suitable for plantation falls outside the river corridor which will be planted in the first year and properly looked after subsequently.
  - ► The entire lease area falls within the river corridor, therefore some retaining walls (C-5 in fifth year) would be erected outside the lease area near *in situ* rocks on left bank.

Figure 22- 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.

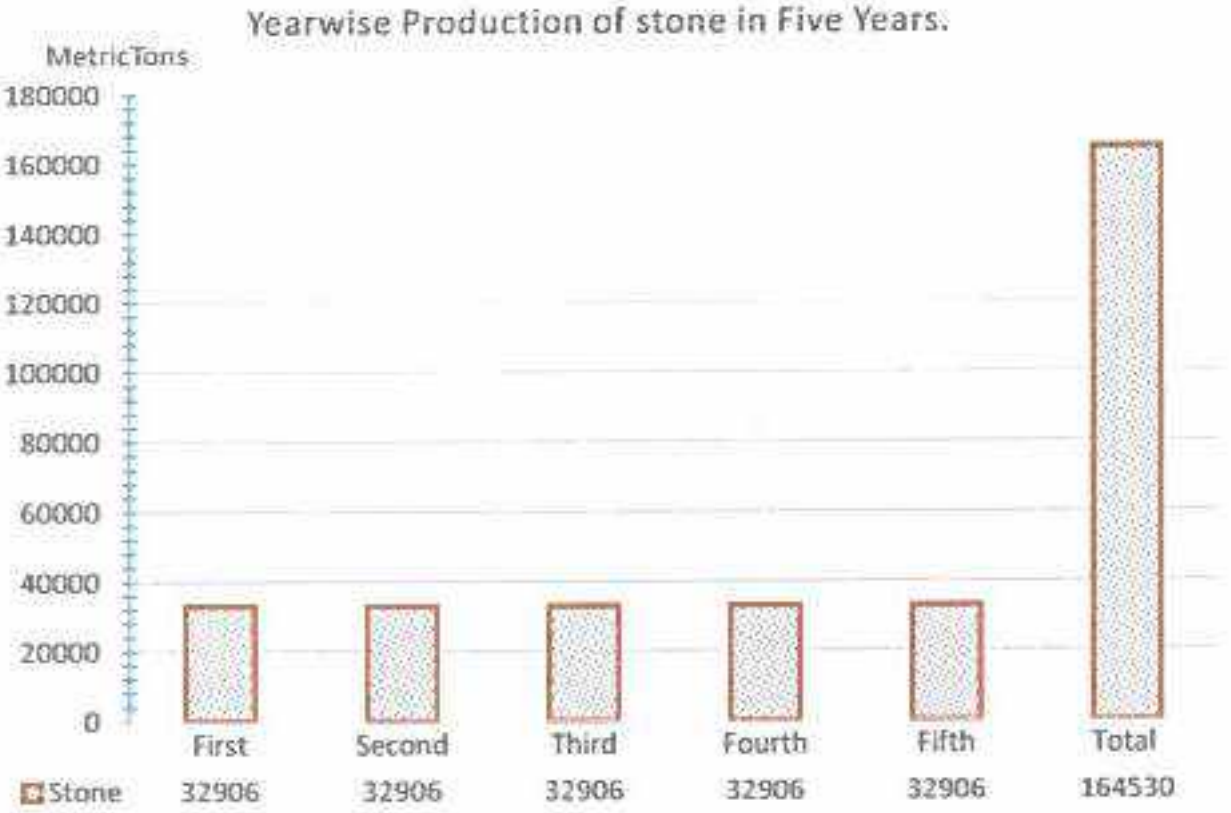


Figure 23: Year wise production of Stone.

Figure 24: Annual Production of Bajri.

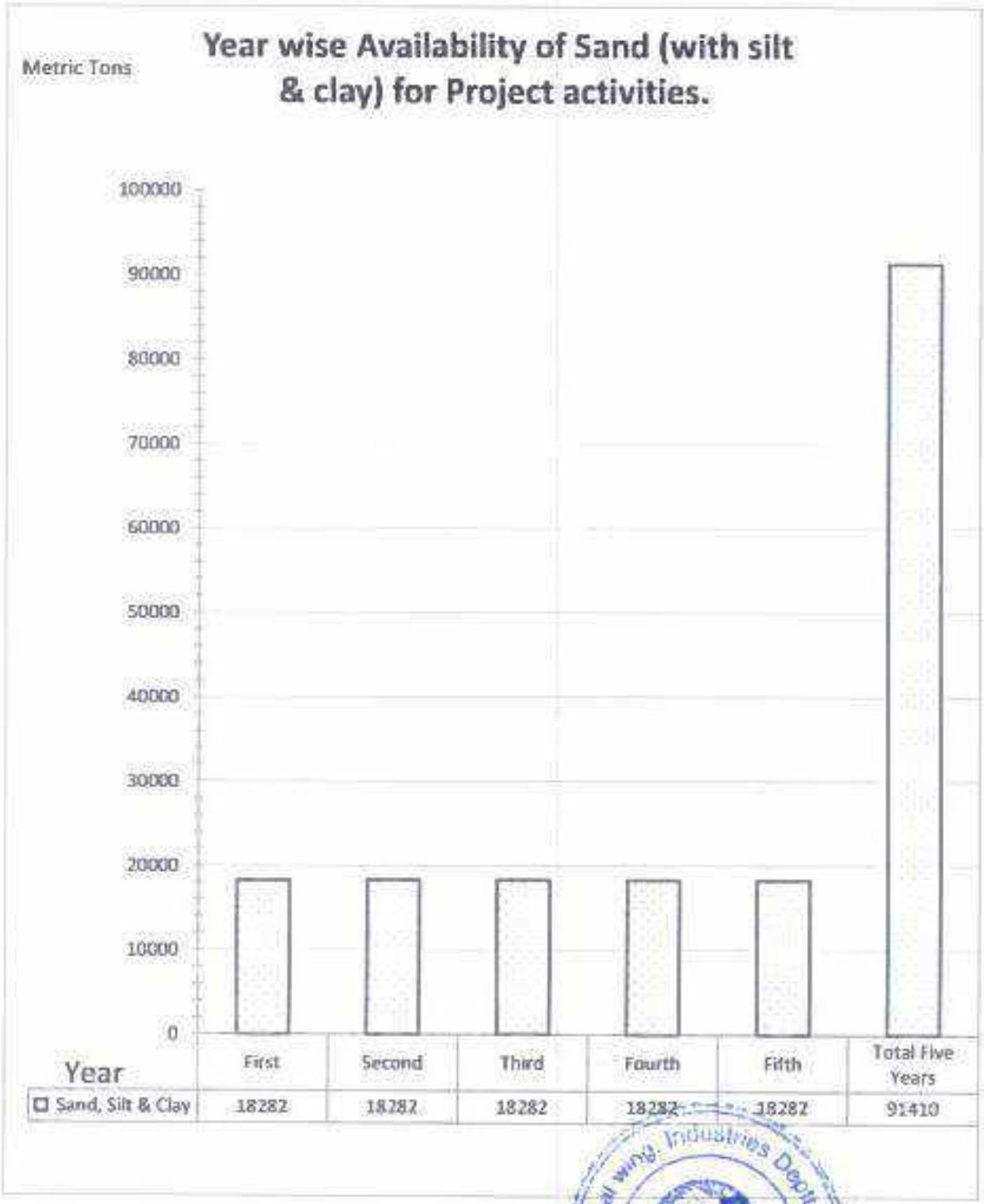


Figure 25: Annual production of sand along with silt & clay

4.4 Detail of road Transport

The maximum total extraction of minerals stone, sand and bajri for use in the Project would be 73125 tonnes or 271 metric tonnes per day, considering 270 working dry days. Thus, about 30 tipper truck trips would be required to move the material from quarry to crusher /

construction sites. The track through River is about 100 metres from the leased area to roadside. The evacuation route is shown in figure 26.

Figure 26. 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.

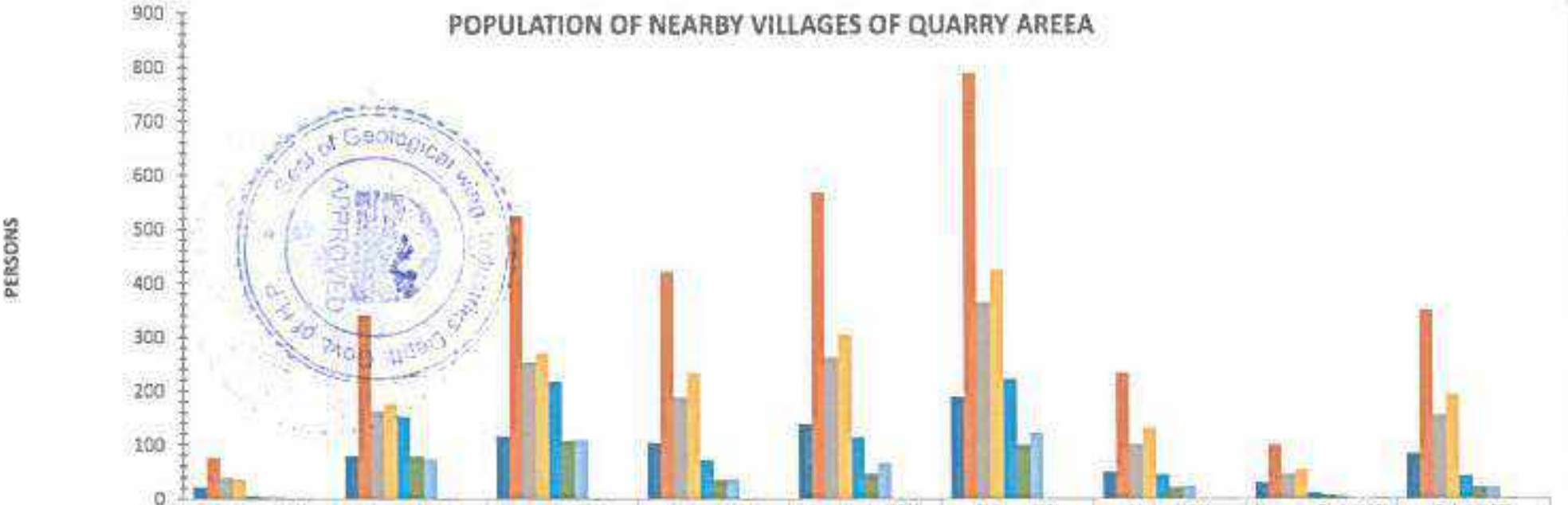
The base line information of the existing environment was collected from various sources such as

- ✓ 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

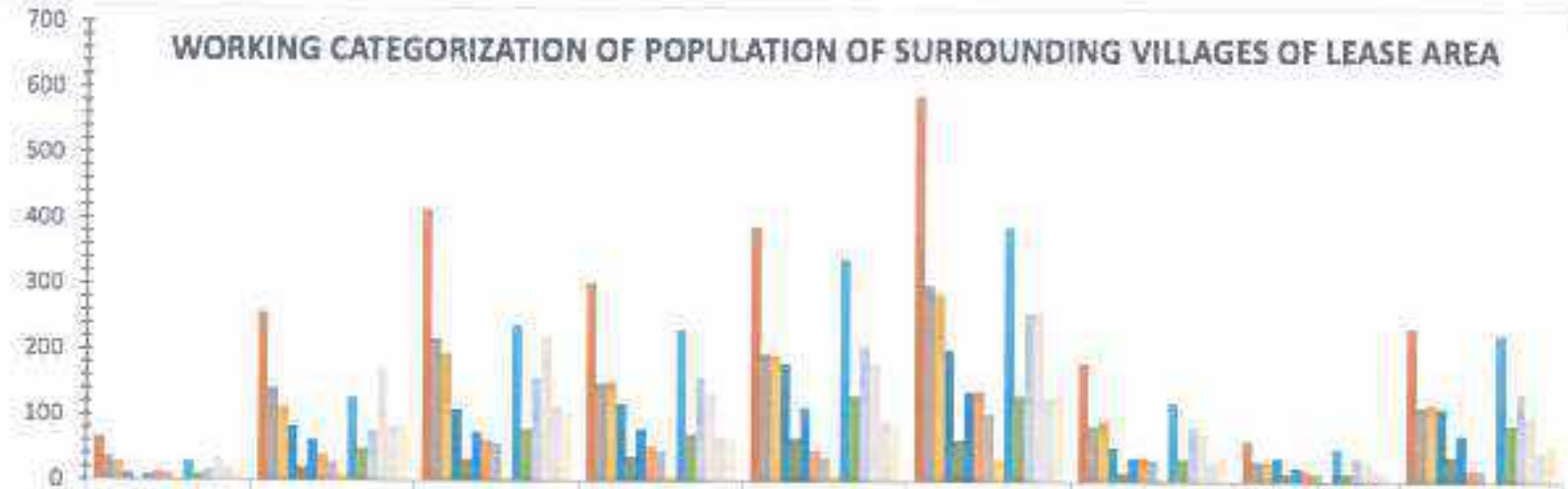
1.1. Demography of the area

The total population of the surrounding area, as per the 2011 Census is given below in the figure 27. Education wise and employment wise break of population in surrounding villages is given in figure 28. The population details of Mandi District and sub tehsil Joginder nager is given in figure 29.



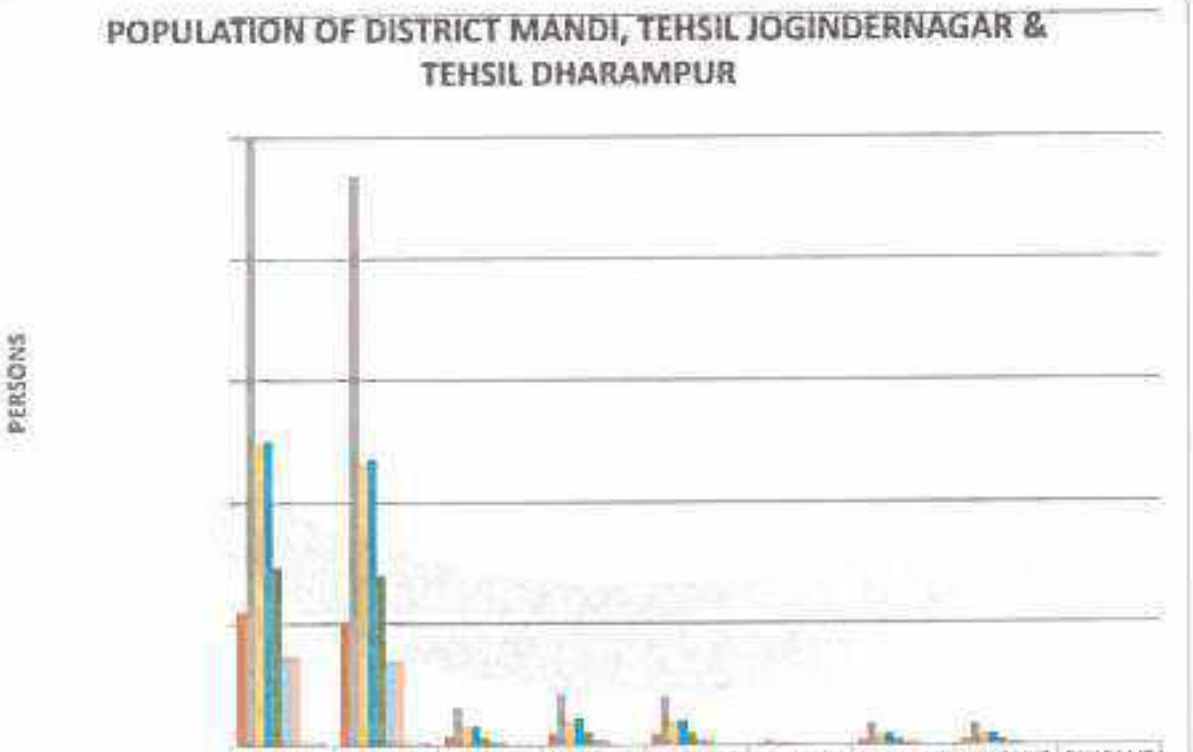
	Gadyara (218)	Parain (223)	Langna (222)	Giuhani (224)	Neri Kotla (226)	Sidhpur (52)	Maiva (106)	Narayan Garh (103)	Bahri (108)
	JOGINDERNAGAR					DHARAMPUR			
TOT. HOUSEHOLD	22	80	117	105	139	189	50	30	84
POPULATION TOTAL	77	341	525	422	569	790	234	100	300
POPULATION MALE	40	164	254	189	263	365	102	46	156
POPULATION FEMALE	37	177	271	233	306	425	132	54	194
POP SC	6	153	219	73	114	223	45	12	43
SC MALE	3	79	109	35	47	100	21	7	22
SC FEMALE	3	74	110	38	67	123	24	5	21
POP ST	0	0	0	0	0	0	0	0	0
MALE ST	0	0	0	0	0	0	0	0	0
FEMALE ST	0	0	0	0	0	0	0	0	0

Figure 27: Population of the villages of the zone of influence.



	Gadyara (218)	Parain (223)	Langna (222)	Giuhant (224)	Neri Kotla (226)	Sidhpur (52)	Maiva (106)	Narayan Garh (103)	Bahri (108)
	JOGINDERNAGAR					DHARAMPUR			
POP LITERATE	66	257	413	303	389	589	181	63	236
MALE LITERATE	38	143	219	150	196	301	87	32	115
FEMALE LITERATE	28	114	195	153	193	287	94	31	121
POP ILLITERATE	11	84	110	119	180	202	53	37	114
M_ILL	2	21	35	39	67	64	15	14	41
F_ILL	9	63	75	80	113	138	38	23	73
MAINWORKER		41	64	56	48	139	39	17	21
MAINWORKER MALE	11	30	58	47	38	104	34	15	19
MAINWORKER FEMALE	3	11	6	9	10	35	5	2	2
MARGWORKER	28	128	239	231	339	389	121	51	226
MARGWORK_M	10	50	81	73	132	132	36	14	89
MARGWORK_F	18	78	158	158	207	257	85	37	137
NONWORKER	175	173	222	135	182	262	74	33	103
NONWORKER MALE	19	84	115	69	93	129	32	17	48
NON WORKER FEMALE	88	88	107	66	89	133	42	15	55

Figure 28: Break up of literacy and employment of Population in Surrounding Villages (Census 2011).



	MANDI	MANDI	MANDI	JOGINDERNAGAR	JOGINDERNAGAR	JOGINDERNAGAR	DHARAMPUR	DHARAMPUR	DHARAMPUR
TOT. HOUSEHOLD	219145	203747	15398	19597	18324	1273	8292	8292	0
POPULATION TOTAL	999777	937140	62637	84470	79135	5335	34777	34777	0
POPULATION MALE	498065	466050	32015	41245	38538	2707	16550	16550	0
POPULATION FEMALE	501712	471090	30622	43225	40597	2628	18227	18227	0
POP SC	293739	280580	13159	20946	19454	1492	8463	8463	0
SC MALE	147250	140605	6645	10397	9659	738	4087	4087	0
SC FEMALE	146489	139975	6514	10549	9795	754	4376	4376	0
POP ST	12787	12359	428	1843	1789	54	23	23	0
MALE ST	6345	6114	231	831	805	26	14	14	0
FEMALE ST	6442	6245	197	1012	984	28	9	9	0

Figure 29: Population break up of District Mandi & Tehsils Jogindernager & 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 26 there is moderately high percentage of *unemployed (35.71%)* and *underemployed is quite high (51.41%)* people in the area despite moderately high level of literacy, (73.30% literates, figure 31) of literacy.

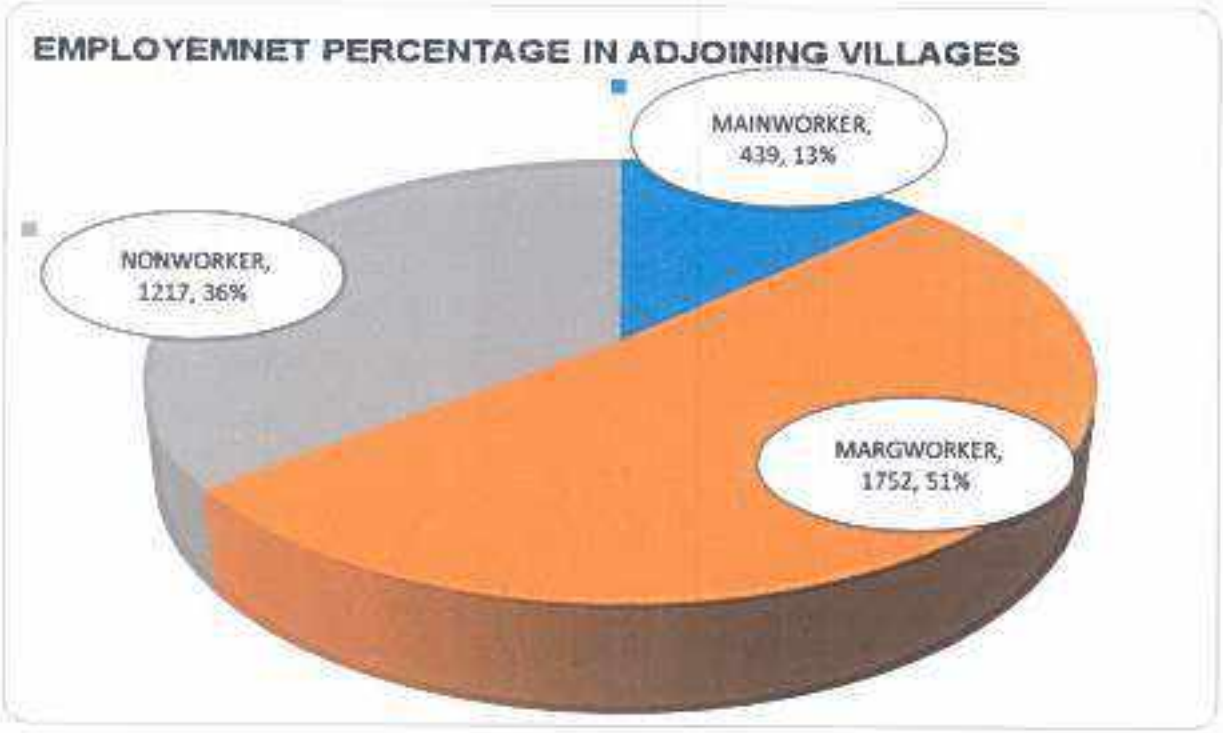


Figure 30: Employment percentage in adjoining villages.

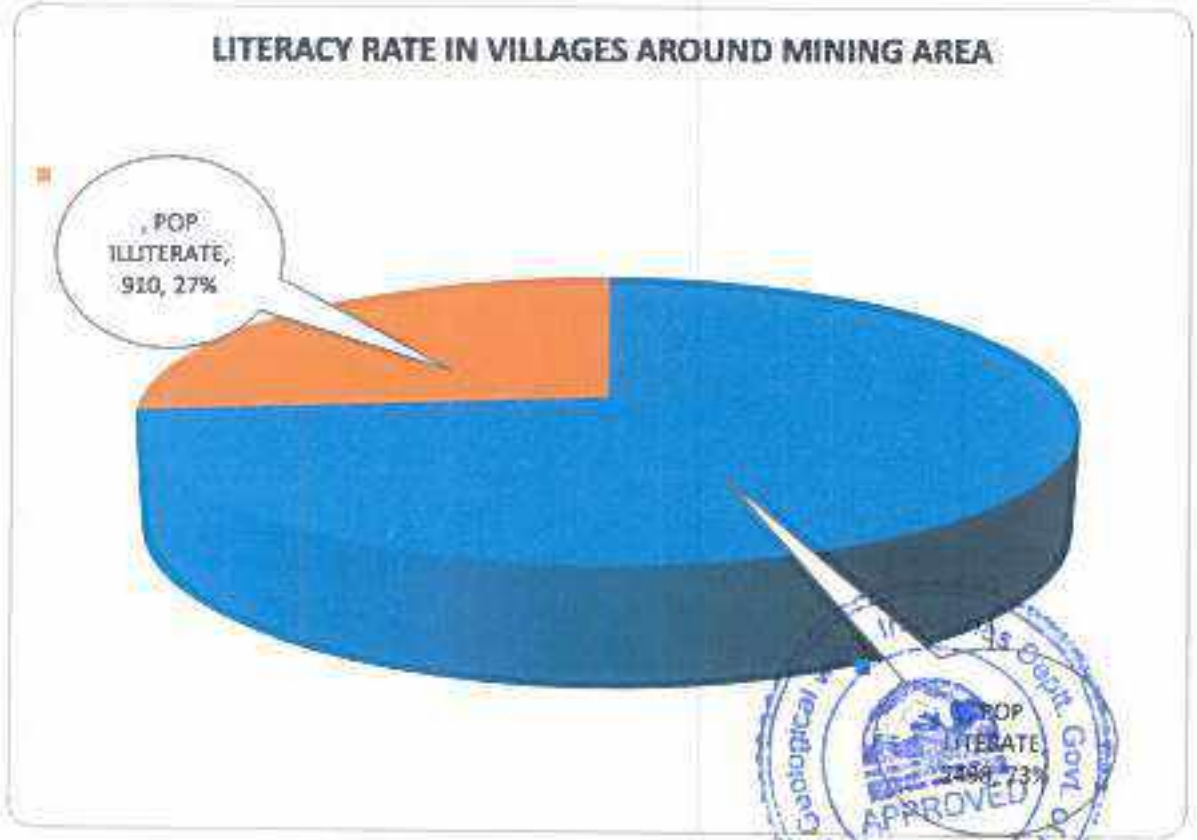


Figure 31: showing Percentage of literate and illiterate POPULATION in the Surrounding mine area

1.3. Land Use Pattern

Primarily the land of the district can be classified in following 7 categories as shown in figure 32.

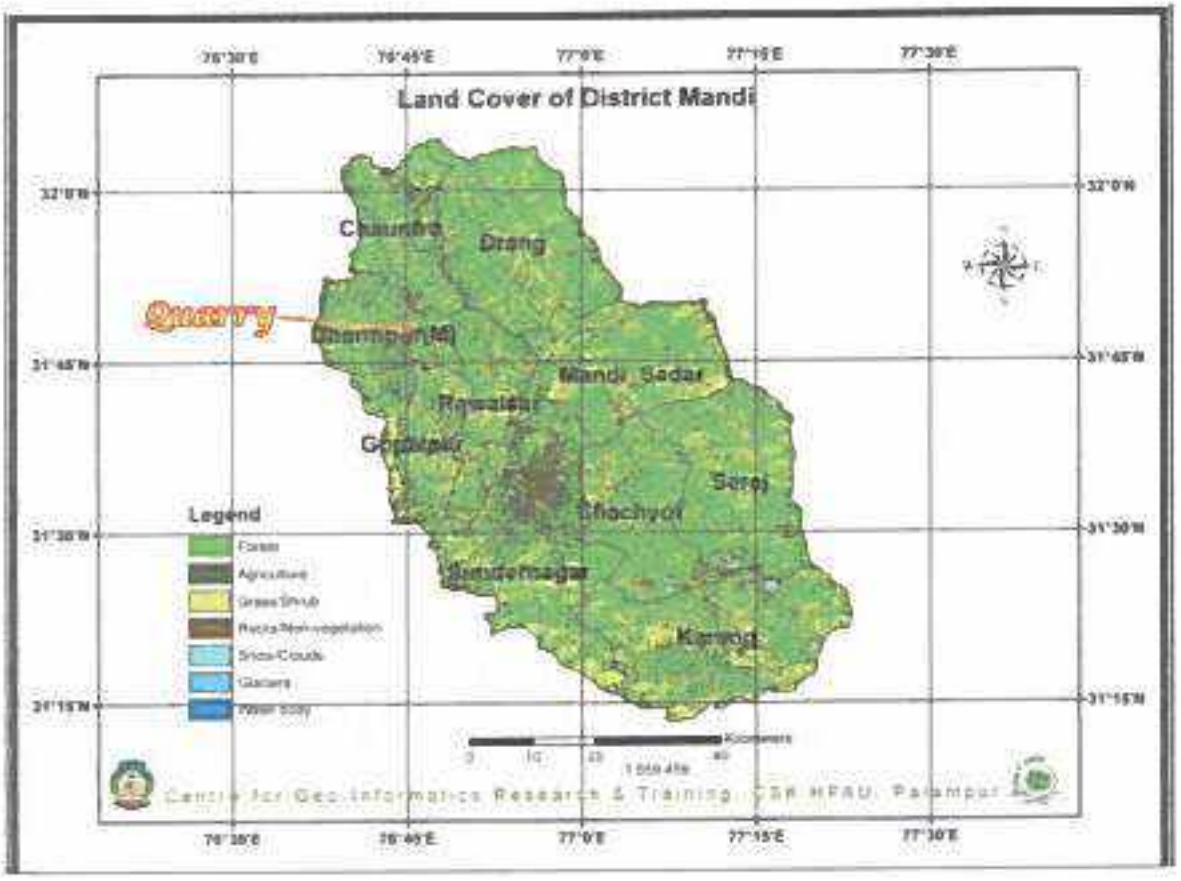
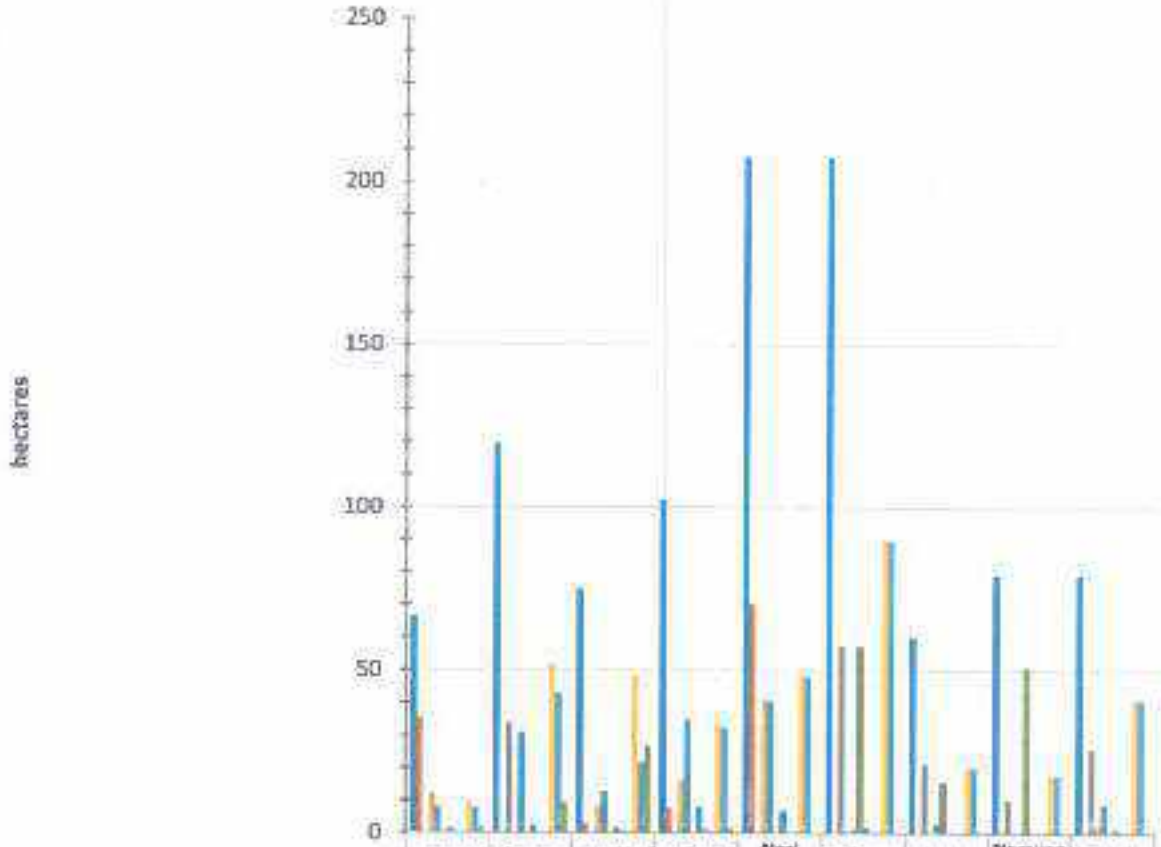


Figure 32: Showing General Land Use Pattern of the District Mandi.

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

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



	Gadyora (218)	Paraln (223)	Langna (222)	Giuhani (224)	Neri Kotla (226)	Sidhpur (52)	Malva (106)	Narayan Garh (103)	Bahri (108)
	Joginderngar					Dharmpur			
Total Geographical Area	66.5	119.55	74.56	102.18	207.55	207.29	59.98	79.15	79
Forest Area	35.65	0	2.96	7.97	78.55	0	0	0	0
Area under Non-Agricultural Uses	0	33.94	0	0	0	57.55	21.42	10.36	26
Barren & Un-cultivable Land Area	11.97	0	8.42	16.28	41.34	0	0	0	2
Permanent Pastures and Other Grazing Land Area	8.07	30.91	12.48	34.84	40.6	1.15	2.97	0	9
Land Under Miscellaneous Tree Crops etc. Area	0	0	0	0	0	57.38	15.68	50.82	0
Culturable Waste Land Area	1.37	2.45	1.54	8.03	6.92	1.59	0	0.39	1
Fallows Land other than Current Fallows Area	0	0	0.7	1.43	0	0	0	0	0
Current Fallows Area	0	0	0	0	0	0	0	0	0
Net Area Sown	9.44	52.25	48.46	33.63	48.14	89.62	19.91	17.62	41
Total Unirrigated Land Area	7.69	42.96	21.76	32.39	48.14	89.62	19.91	17.62	41
Area Irrigated by Source	1.75	9.29	26.7	1.24	0	0	0	0	0

Figure 33: Showing Land Use Pattern of villages around the mining lease area.

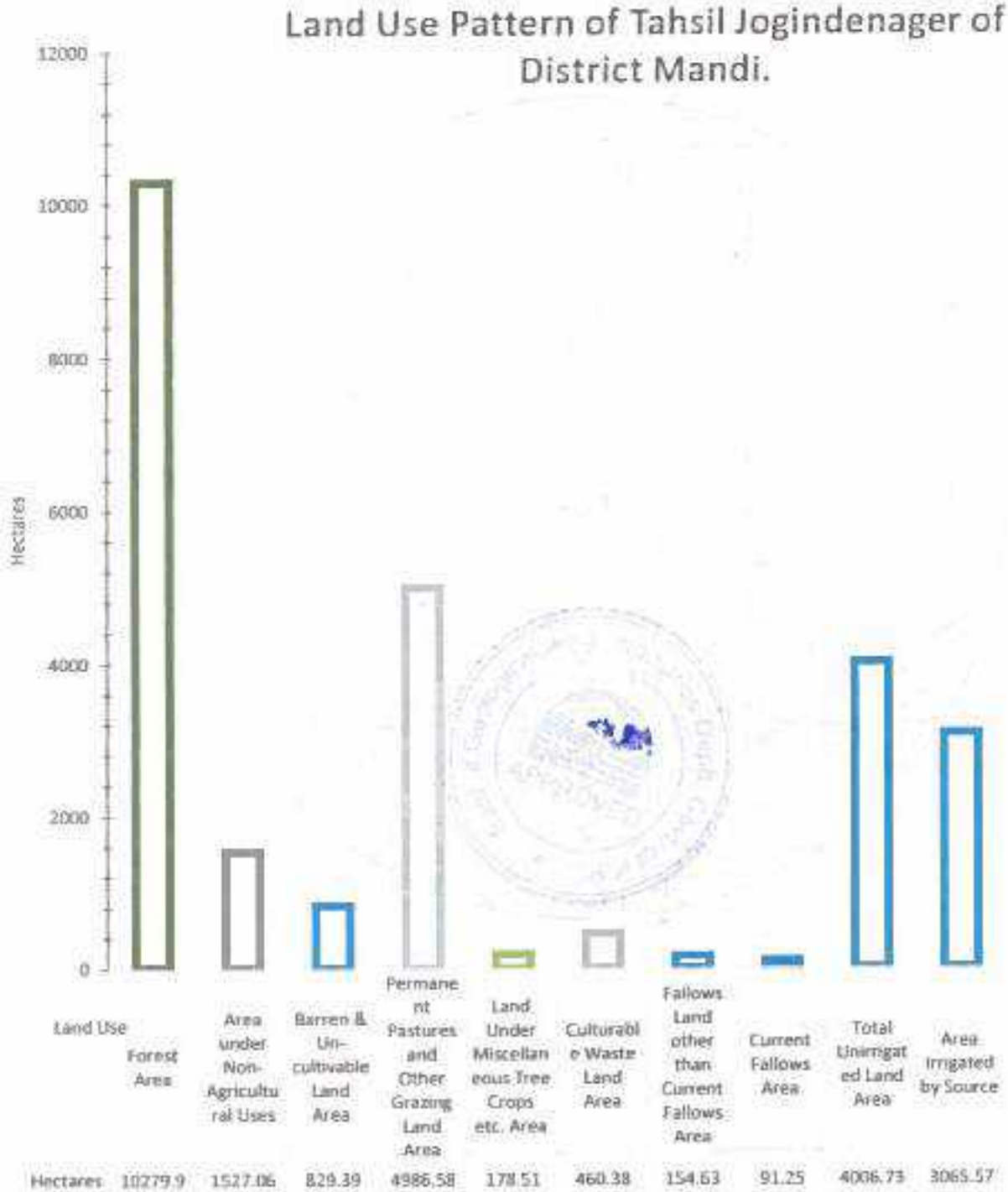


Figure 34: Land Use Pattern of Tahsil Joginder Nager of District Mandi.

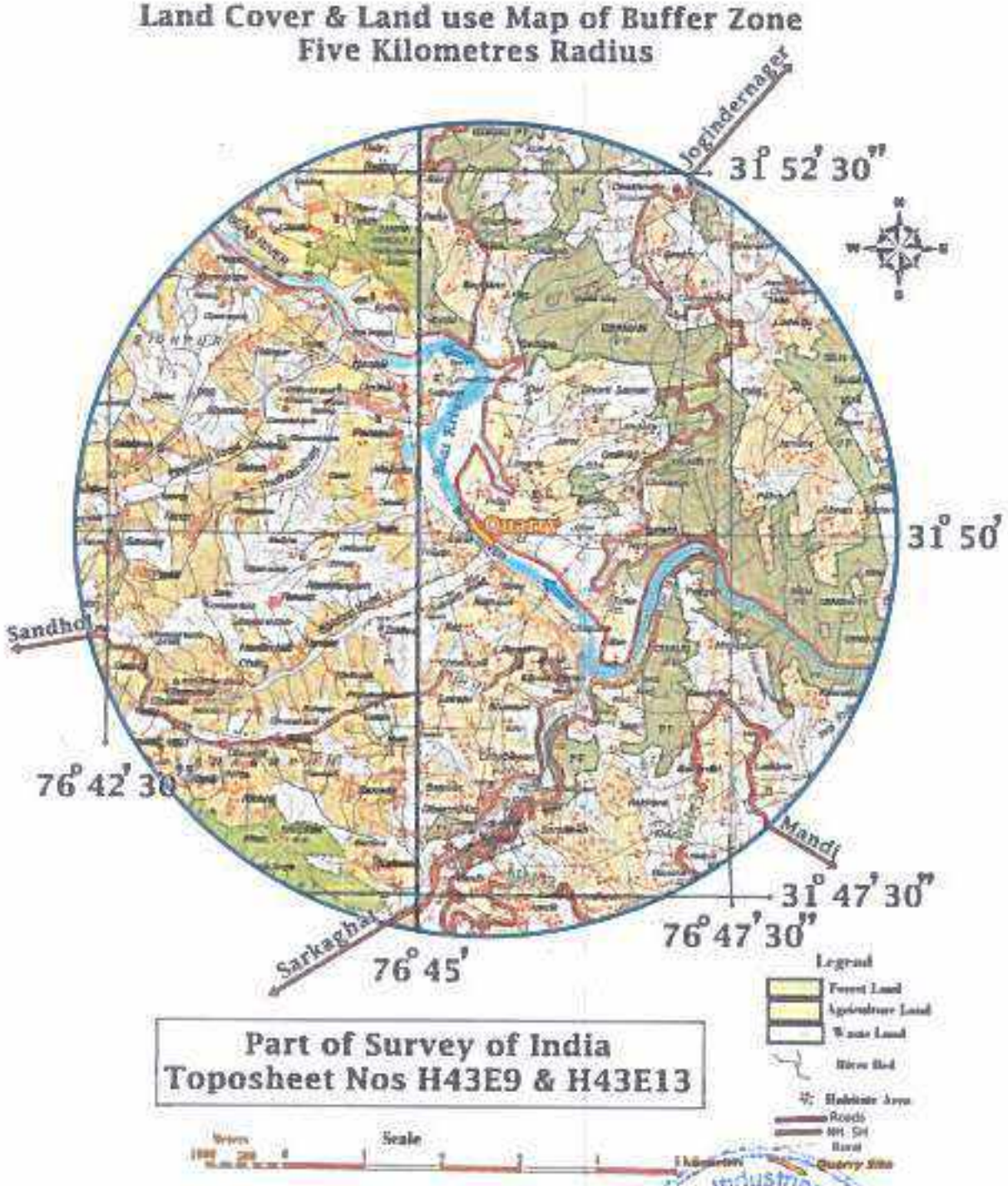


Figure 35: Showing the Five kms Radius Buffer zone.

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: -36.

Figure: -37 show production of agriculture produces in district Mandi. The area under vegetables and their production is given in the figure: -38.

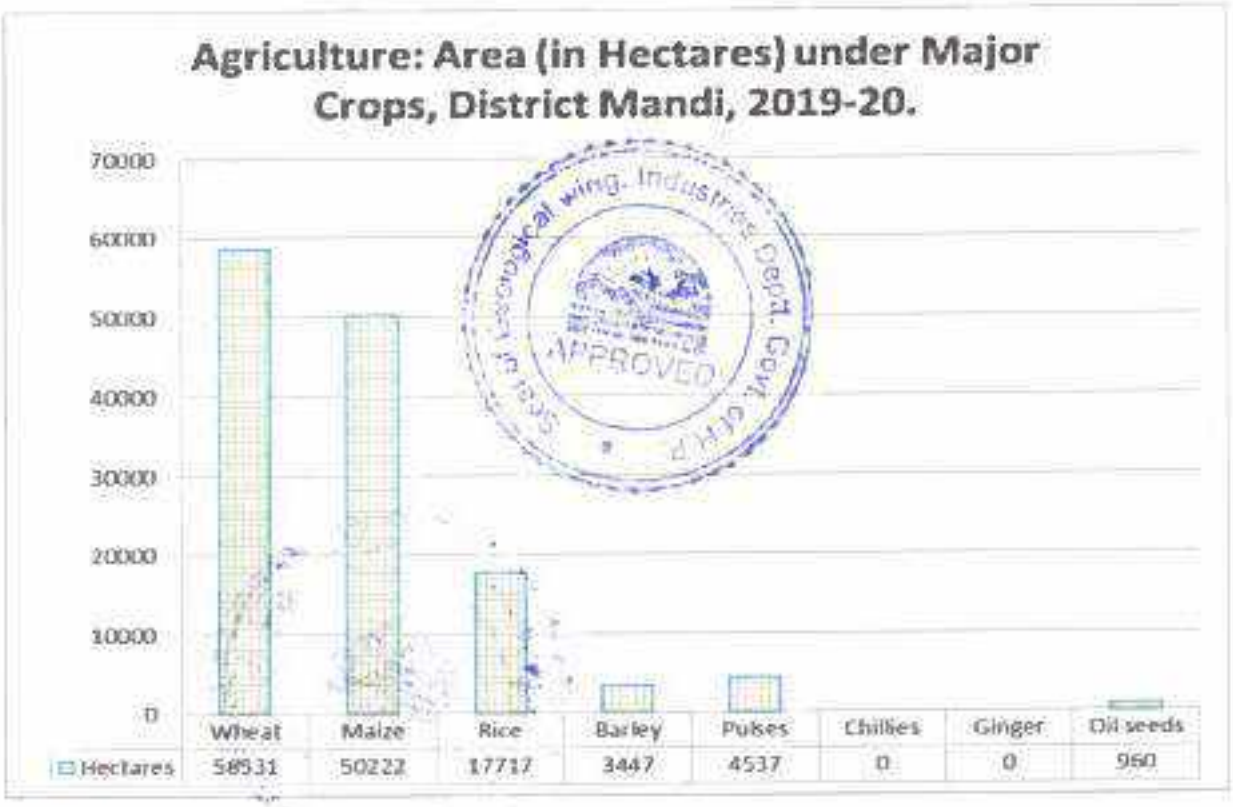


Figure 36: : Showing area under different crops in Mandi District.

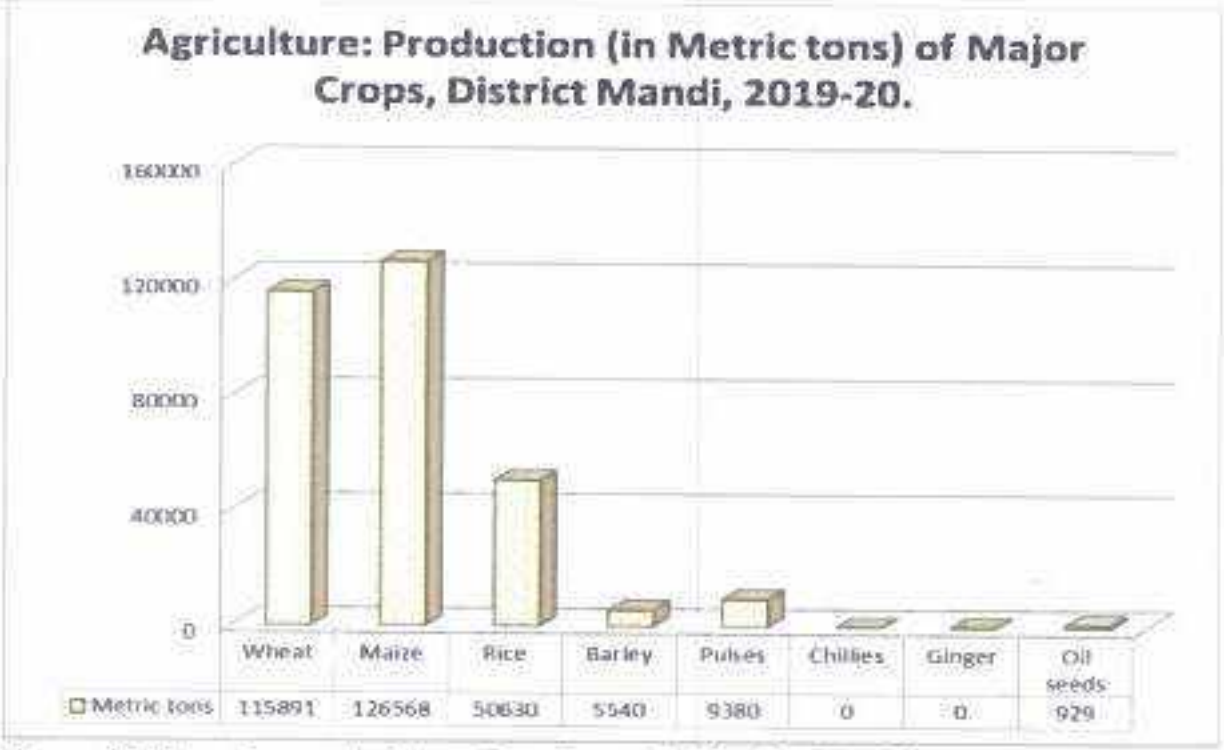


Figure 37 Showing production of each crop in District Mandi.

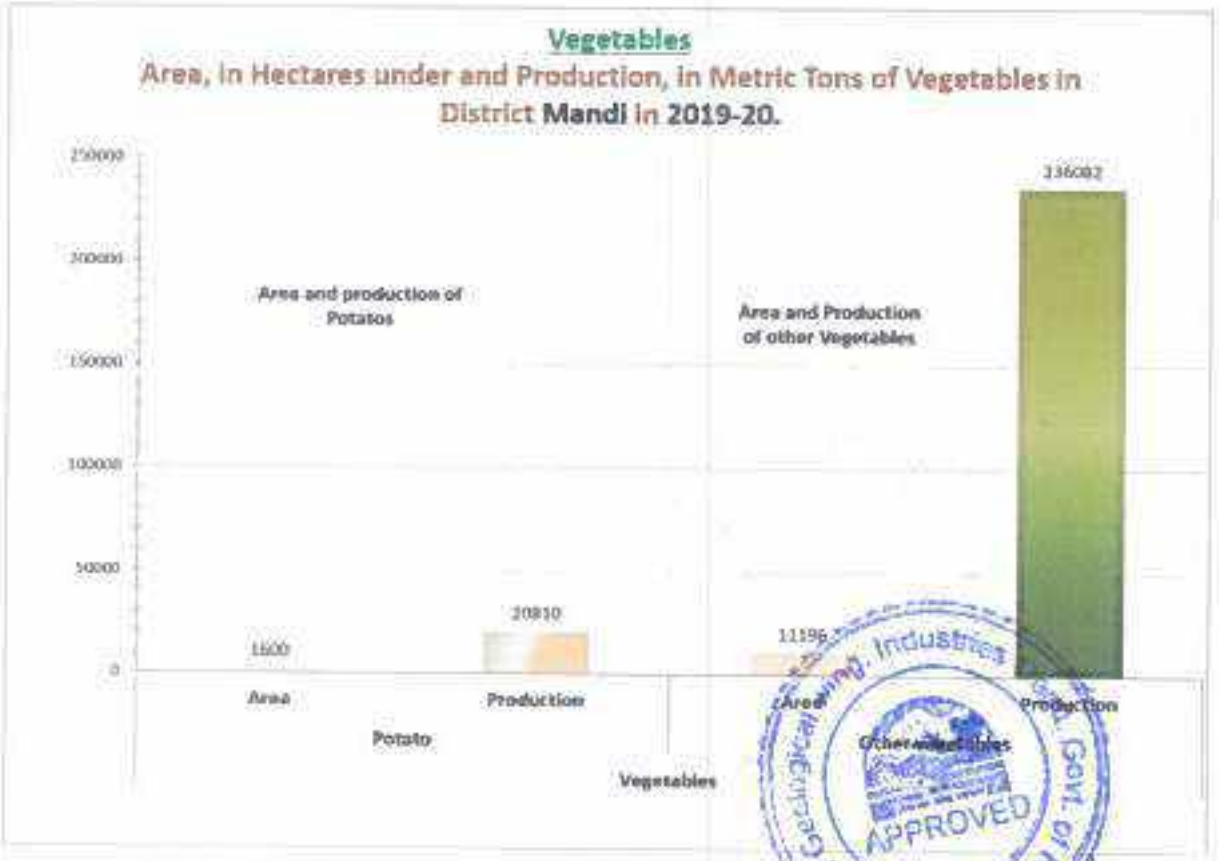


Figure 38: Showing area under vegetable, in Hectare and Production, in Metric tons, of District Mandi.

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 4; 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**
Guava	**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: -39. The population of the Buffaloes and Cattle in District Mandi is given in the figure: -40.

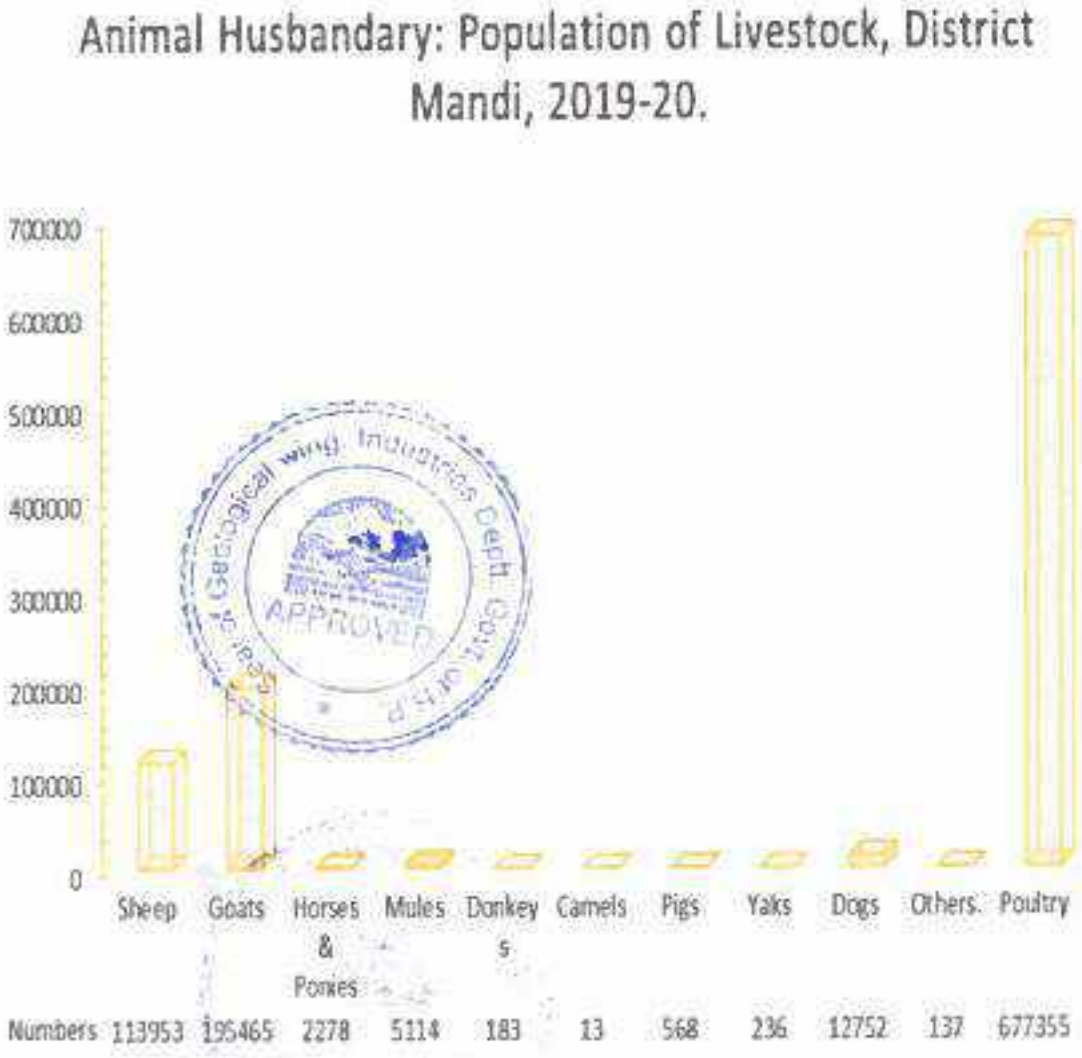


Figure 39:Livestock population of District Mandi.

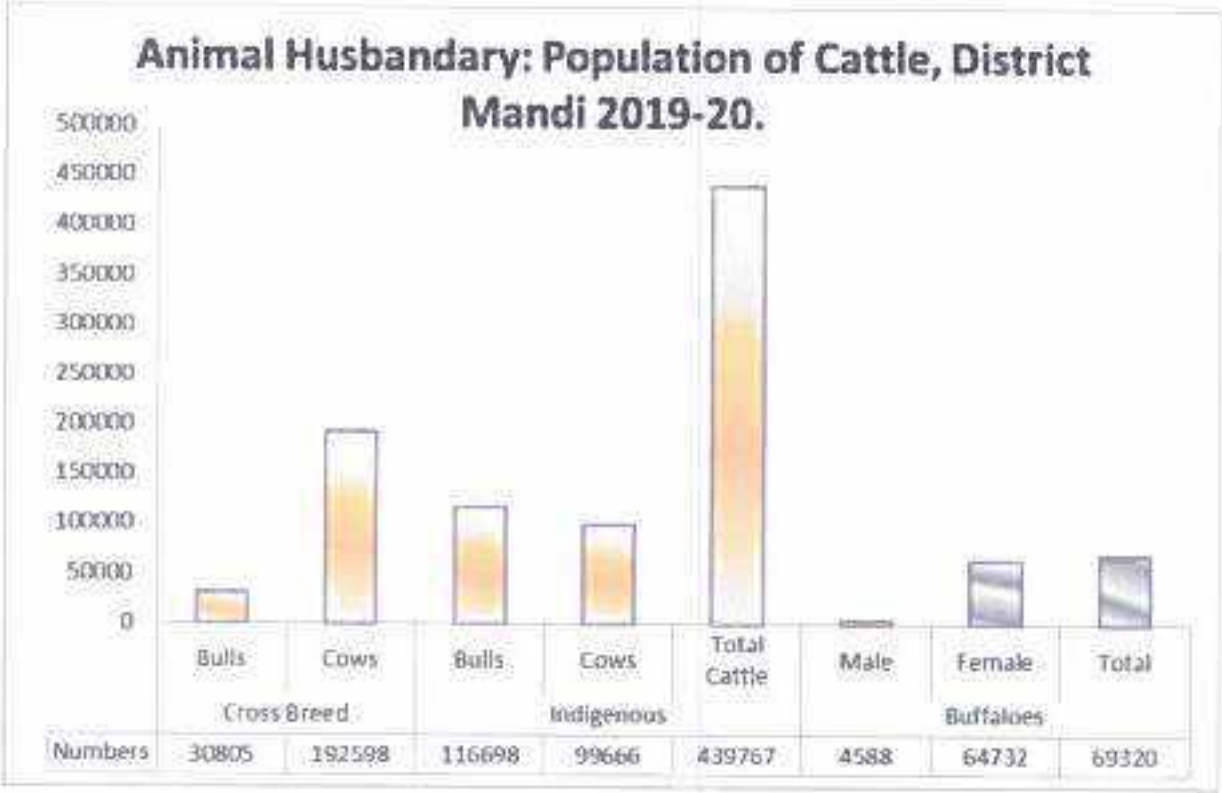


Figure 40: Showing Population of Cattle Buffaloes in District Mandi.

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 trought 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 trought fishing.

No perennial stream passes through the area under consideration.

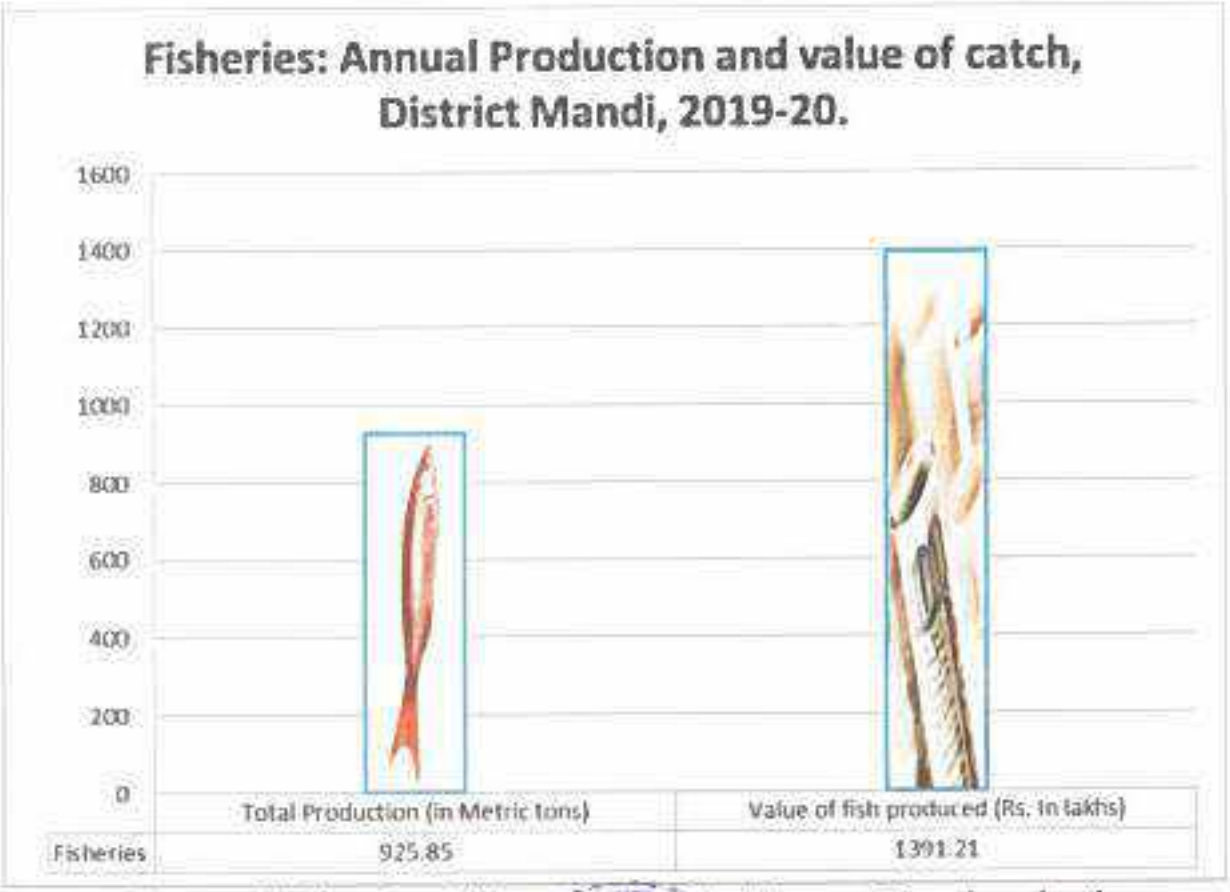


Figure 41: Showing Fish catch / production and its sale value in 2019-20.

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 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 5

Birds		
Zoological Name	**English Name**	**Common Name**
Milvus migrants	Vulture	Cheel, Gidh, Fell
Eudynamys scolopacca	Koel	Koel
Columbia livia	Pigeon	Kabuttar
Coracias bengalensis	Blue jay	Nilkantha

Columns livia	Hawk	Baj
Francolius francolinus	Black partridge	Kala Tittar
Francolius pondicerians	Grey partridge	Safed Tittar
Payo crisslatus	Peacock	Mor
Coturnix coturnix	Common quail	Bater
Alectoris graeca	Chakor	Chakor
Crovus splendens	Crow	Kanwa
Prottacula Karneri	Parrot	Totta
Tragopan melanocephalus	Western horned Tragopan	Phulgar/Jujurana
Picoides macei	Fulvourbreasted Pied Woodpecker	Kathfowra
Streptopelia decaocta	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 jovensis	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	Chiria

Table 6

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
Comis aureus	Jackal	Gidder
Macaca mulatta	Ressus monkey	Lal Bander
Preshytes entellus	Languor	Languor
Sus sacrofa	Boar	Suar
Hystrix indica	Porcupine	Sehal
Lepus nigricollis	Hare	Khargosh, Sherru, farru
Moschus moschiferus	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**

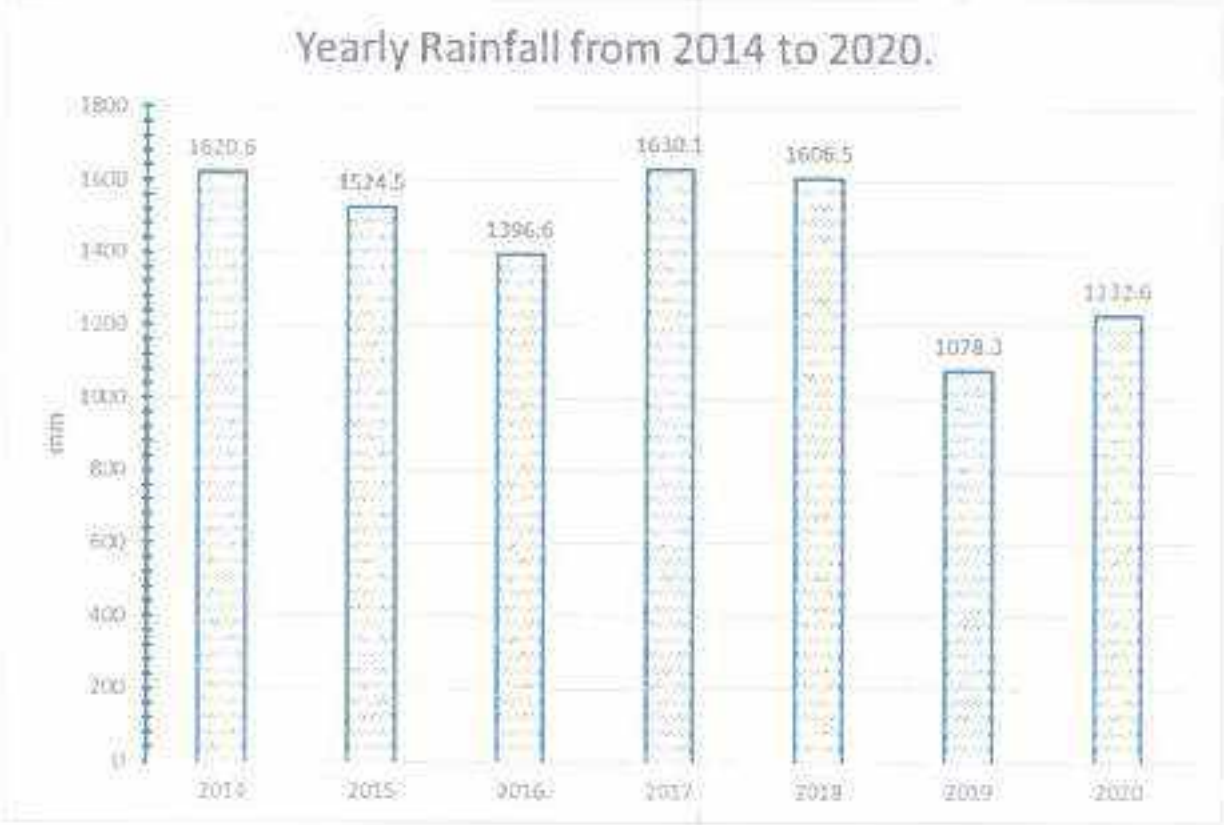


Figure 42:Yearly Rainfall from year 2014 to 2020.

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 609 metre above mean sea level.
- The lowest point is at 605 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 Darya'.
- 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 32500 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 metric tons of stone, Bajri and sand with silt-clay per day.
- 30 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 30 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 river 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 Rural Road is about 100m through the river track. The mined material is transported through tracks made in the river. About 270 metric tonnes of material shall be transported per day with an average of 30 tipper truck trips. The movement of 30 tipper truck tips would have hardly any impact on traffic on Rural Road leading to SH 19 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 609 metre above mean sea level.
- The lowest point is at 605 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., 20 to 23 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, no check walls are required to be constructed.

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	100	15	5000
Second	0	0	2000
Third	0	0	2000
Fourth	0	0	2000
Fifth	0	0	2000
Total	100	15	13000

Year wise survival rate.

The survival rate is about 30 percent in the area because of the sandy 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 100 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 21 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. 2721/1, measuring 4.1207 Hectares, Mauza/Mohal Prain Tehsil Jogindernager & 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

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

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. 2721/1, measuring 4.1207 Hectares, Mauza - Prain, Tehsil Jogindernager & 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.

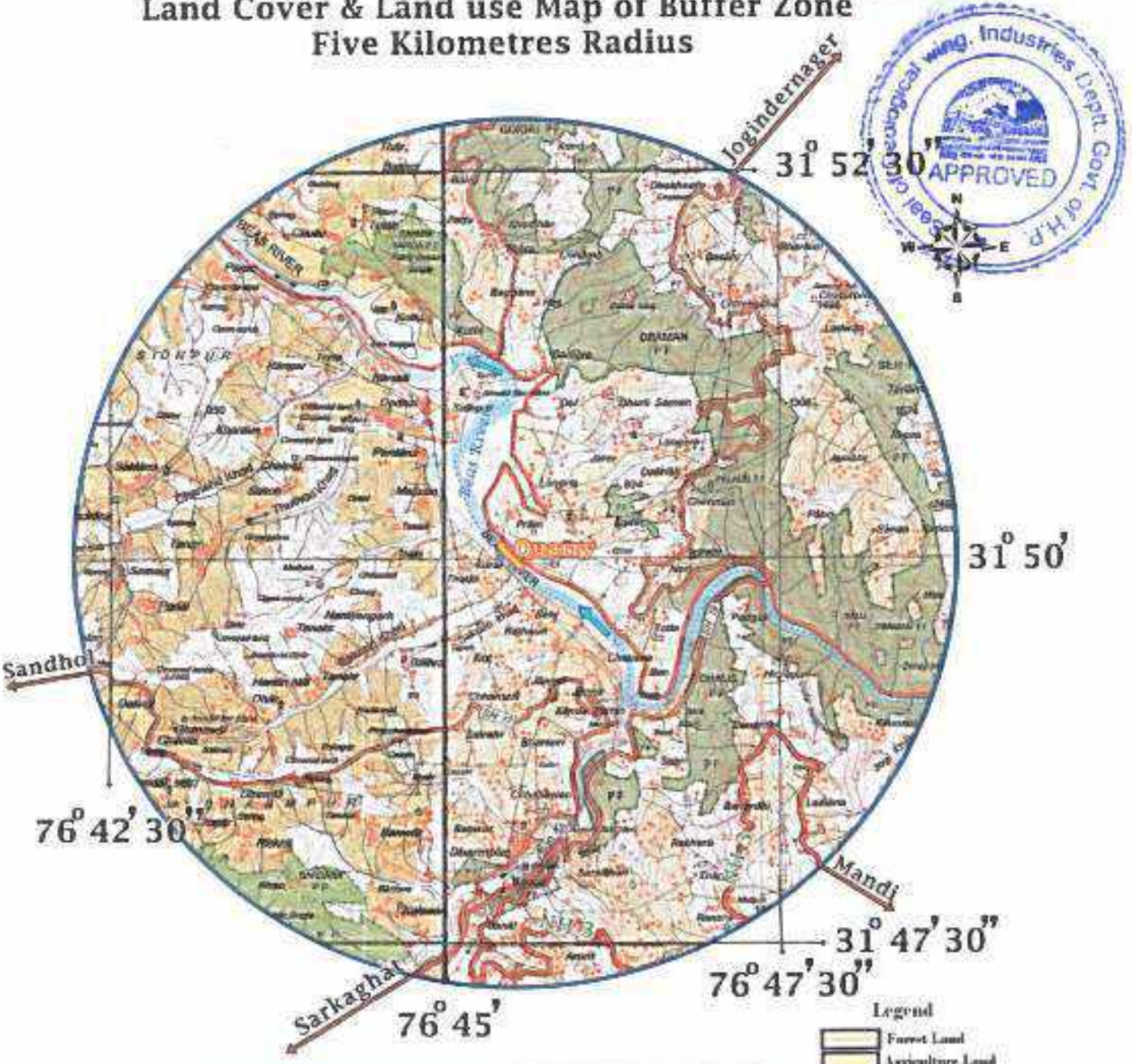
Date
Place: Shimla

Seal of Geological wing, Industries Dept. 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 4

Land Cover & Land use Map of Buffer Zone Five Kilometres Radius



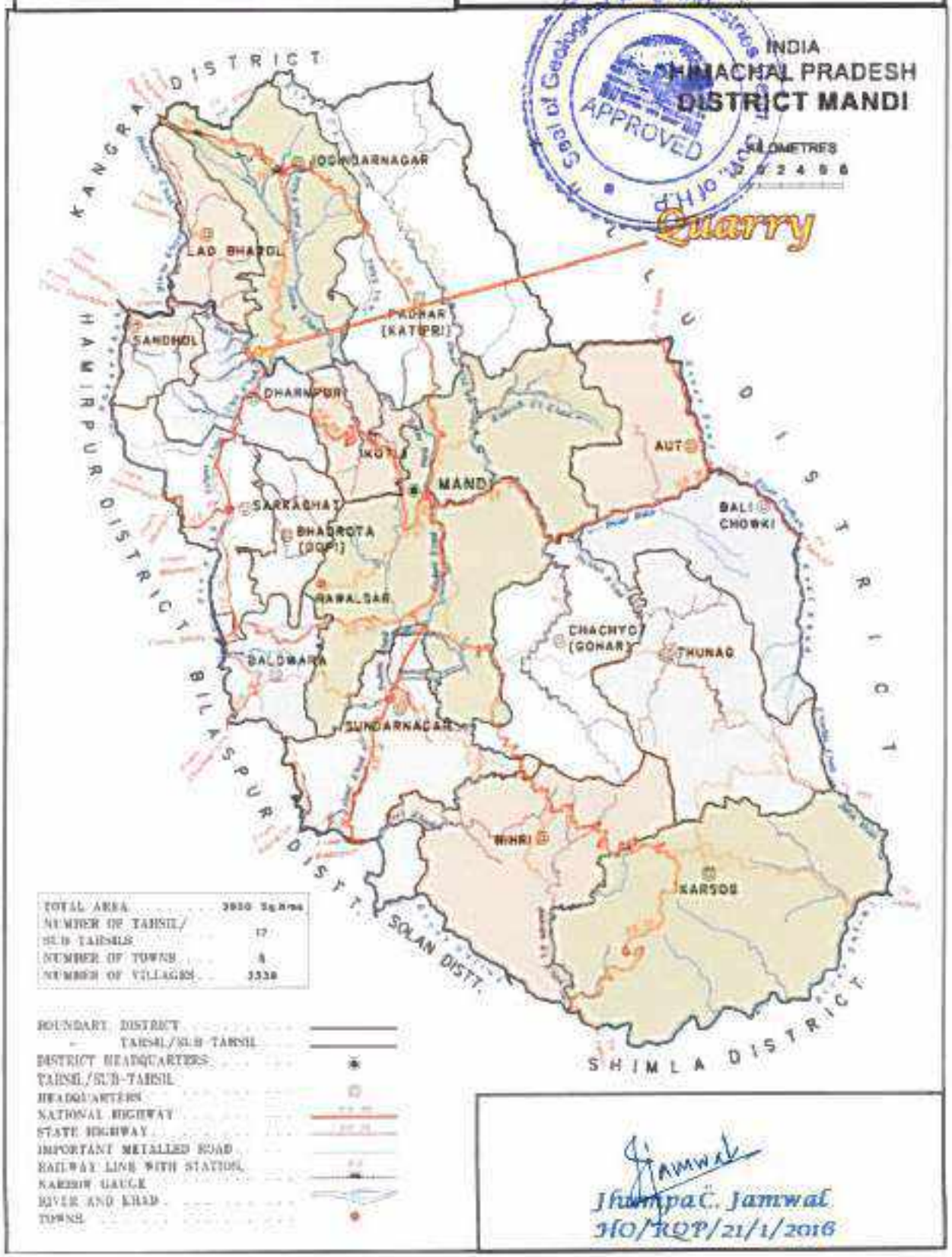
Part of Survey of India
Toposheet Nos H43E9 & H43E13

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

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

Plate 1

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



Jhampa C. Jamwal
HO/RQP/21/1/2016

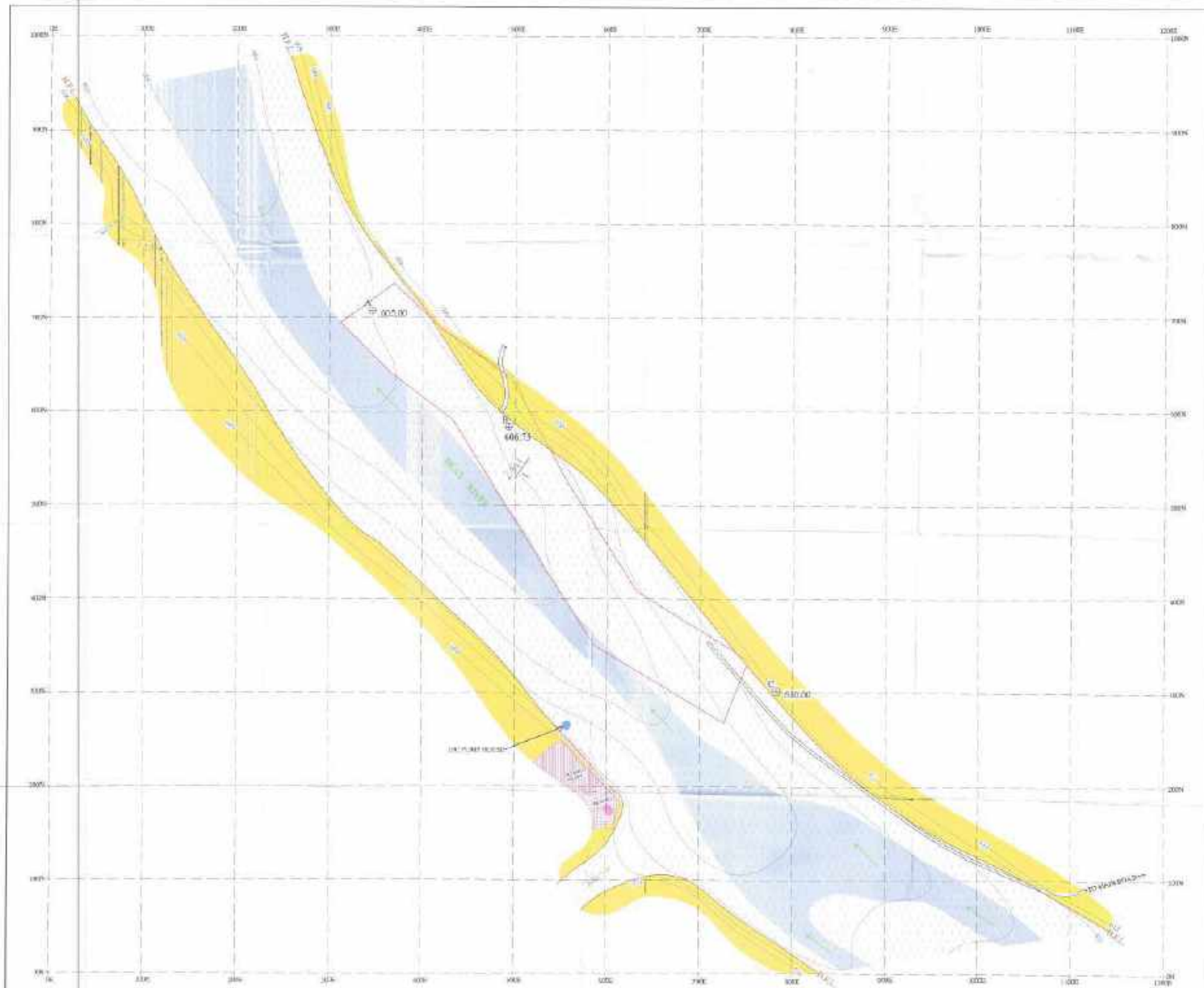


Plate No. 2

GEOLOGICAL INDEX

- CHANNEL DEPOSIT
- TERRACE DEPOSIT

TOPOGRAPHICAL INDEX

- LEASE BOUNDARY
- SURVEY STATION
- CONTOUR LINE
- HIGHEST FLOOD LEVEL
- RIVER FLOW
- HAUL ROAD
- CREATE WALL
- U/C PUMP HOUSE

M/S TM & TP HEP'S, HPPCL: BEAS RIVER (PRAIN Q-5.)

APPLIED BY: THE GENERAL MANAGER, TRIVENI MAHADEV & THANA PLAIN HEP'S, HPPCL.

SCALE: 1:2000 (1 CM = 20 METERS)

CONTOUR INTERVAL: 1.00 METER.

GEOLOGICAL AND SURFACE PLAN FEATURES.

COORDINATES :-

A N-31°50'10.07"
E-76°45'19.40"

B N-31°50'07.01"
E-76°45'24.90"

NORTH

CERTIFIED THAT THE PLAN IS CORRECT.

Plate No.II

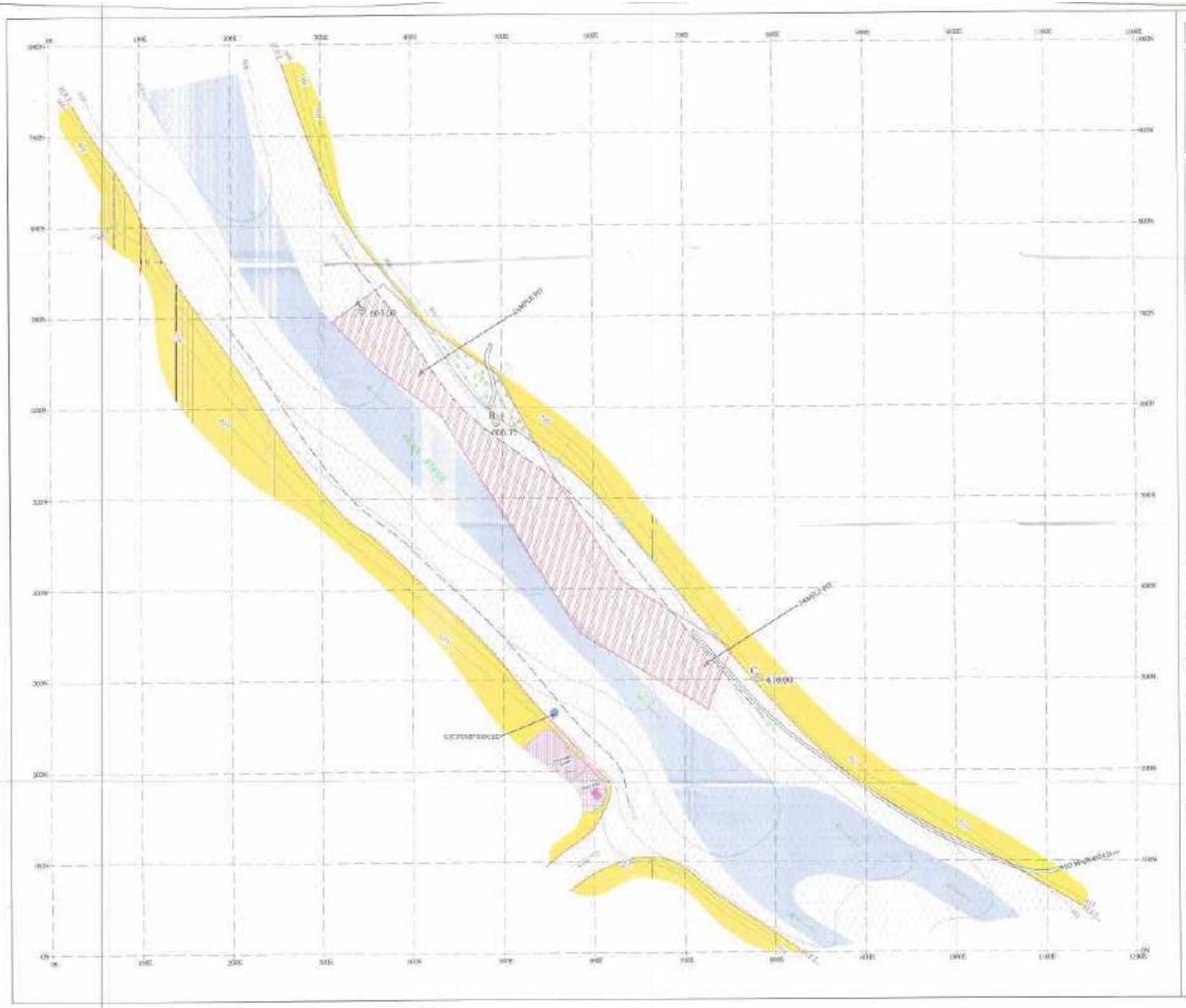


Plate No. 3

GEOLOGICAL INDEX

- CHANNEL DEPOSIT
- TERRACE DEPOSIT

TOPOGRAPHICAL INDEX

- LEASE BOUNDARY
- SURVEY STATION
- CONTOUR LINE
- HIGHEST FLOOD LEVEL
- RIVER FLOW
- HAUL ROAD
- CREATE WALL
- LAC PUMP HOUSE
- PROHIBITED ZONE
- PURPOSED CHECK DAM
- PLANTATION
- WORKING AREA
- SAMPLE PIT

M/S TM & TP HEPS, HPPCL (BEAS RIVER (PRAIN Q 5.)

APPLIED BY	THE GENERAL MANAGER, TRIVENI MAHADEV & TRIANA PLAIN HEPS, HPPCL.
SCALE	1:2000 (1 CM = 20 METERS)
CONTOUR INTERVAL	1.00 METER.

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

COORDINATES :-

A N-31°58'10.67"
E-76°45'19.49"

B N-31°58'07.01"
E-76°45'24.90"

NORTH :-

CERTIFIED THAT THE PLAN IS CORRECT.

Plate No.III

MINING PLAN

OF MINOR MINERAL LEASE FOR SAND, STONE & BAJRI KHASRA NO.1401, 1402, 1798, 974, 1409/222 & 681, MEASURING 20.4956 HECTARE MAUZA BALDA, THATHI, TANEHAD & KOT, TEHSIL –DHARAMPUR, DISTT – MANDI (H.P.)

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

2023

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

INDEX

MAP INDEX

Declaration
Certificate of RQP

भूविज्ञान शाखा
उद्योग विभाग हिमाचल
Geological Wing
Dept. of Industries
Shimla
APPROVED
With Condition
शर्तों के साथ अनुमोदित
Advt. Letter No. Ucly-cgt-Bhu-(Chan-4)/apkm-540/17-1647
Dated
Dated 23/5/23

201
29-5-23

29/05/23

GM/AGM/DM(Env)

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

MINING PLAN
OF MINOR MINERAL LEASE FOR SAND, STONE & BAJRI SITUATED IN KHASRA NO. 1401, 1402, 1798, 974, 1409/222 & 681, MEASURING 20.4956 HECTARE MAUZA THATHI, BALDA, TANEHAD & KOT, TEHSIL –DHARAMPUR, DISTT – MANDI (H.P.)

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-540/2017-6599 dated 10/11/2021.

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° 4'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

Saklain 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 Dhrampur on Dharmpur Seog 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

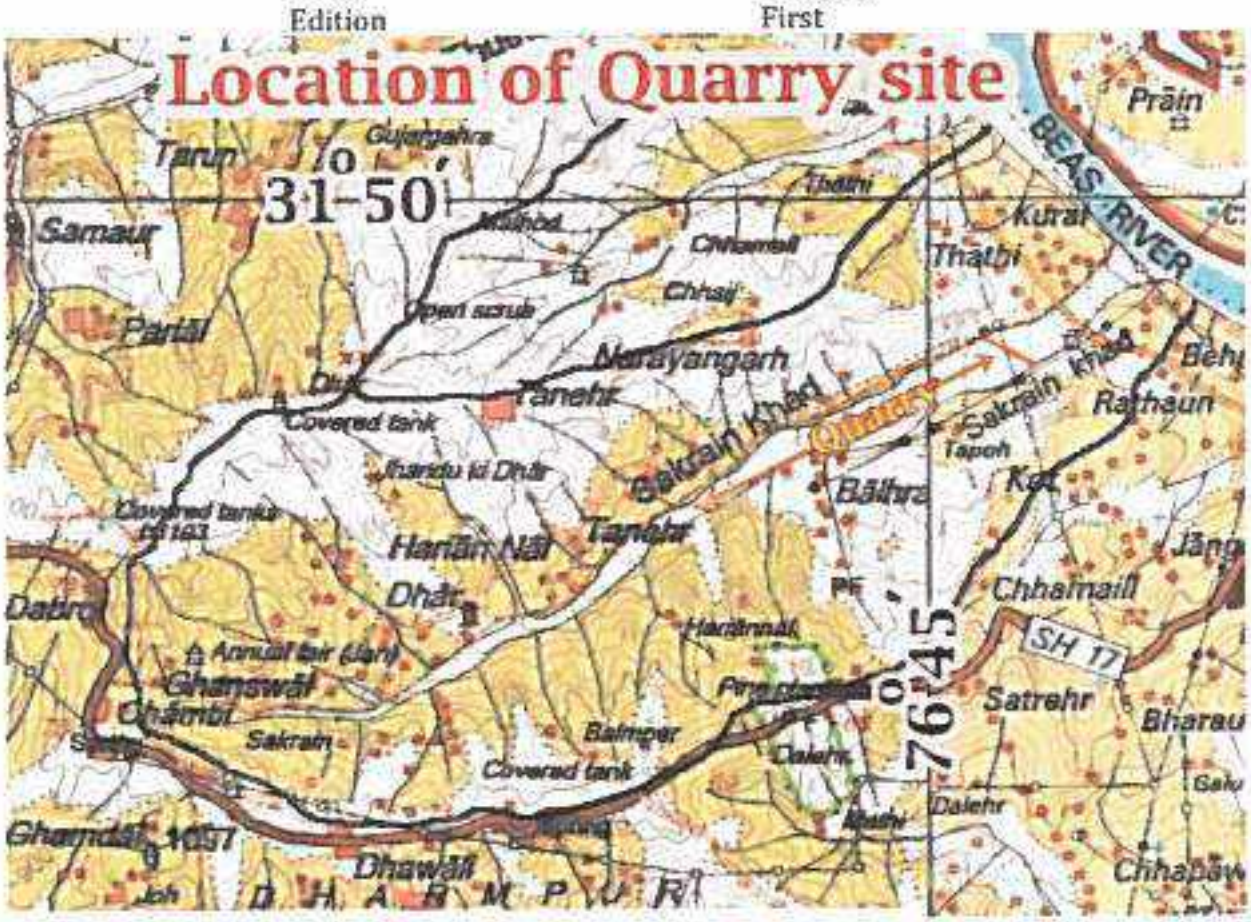


Figure 1: Location of the Mining Lease area.

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 boundary pillars (calculated).

Pillars	Latitude North	Longitude East
A	31° 49' 15.84"	76° 44' 13.43"
B	31° 49' 24.33"	76° 44' 28.27"
C	31° 49' 25.89"	76° 44' 34.83"
D	31° 49' 28.09"	76° 44' 36.71"
E	31° 49' 30.04"	76° 44' 40.98"
F	31° 49' 31.80"	76° 44' 56.48"
G	31° 49' 42.38"	76° 45' 12.07"
H	31° 49' 41.12"	76° 45' 17.33"

I	31° 49' 34.08"	76° 45' 12.39"
J	31° 49' 32.62"	76° 45' 09.94"
K	31° 49' 27.41"	76° 44' 56.83"
L	31° 49' 26.22"	76° 44' 42.45"
M	31° 49' 24.61"	76° 44' 37.47"
N	31° 49' 22.29"	76° 44' 33.71"
O	31° 49' 22.58"	76° 44' 28.62"
P	31° 49' 20.12"	76° 44' 24.98"
Q	31° 49' 18.77"	76° 44' 24.85"
R	31° 49' 14.12"	76° 44' 14.65"

G. M., TM & TP HEPs P.O. Kotli, Distt Mandi
Saklain Quarry, Pillar Coordinates

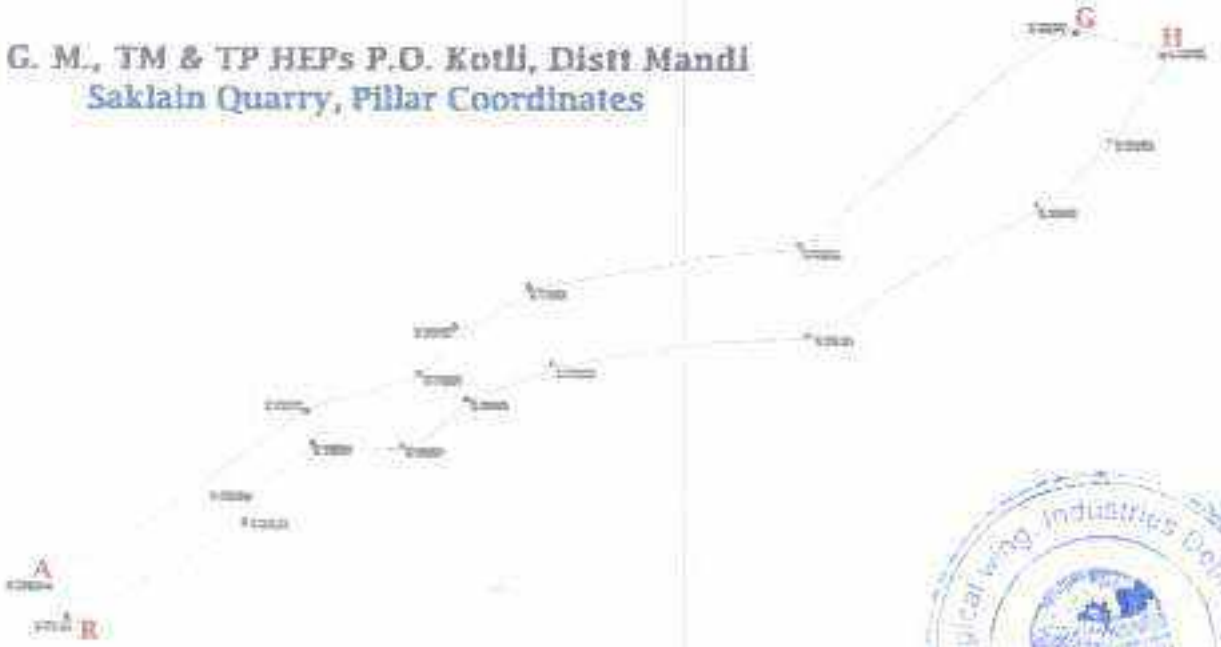


Figure 1: Calculated Coordinates of Boundary Pillars

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

2.3 Address & Detail of Lease

S. No	Khasra Number	Area Hectares	Owner of Land	Kism	Mauza/mohal
1	1401	1.6813	Government	Gair mumkin khad	Thathi
2	1402	5.4888			
3	1409/222	3.0181			Balda
4	681	1.6813			
5	1798	3.1372			Tanehad
6	974	5.4889			Kot
TOTAL		20.4956 HECTARES			

	Village: -	Tanehad, Balda, Kot & Thathi
	Patwar circle:	Bahri
	Post Office: -	Thathi
	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	0.10
2	Roadside	Dharampur	5.5
3		Kotli	48
4		Mandi (District Offices)	70
5		Shimla (State capital) Airport	170 172
6		Bunter (Airport)	128
7		Jogindernager Metre gauge Rly Stn.	52

8		Sarkaghat	26
9		Dharamsala	94
		Gaggal Airport	100

2.5 Approach to the Area.

The leased site is part of Riverbed and is at 5.5 km from Dharampur via Dharampur- Seog Road, which is approx. 100 m from the quarry site by a Gahri – Saklain-Sandhol link road. Figure below shows the approach map of the area.

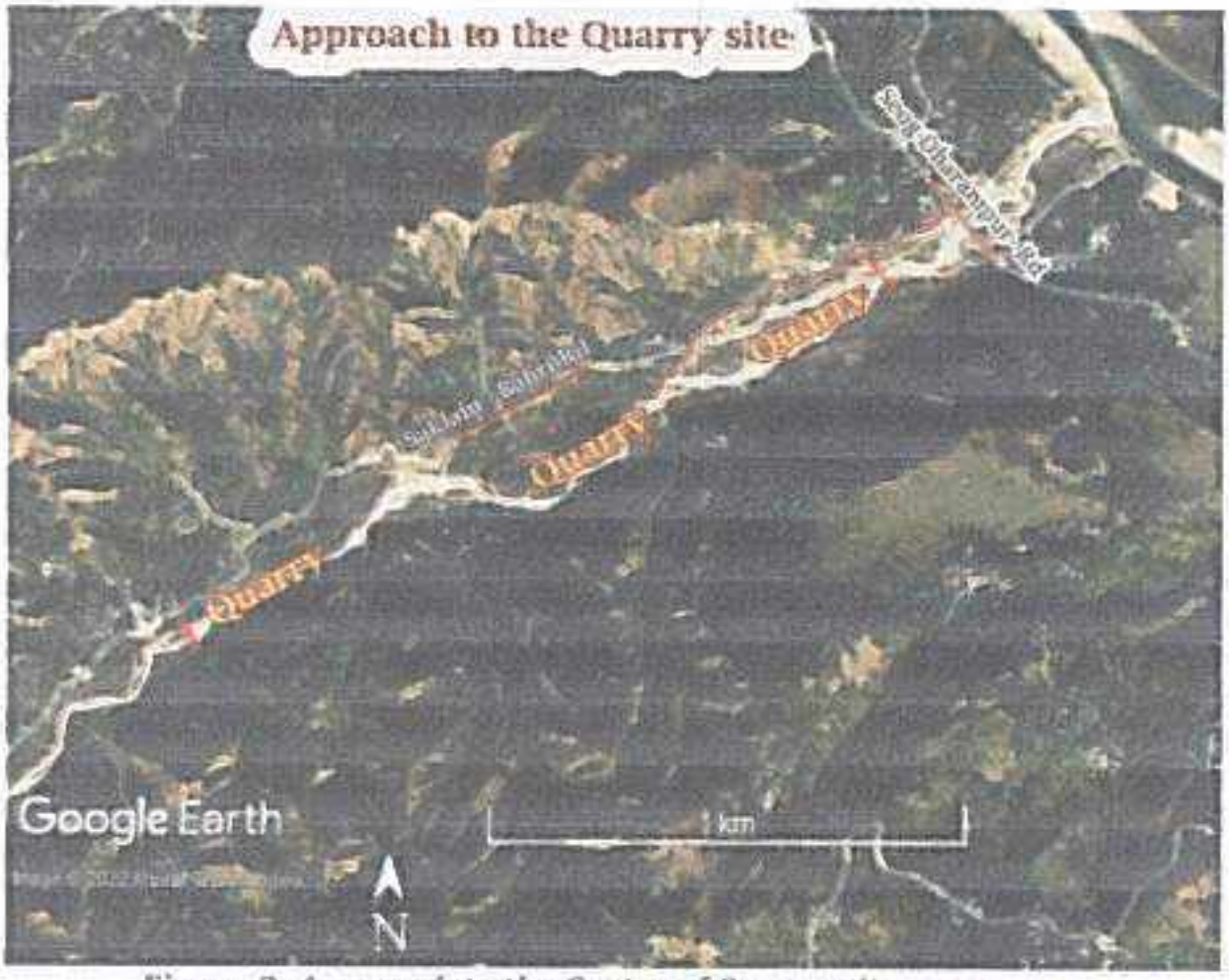


Figure 3: *Approach to the Centre of Quarry site*

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 Saklain Khad region is as given below in the figure: -4: -

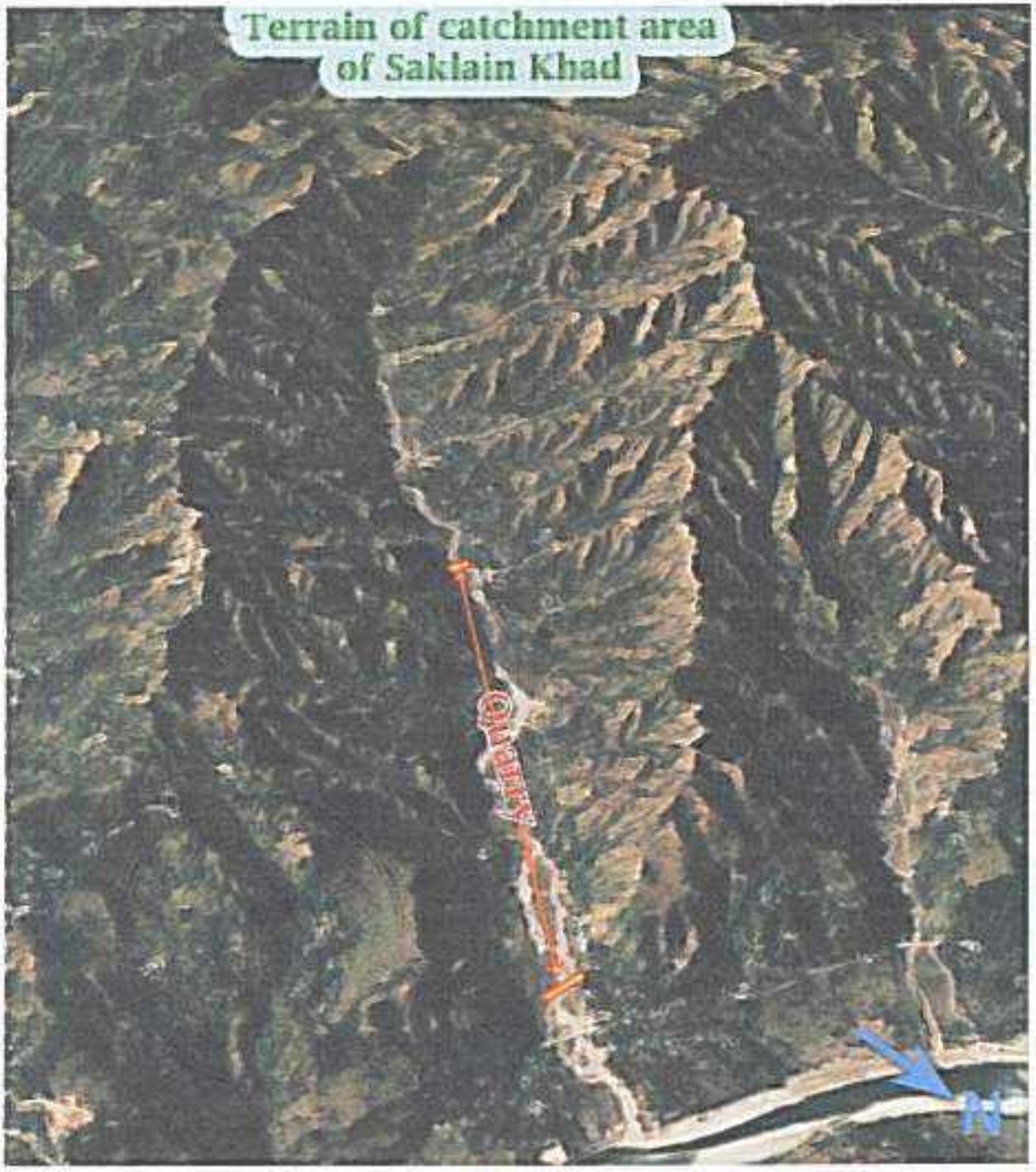


Figure 4: The terrain map of the Saklain Khad region.

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 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 Saklain Khad is 695 Meters above MSL.
- The lowest contour of the leased-out area in Saklain Khad is 647 Meters above MSL.

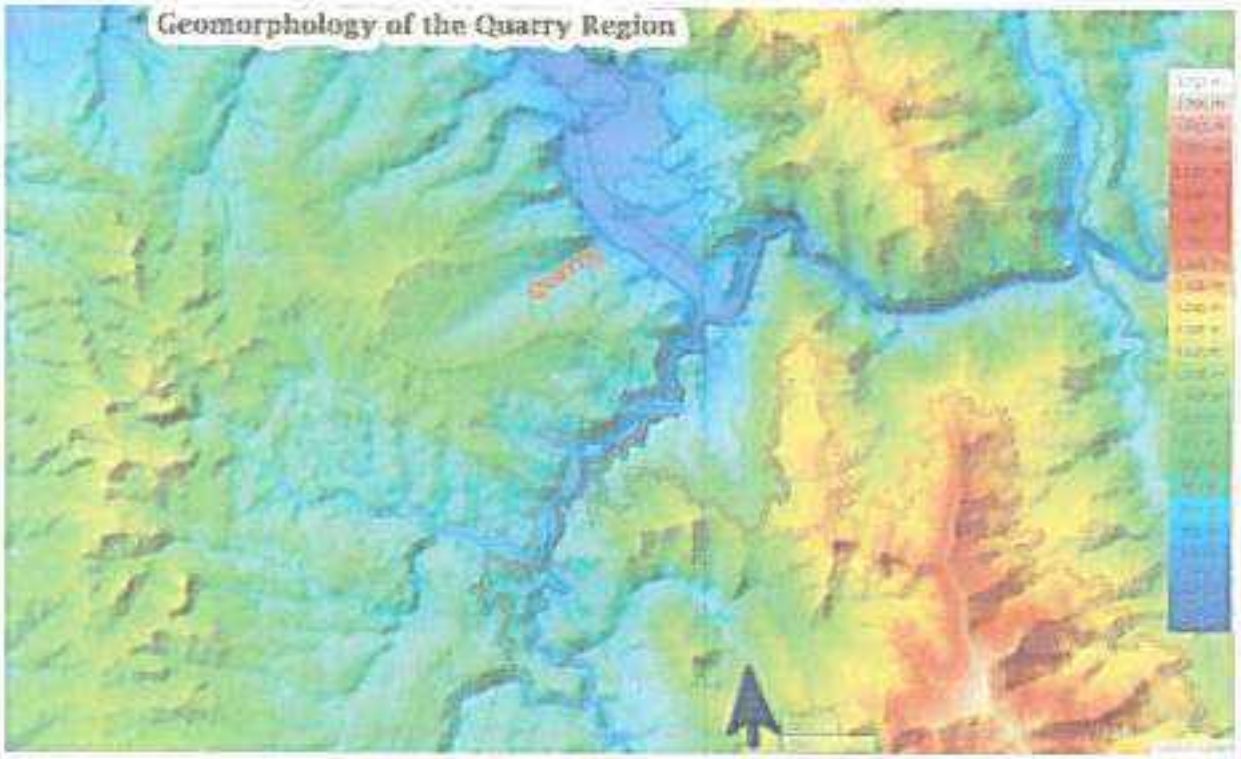


Figure 5: Terrain Map of the Area.

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.

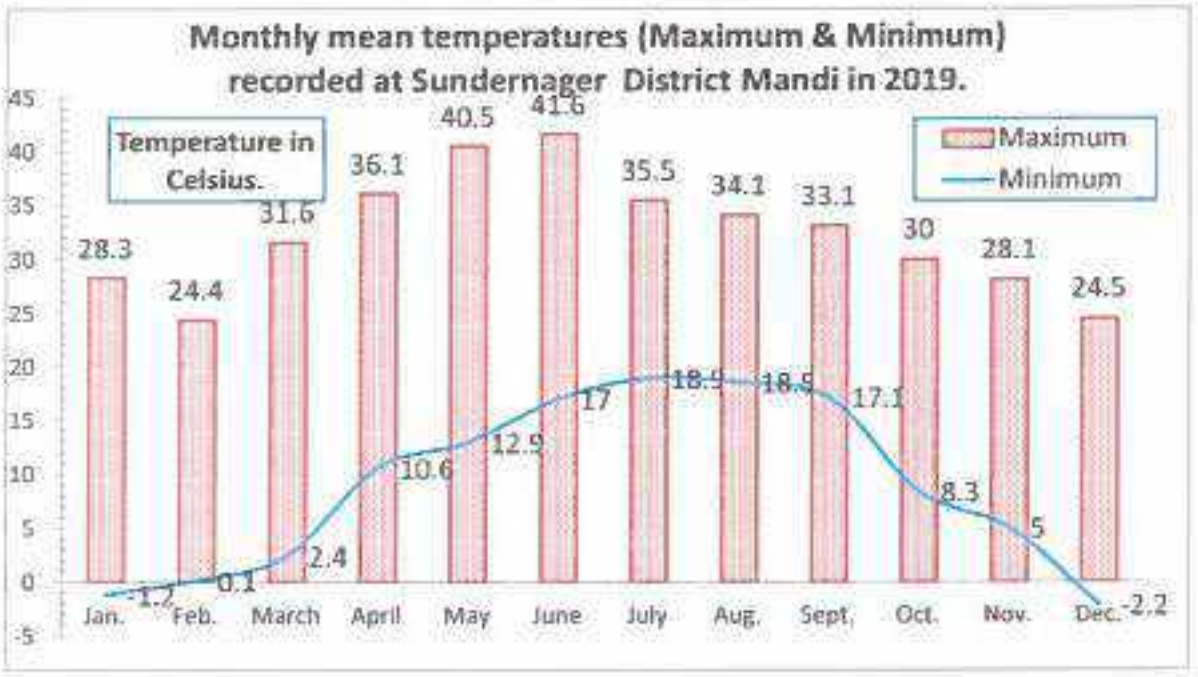
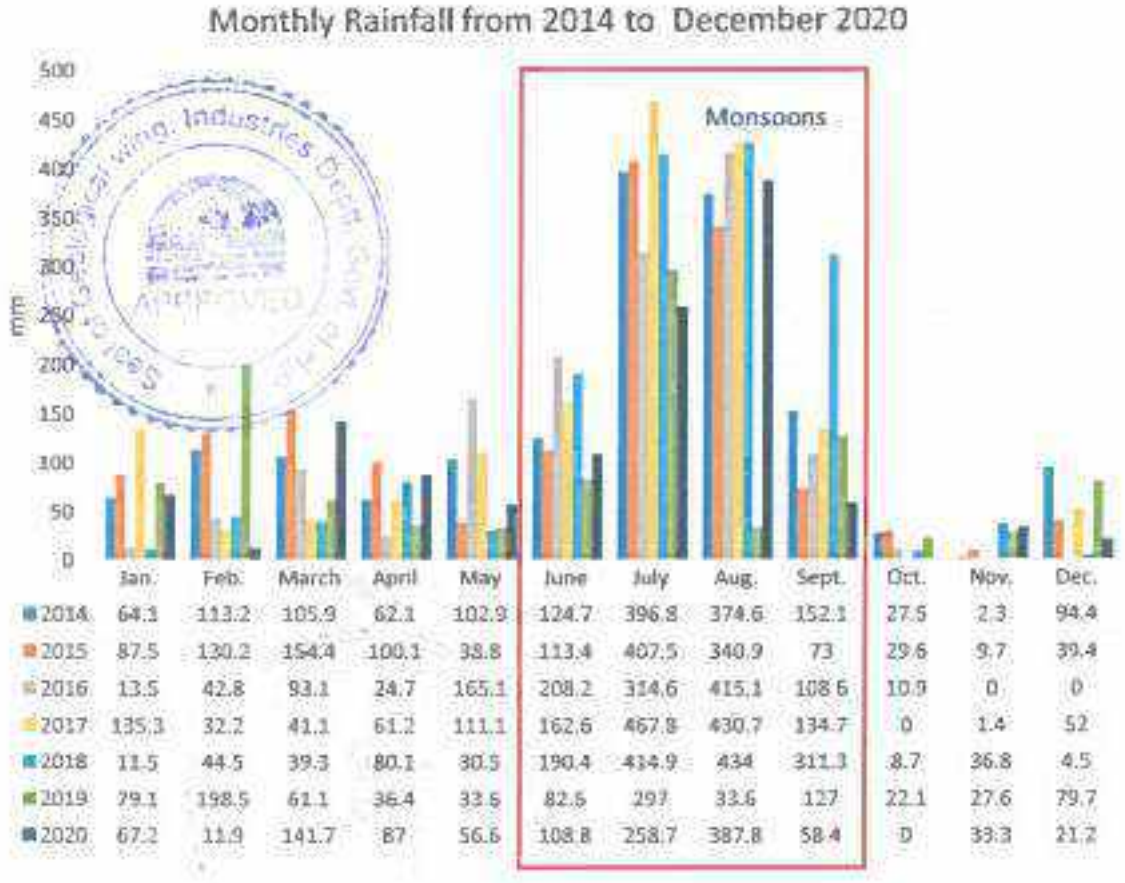


Figure 6: Mean monthly maximum and minimum temperature recorded at IMD station at Sundernager.

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	434.9	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 bed of Saklain Khad tributary of Beas River and accessibility to the quarry site is through a kutcha road from Dharmpur- Seog Rural 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 Saklain Khad, a primary tributary of Beas River. Saklain Khad originates at a height of 1175 meter above mean sea level, from a peak west of Chambi 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 Saklain Khad lies on survey of India Topo-sheet Nos H43E9 & H43E13.

The general analysis of the drainage system of Saklain Khad is given below in table 5 (as per 1: 50000 scale)

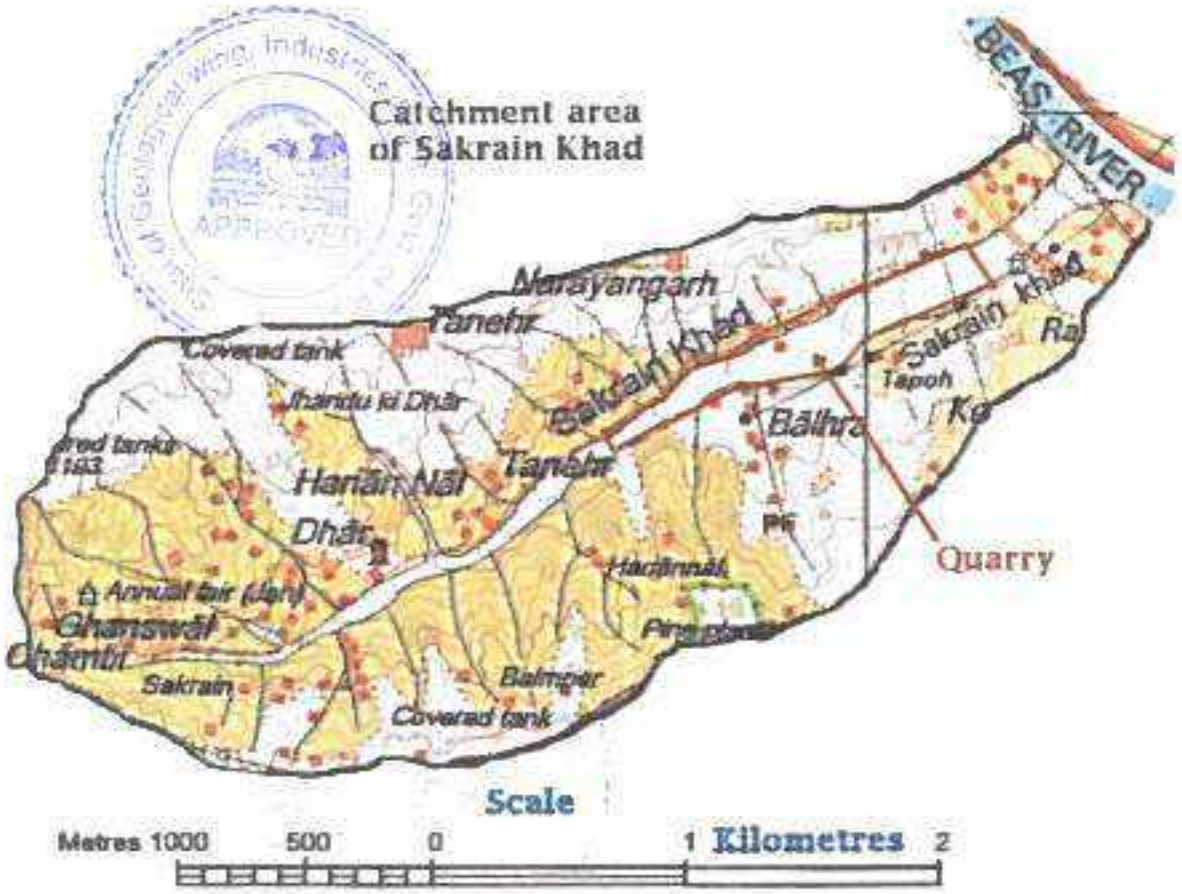


Figure 8: Catchment of Saklain Khad.

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.

Basic Geometry of the catchment is as: -

Area of the Catchment = 6.4 Sq. Km
Perimeter of the Catchment = 23.4 Km
Length of the river 5.32 Km
Average width of valley 1.35 Km
Width of the catchment at maximum 1.85 km
From various analysis of the drainage the Saklain 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.

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

Saklain Khad – Primary tributary of Beas River

1.3 Drainage System

Beas River

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

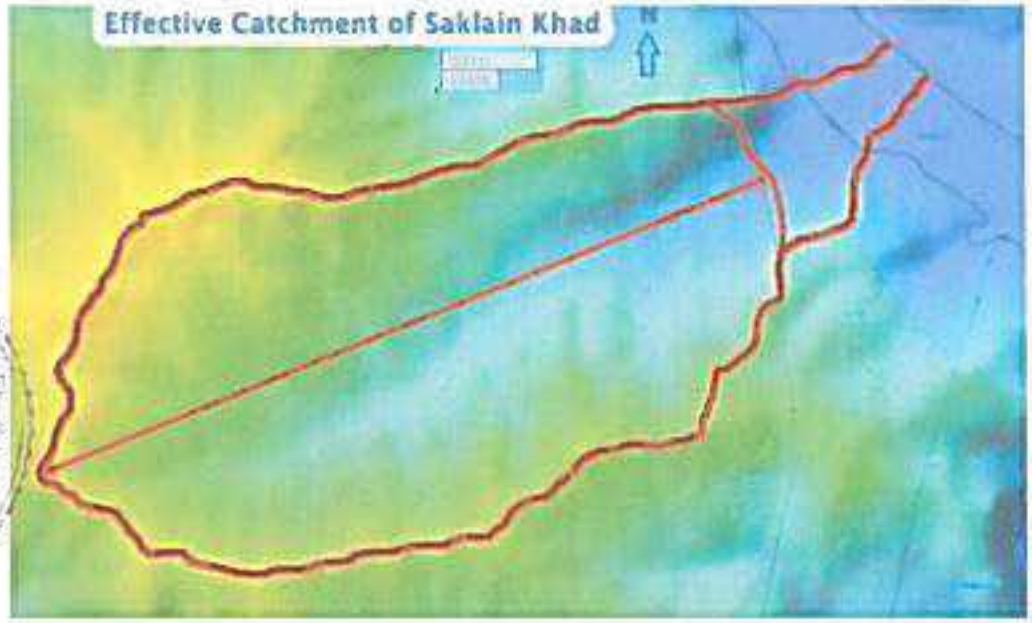


Figure 9: Effective Catchment area of Saklain Khad.

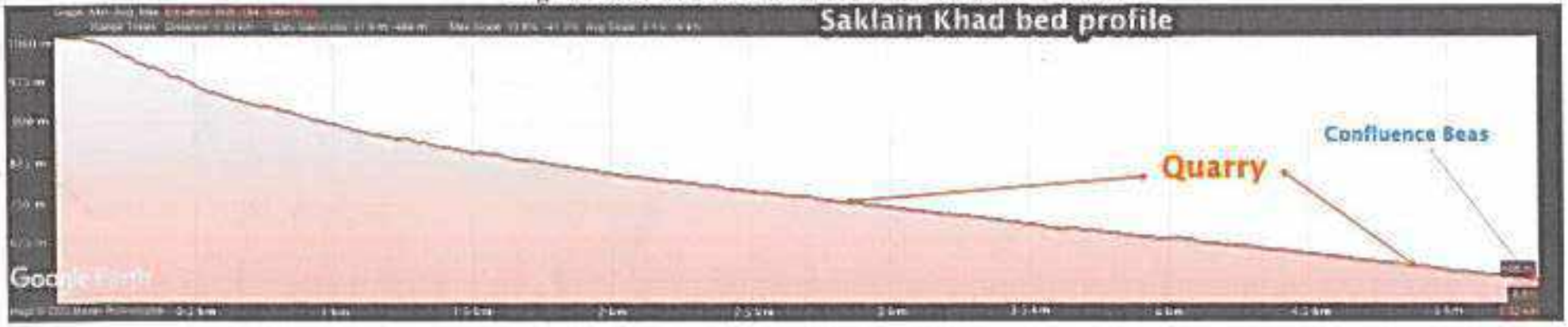


Figure 10 Khad bed profile.

1.4 Type of Drainage

Dendritic (Figure 8)

1.5 Origin of River/Stream

Saklain Khad originates at a height of 1175 meter above mean sea level, near Chambi village (origin lies in the Survey of India, toposheet No H43E9). 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.

1.6 Attitude at Origin

1175 metres above MSL.

1.7 Width of River at the place of Mining

85 to 177 Metres.

1.8 The annual deposition at the place of mining

6 to 8 Cm. at different location in the Saklain Khad.

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 *20 to 34 cm X 16 to 34 cm X 18 to 30 cm* (length X breath X height) (Photo1)

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

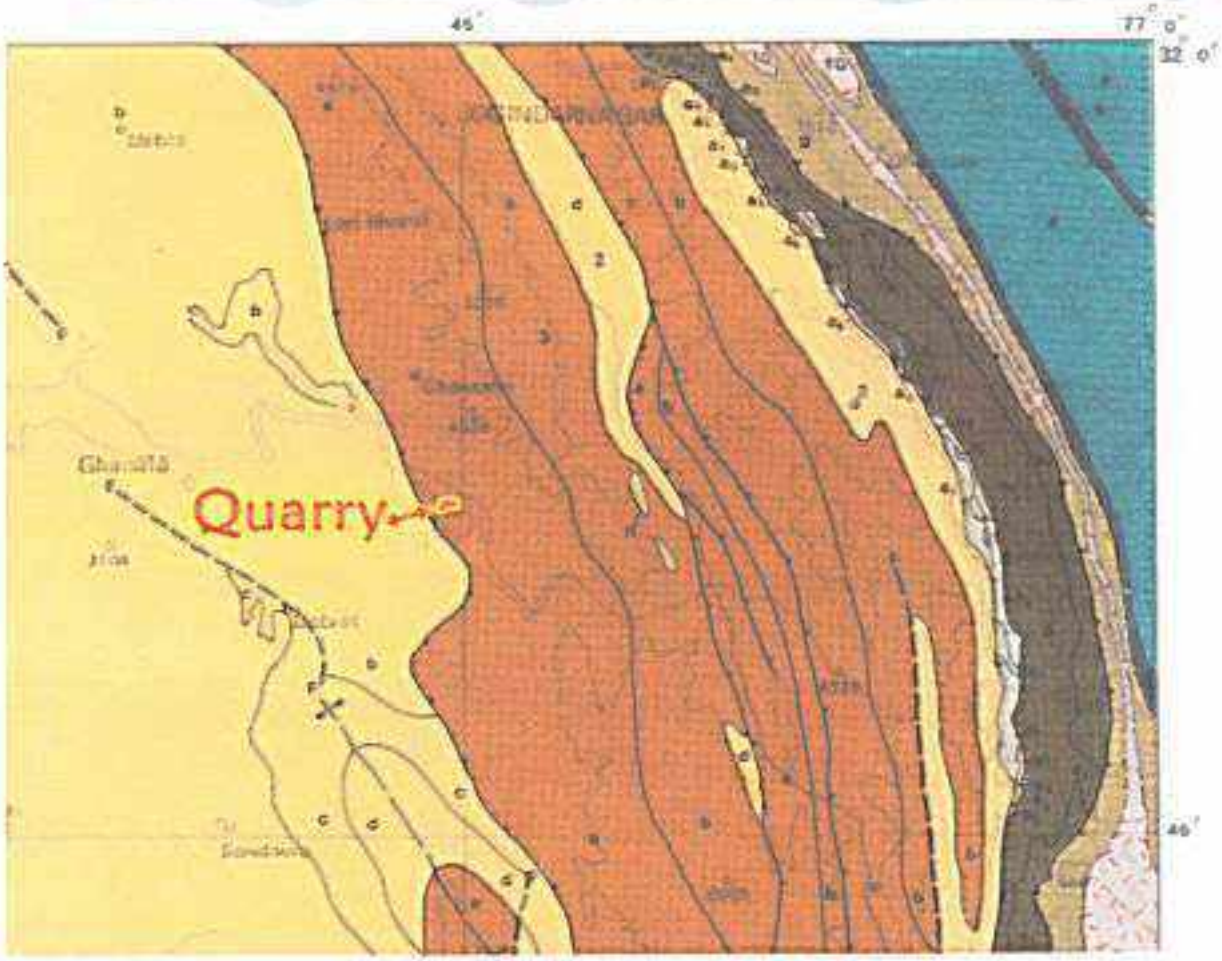
2.1 Regional Geology

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 Srikantia (1988). Mandi District lying within the Lesser Himafaya and the Shiwalik Foothill comprises rocks ranging in age from Proterozoic to Quaternary. The oldest rocks are of undifferentiated Proterozoic age, comprising carrbonaceous 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 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

Figure 11:Geological Map of the Area

Table: Stratigraphy of the Saklain 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 unconformably 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.

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 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 Saklain 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 Saklain 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 Saklain 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.

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 caried 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.*

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:

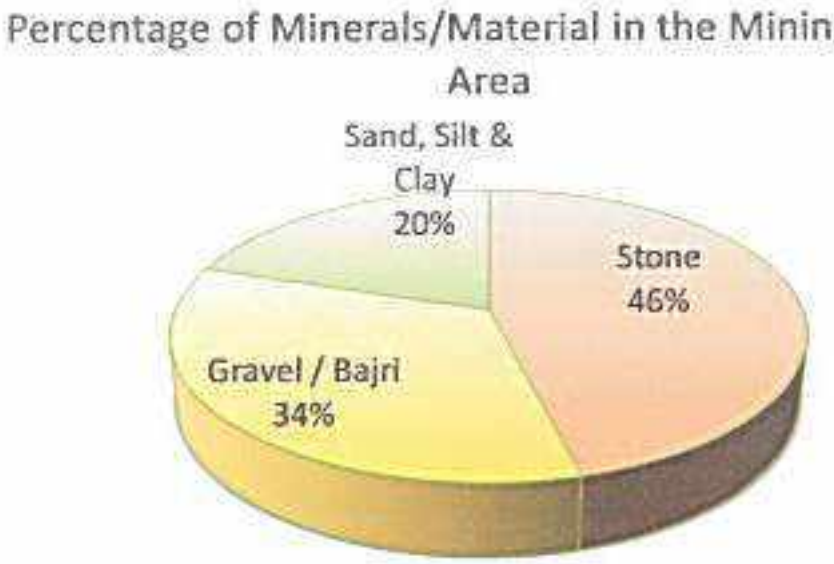


Figure 12: Percentage of each category of mineral present in the leased area.

1	Stone	46%
2	Gravel / Bajri	34%
3	Sand, silt & clay	20%

3.3 Estimate of Geological Reserve

The entire block falls within the river corridor. Thus, the mining leased area of 204956 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 proven Geological deposits in the area are to a tune of about 2305755, metric tons as shown in the chart.

Geological Reserves

Geological Reserves	Thickness, in metres	Lease Area (Square Metres)	Reserves Rounded off (in tonnes)
Proved	5	204956	23,05,750
Probable	10	204956	46,11,500
Inferred	20	204956	92,23,000
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 177 meters, thus, no mining is proposed in the area up to 8.5 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 1:3000 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., 126800 square metres of lease area, is mineable as it falls within the river corridor, leaving out the safety zone provided along the banks.***

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
204956	126800	131240	97000	57060	285300

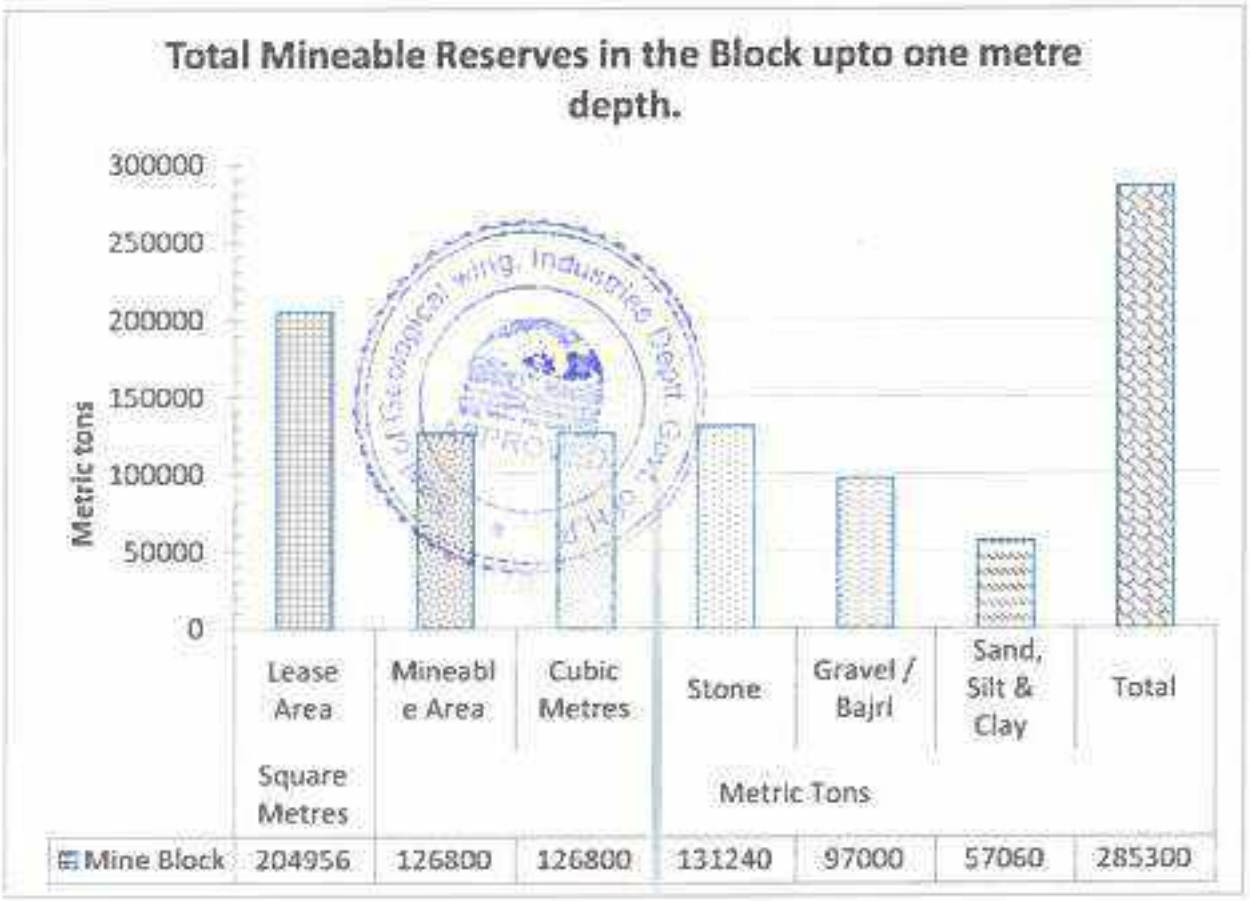


Figure 14: Mineable Reserve up to One Metre depth

Thus, the safe mine-able block of 126800 square metres contains 285300 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 2.55 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 126800 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 figure 13. 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 15 shows the proposed production of materials in five years.

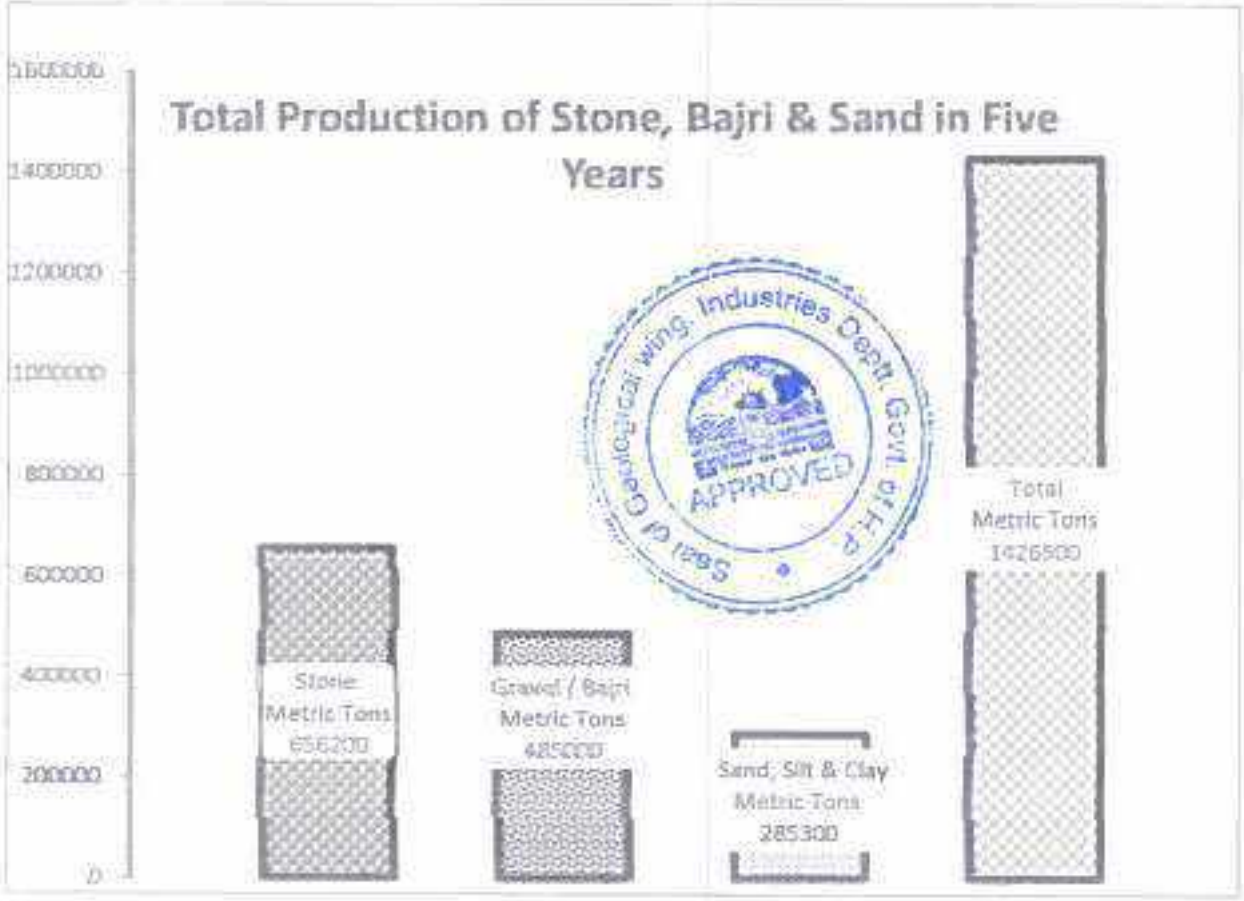


Figure 15:Proposed production of total material in five years

4 MINE DEVELOPMENT AND PLAN OF PROGRESSIVE MINING

The mining activity will be manual and to some extent 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 1056 tonnes of material in a day 265 to 300 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 mechanically. 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

	First	Second	Third	Fourth	Fifth	Total
Stone	131240	131240	131240	131240	131240	656200
Gravel / Bajri	97000	97000	97000	97000	97000	485000
Sand, Silt & Clay	57060	57060	57060	57060	57060	285300
Total	285300	285300	285300	285300	285300	1426500

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

Table 4 Year wise production of materials.

Year	Stone	Gravel / Bajri	Sand, Silt & Clay	Total
First	131240	97000	57060	285300
Second	131240	97000	57060	285300
Third	131240	97000	57060	285300
Fourth	131240	97000	57060	285300
Fifth	131240	97000	57060	285300
Total	656200	485000	285300	1426500

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 285300 tonnes of material is proposed to be mined from 126800 square meters of safe mining area out of 204956 square metres of leased block.
  - ➢ 131240 tonnes of stone and 97000 metric tons of bajri will be produced and dispatched to dedicated stone crushers.
  - ➢ 57060 tonnes of sand with inseparable silt & clay will be produced and dispatched to construction sites of the project.
  - ► About 32 percent of the leased Area falls outside the river corridor hence plantation can be undertaken in the 1st year at P1.
  - ► More than 68 percent of the leased Area falls within the river corridor, *in situ* rocks form the both the banks, therefore no retaining walls are proposed for its protection. However, 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.

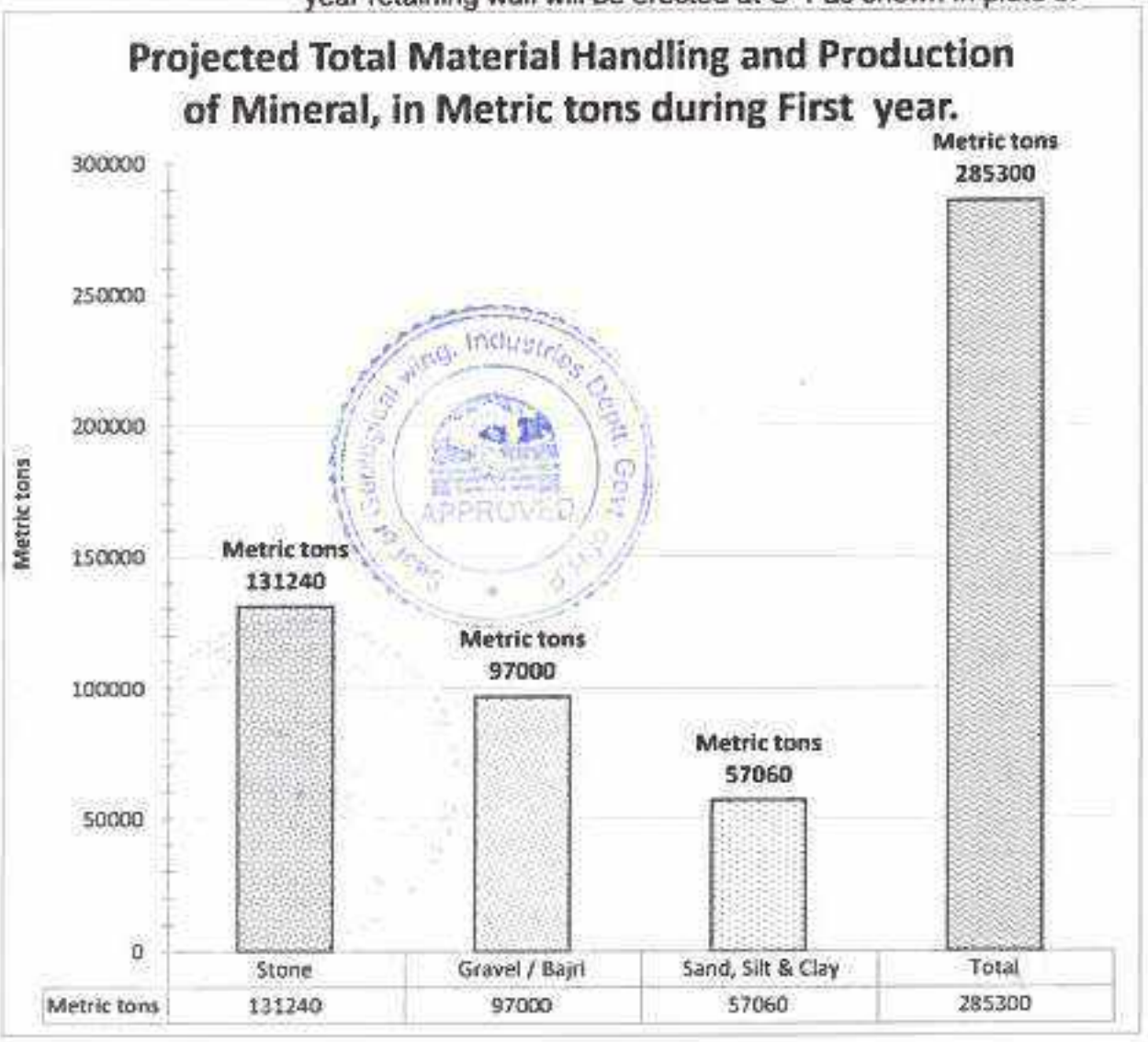


Figure 17- Proposed Production and Material Handling in the First Year of Mining.

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

During 2nd year of development and production programme:

- ✓ Mining of 285300 tonnes of material is proposed to be mined from 126800 square meters of safe mining area out of 204956 square metres of leased block.
  - ➢ 131240 tonnes of stone and 97000 metric tons of bajri will be produced and dispatched to dedicated stone crushers.
  - ➢ 57060 tonnes of sand with inseparable silt & clay will be produced and dispatched to construction sites of the project.
  - ► About 32 percent of the leased Area falls outside the river corridor hence plantation can be undertaken in the 2nd year at P2.
  - ► More than 68 percent of the leased Area falls within the river corridor, *in situ* rocks form the both the banks, therefore no retaining walls are proposed for its protection. However, 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-2 as shown in plate 3.

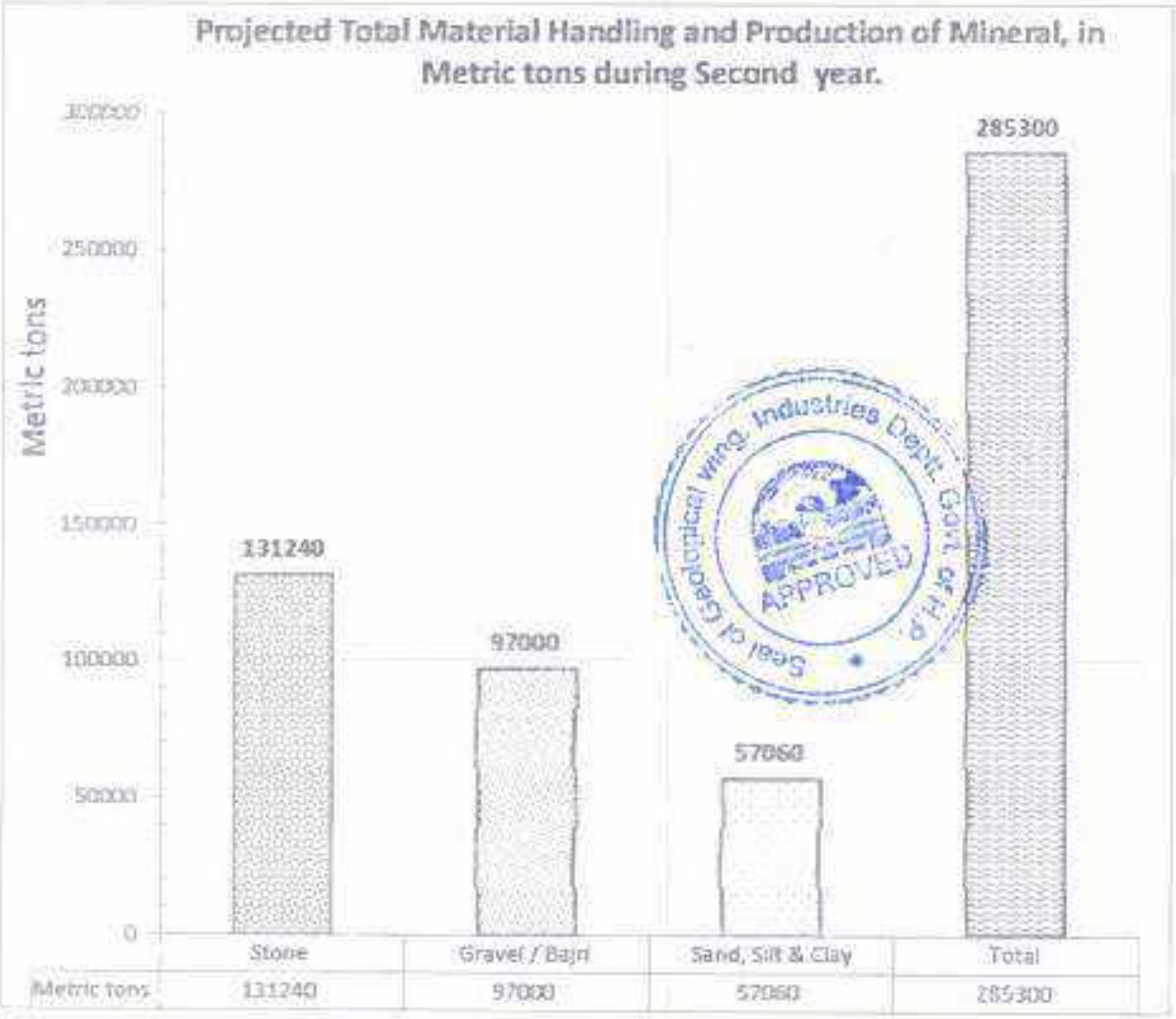


Figure 18- Proposed Production and Material Handling in the second Year of Mining.

4.2 c Development and Production at end of third Year.

During 3rd year of development and production programme:

- ✓ Mining of 285300 tonnes of material is proposed to be mined from 126800 square meters of safe mining area out of 204956 square metres of leased block.
  - ➢ 131240 tonnes of stone and 97000 metric tons of bajri will be produced and dispatched to dedicated stone crushers.
  - ➢ 57060 tonnes of sand with inseparable silt & clay will be produced and dispatched to construction sites of the project.
  - ► About 32 percent of the leased Area falls outside the river corridor hence plantation can be undertaken in the 3rd year at P3.
  - ► More than 68 percent of the leased Area falls within the river corridor, *in situ* rocks form the both the banks, therefore no retaining walls are proposed for its protection. However, 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-3 as shown in plate 3.

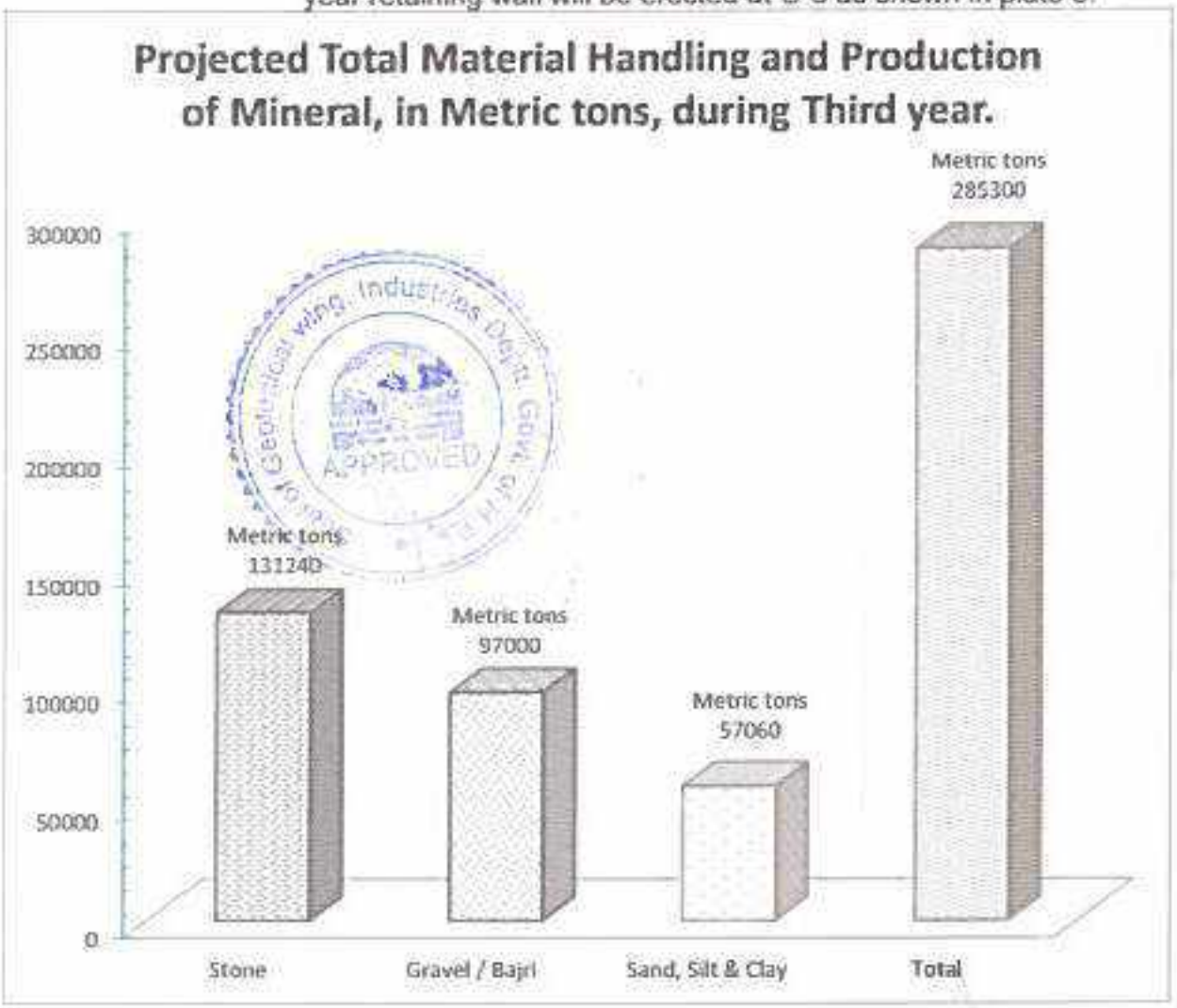


Figure 19- Proposed Production and Material Handling in the Third Year of Mining.

4.2 d Development and Production at end of fourth Year.

During 4th year of development and production programme:

- ✓ Mining of 285300 tonnes of material is proposed to be mined from 126800 square meters of safe mining area out of 204956 square metres of leased block.
  - ➢ 131240 tonnes of stone and 97000 metric tons of bajri will be produced and dispatched to dedicated stone crushers.
  - ➢ 57060 tonnes of sand with inseparable silt & clay will be produced and dispatched to construction sites of the project.
  - ► About 32 percent of the leased Area falls outside the river corridor hence plantation can be undertaken in the 4th year at P4.
  - ► More than 68 percent of the leased Area falls within the river corridor, *in situ* rocks form the both the banks, therefore no retaining walls are proposed for its protection. However, 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-4 as shown in plate 3.

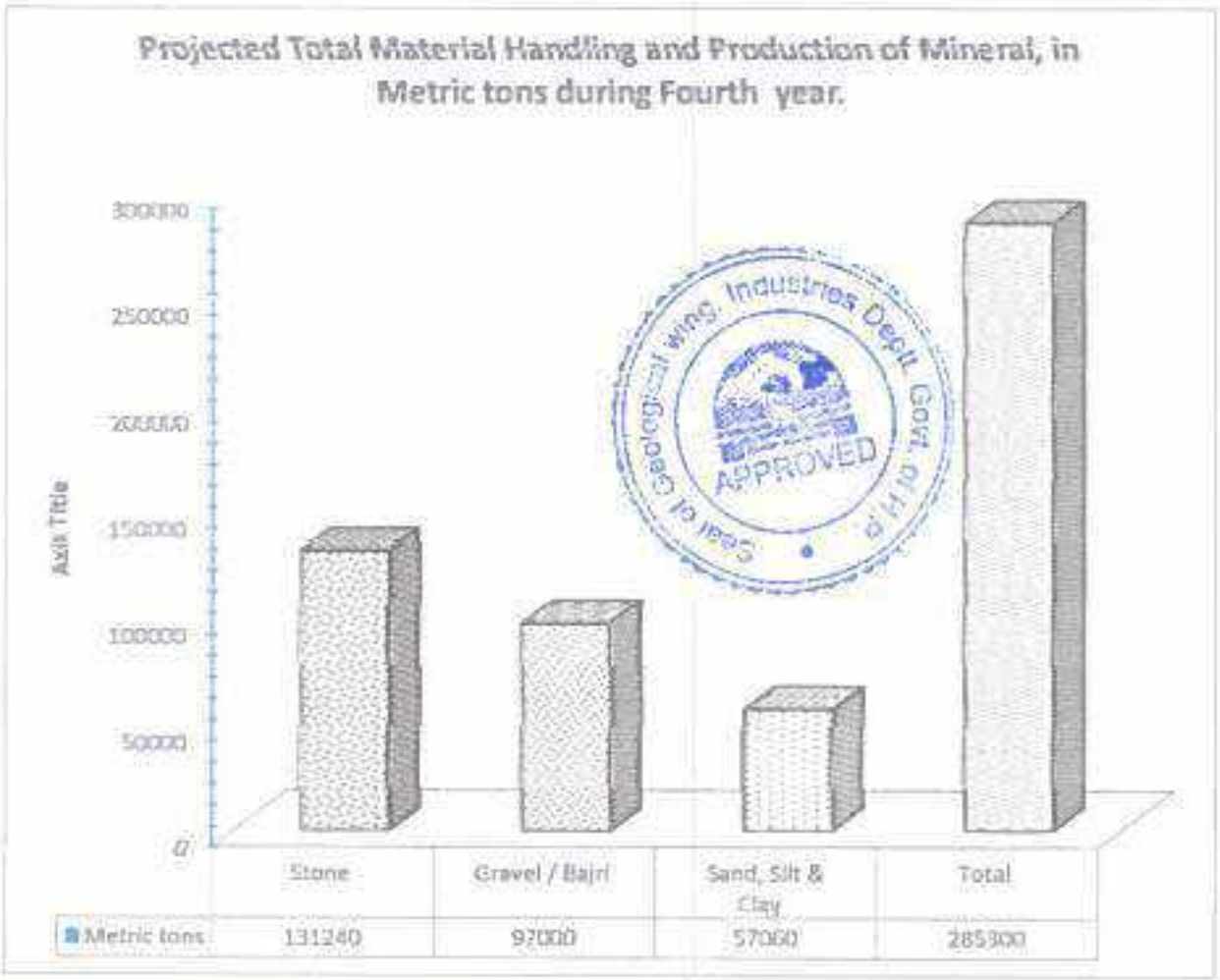


Figure 20- Proposed Production and Material Handling in the Fourth Year of Mining.

4.2 e Development and Production at end of fifth Year.

During 5th year of development and production programme:

- ✓ Mining of 91800 tonnes of material is proposed to be mined from 40800 square meters of safe mining area out of 77259 square metres of leased block.
  - ➢ 38556 tonnes of stone and 132130 metric tons of bajri will be produced and dispatched to dedicated stone crushers.
  - ➢ 21114 tonnes of sand with inseparable silt & clay will be produced and dispatched to construction sites of the project.
  - ► About 37 percent of the leased Area falls outside the river corridor hence plantation can be undertaken in the 5th year at P5.
  - ► More than 63 percent of the leased Area falls within the river corridor, *in situ* rocks form the both the banks, therefore no retaining walls are proposed for its protection. However, 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.

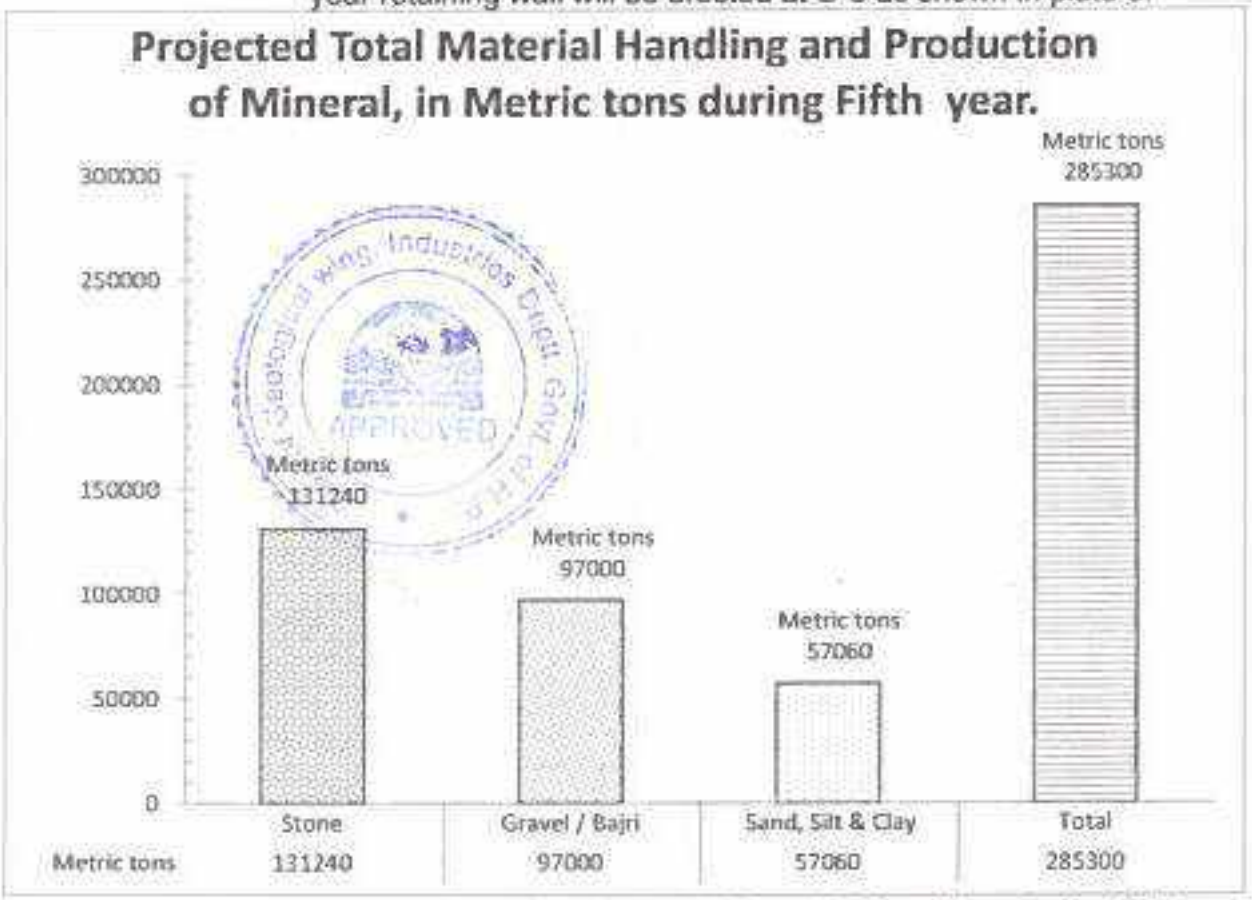


Figure 21- Proposed Production and Material Handling in the Fifth Year of Mining.

4.3 End Use of Mineral

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

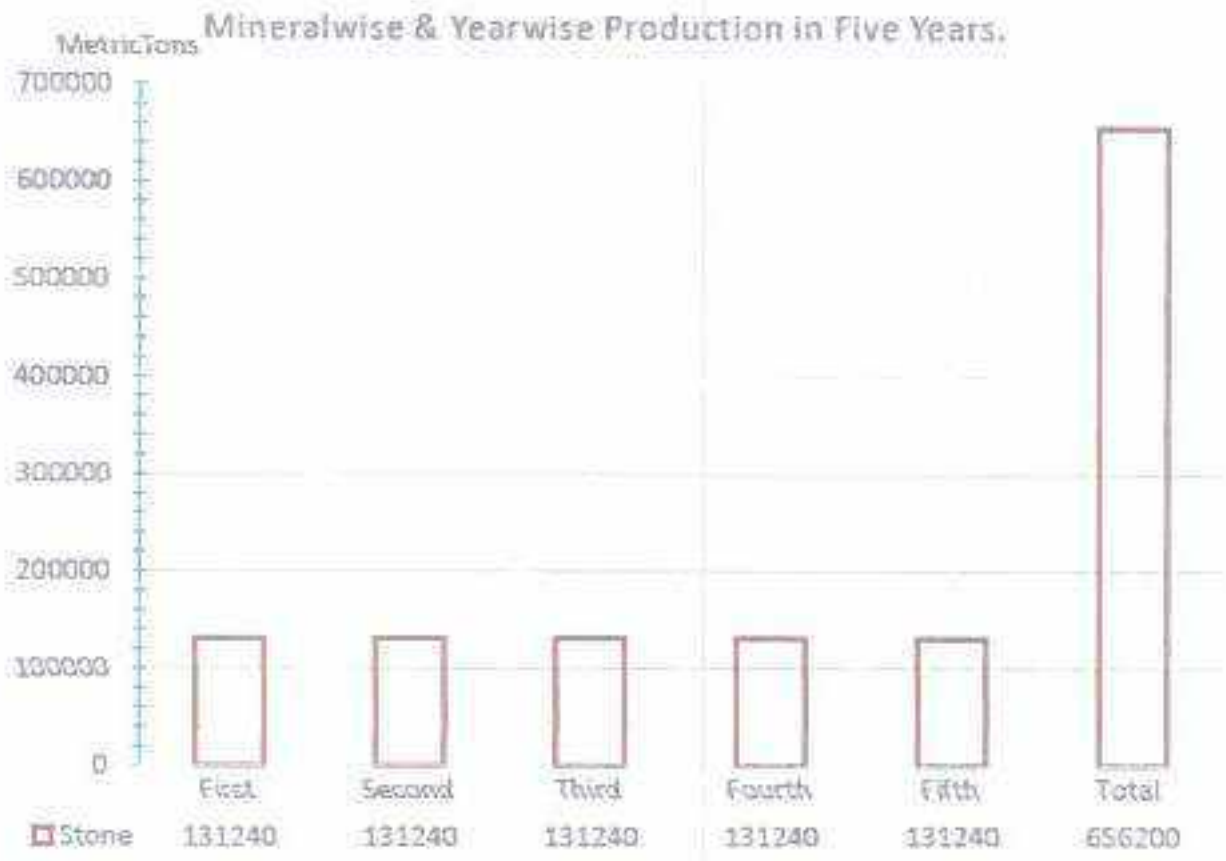


Figure 22: Year wise production of Stone.

Figure 23: Annual Production of Bajri.

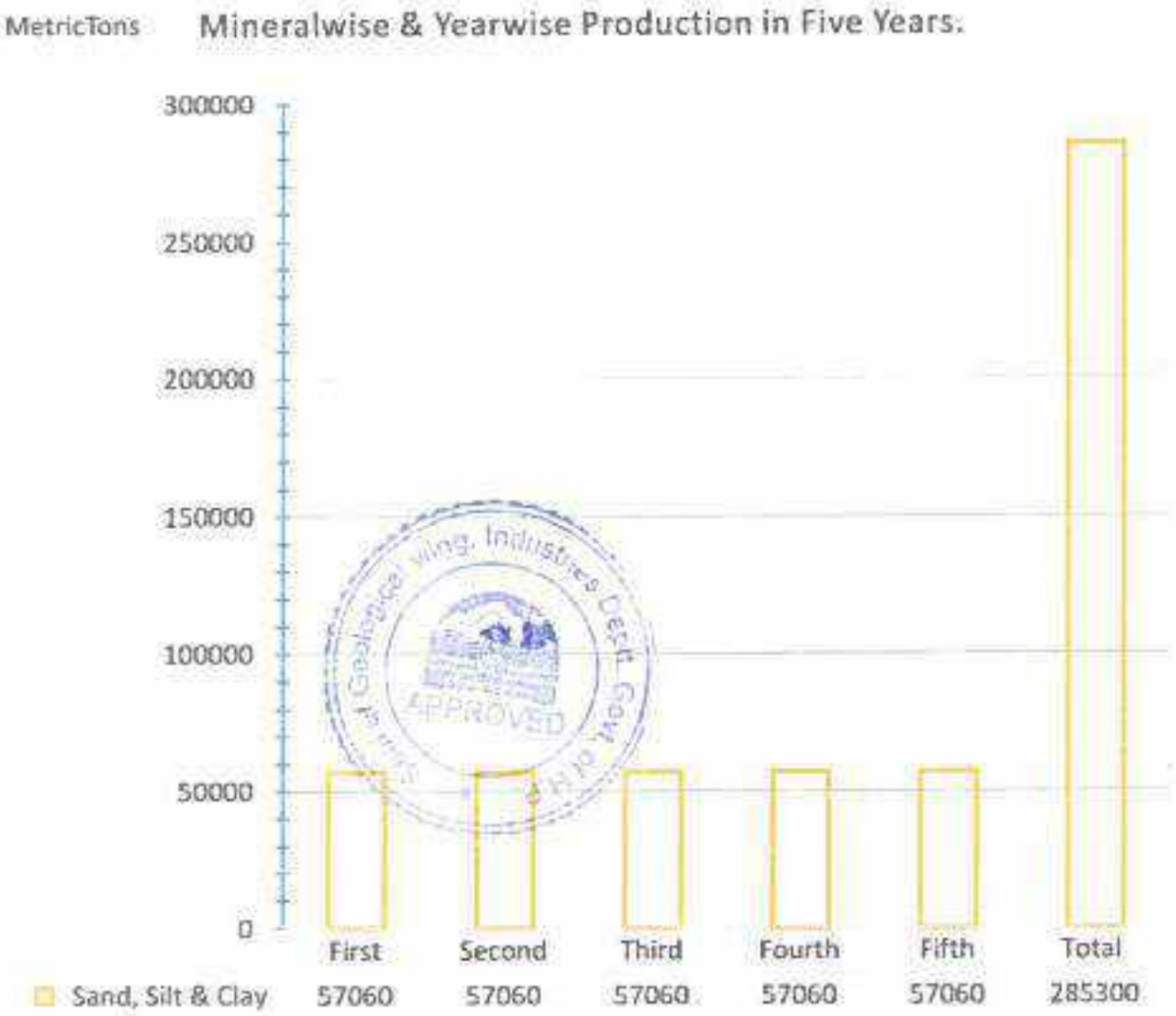


Figure 24: Annual production of sand along with silt & clay.

4.4 Detail of road Transport

The maximum total extraction of minerals stone, sand and bajri for use in the Project would be 285300 tonnes or 1056 metric tonnes per day, considering 270 working dry days. Thus, about 118 tipper truck trips would be required to move the material from quarry to crusher / construction sites. The track through River is about 50 metres along the leased area to rural roadside. The evacuation route is shown in figure 25.

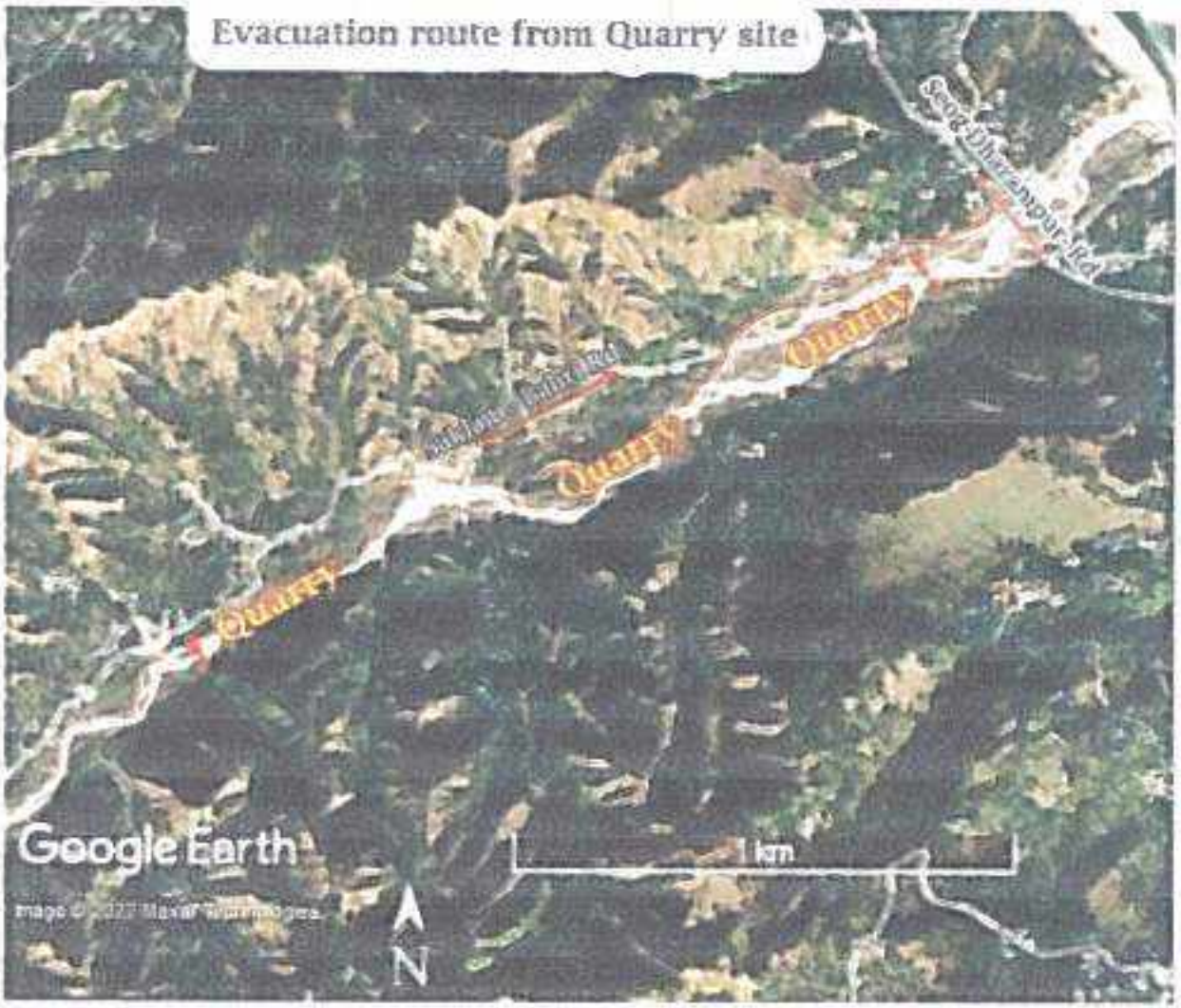


Figure 25. Evacuation route Map

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.

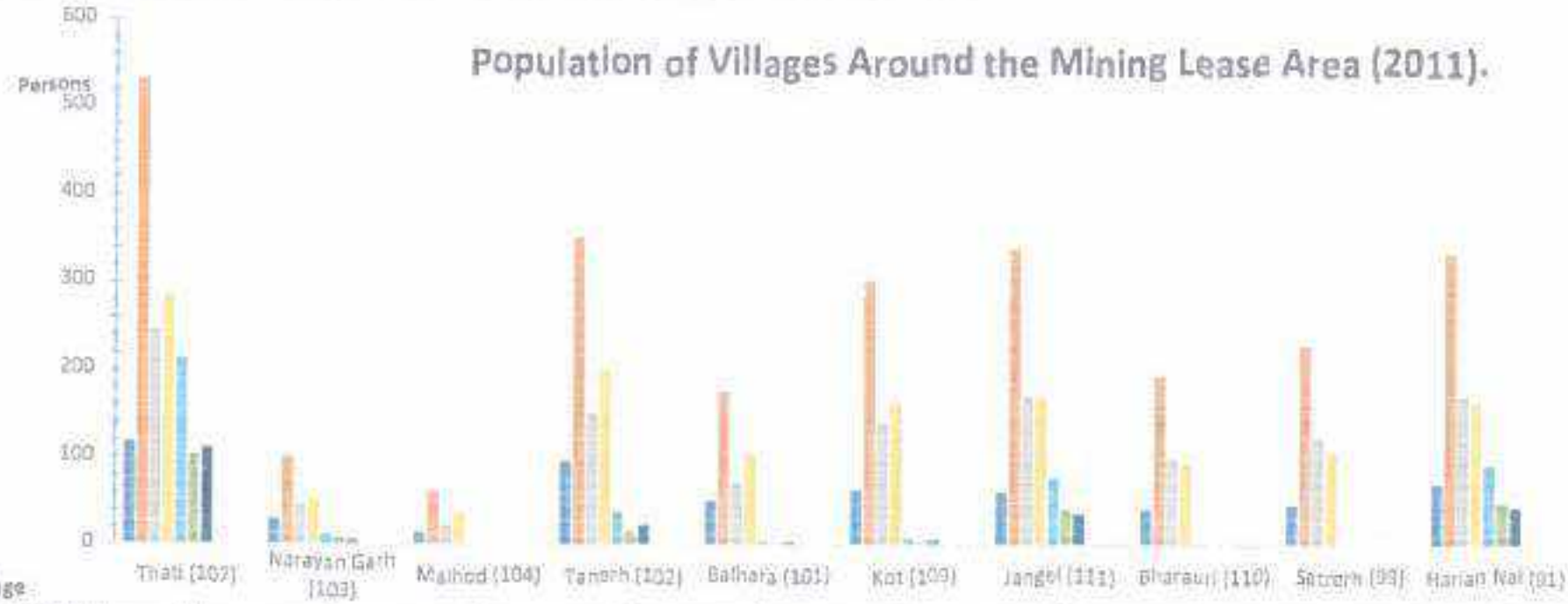
The base line information of the existing environment was collected from various sources such as

- ✓ 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

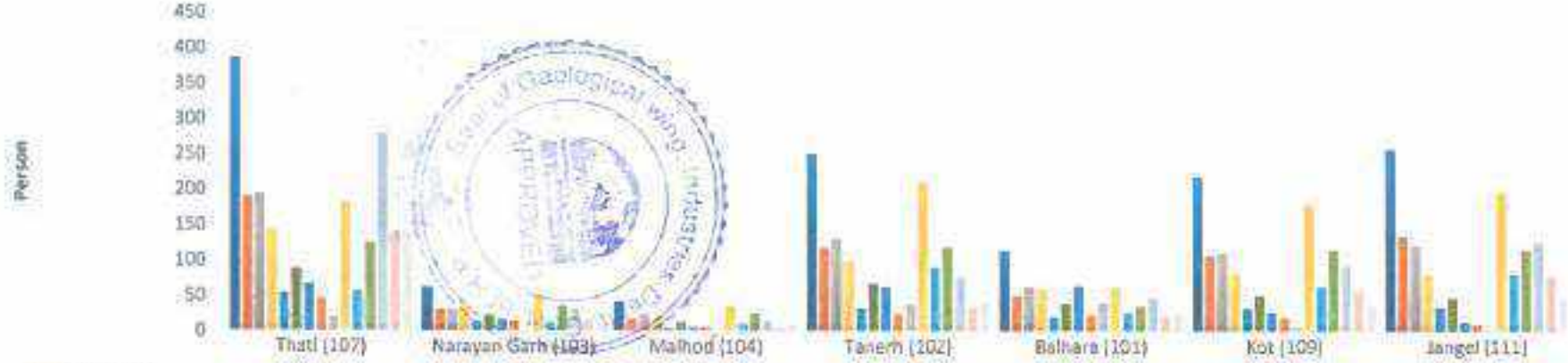
The total population of the surrounding area, as per the 2011 Census is given below in the figure 26. Education wise and employment wise break of population in surrounding villages is given in figure 27. The population details of Mandi District and sub tehsil Dharampur is given in figure 28.



Village	Thati (102)	Narayan Garh (103)	Malhod (104)	Tanerh (102)	Bathera (101)	Kot (109)	Jangel (111)	Bharauri (110)	Satorh (99)	Harian Nal (91)
Total House Hold	118	30	15	96	51	63	62	41	46	71
Population	531	100	61	352	176	302	339	133	229	334
Male	246	46	23	152	72	140	171	59	123	170
Female	285	54	38	200	104	162	168	94	106	164
Schedule Caste	213	42	8	39	5	8	77	0	0	92
SC_Male	103	20	3	16	1	3	42	0	0	49
SC_Female	110	22	5	23	4	5	35	0	0	43
Schedule Tribe	0	0	0	0	0	0	0	0	1	0
ST_Male	0	0	0	0	0	0	0	0	0	0
ST_Female	0	0	0	0	0	0	0	0	1	0

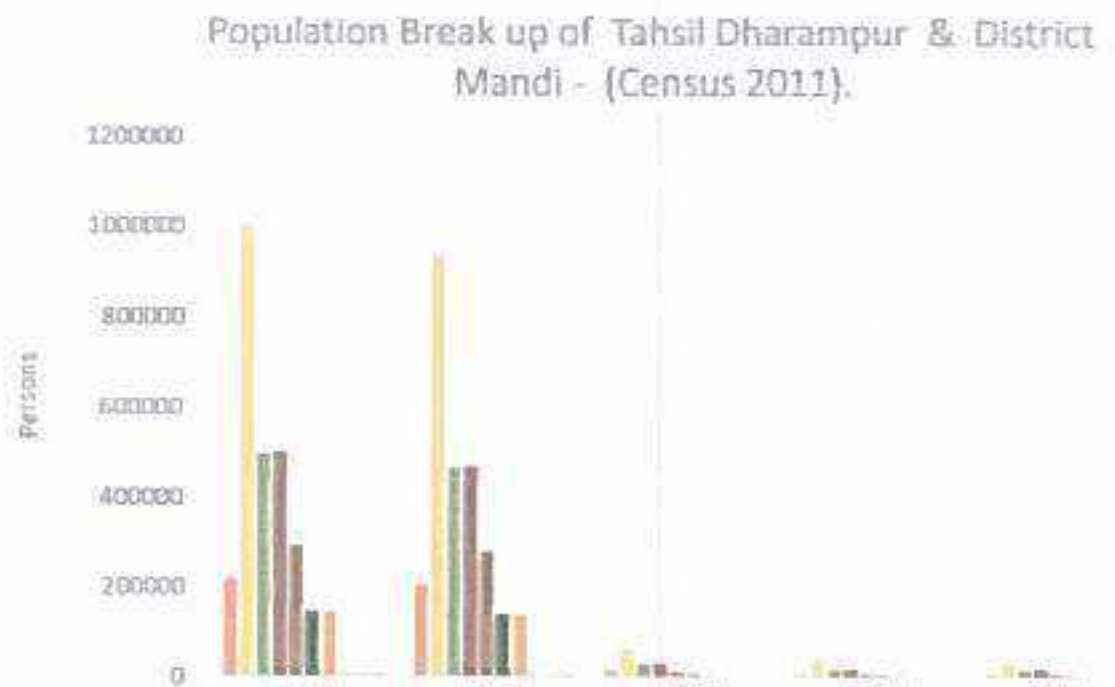
Figure 26: Population of the villages of the zone of influence.

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



	Thatl (107)	Narayan Garh (103)	Malhod (104)	Tanem (102)	Balhara (101)	Kot (109)	Jangel (111)
Total Literate	387	63	43	251	115	218	258
Male Literate	191	32	18	119	51	107	136
Female Literate	196	31	25	132	64	111	122
Total Illiterate	144	37	18	101	61	84	81
Male Illiterate	55	14	5	33	21	33	35
Female Illiterate	89	23	13	68	40	51	46
Total Workers	68	17	7	64	65	28	14
Male Workers	46	15	7	25	23	20	11
Female Workers	22	2	0	39	42	8	3
Marginal Workers	183	51	37	211	63	180	198
Marginal Workers M	57	14	11	92	27	64	82
Marginal Workers Fe	126	37	26	119	36	116	116
Non-Workers	280	32	17	77	48	94	127
Non-Workers M	143	17	5	35	22	56	78
Non-Workers Fe	137	15	12	42	26	38	49

Figure 27: 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 28: Population break up of District Mandi & Tahsil 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 29 there is moderately high percentage of *unemployed (32.480%)* and *underemployed 51.777%)* people in the area despite moderately high level of literacy. (73.02% literates, figure 30) of literacy.

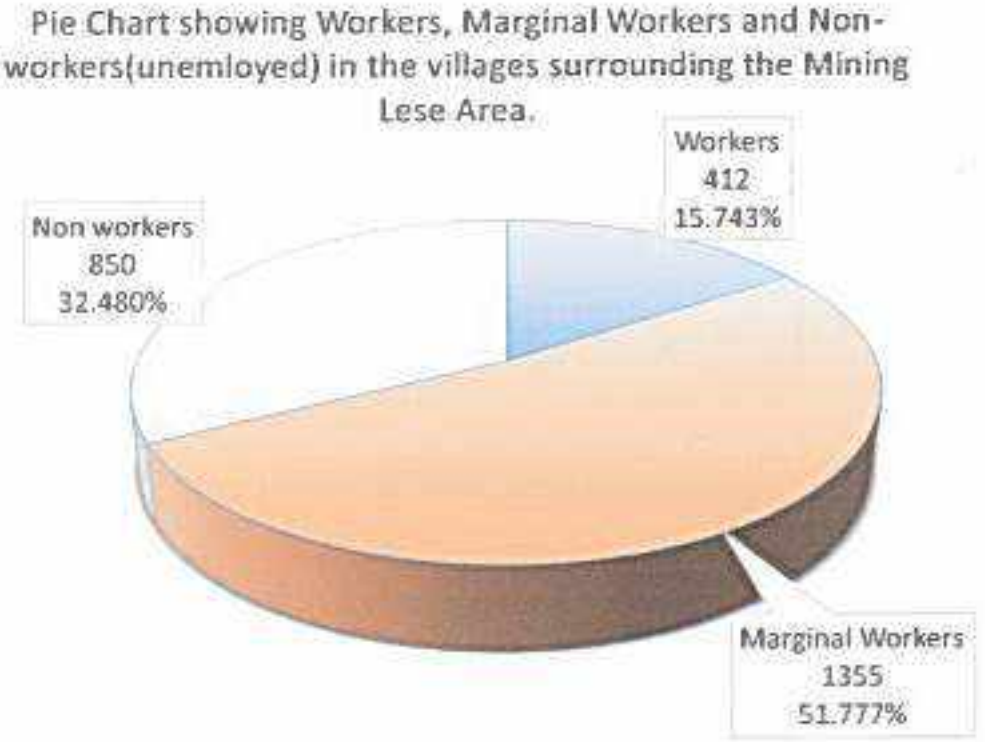


Figure 29: Employment percentage in adjoining villages.

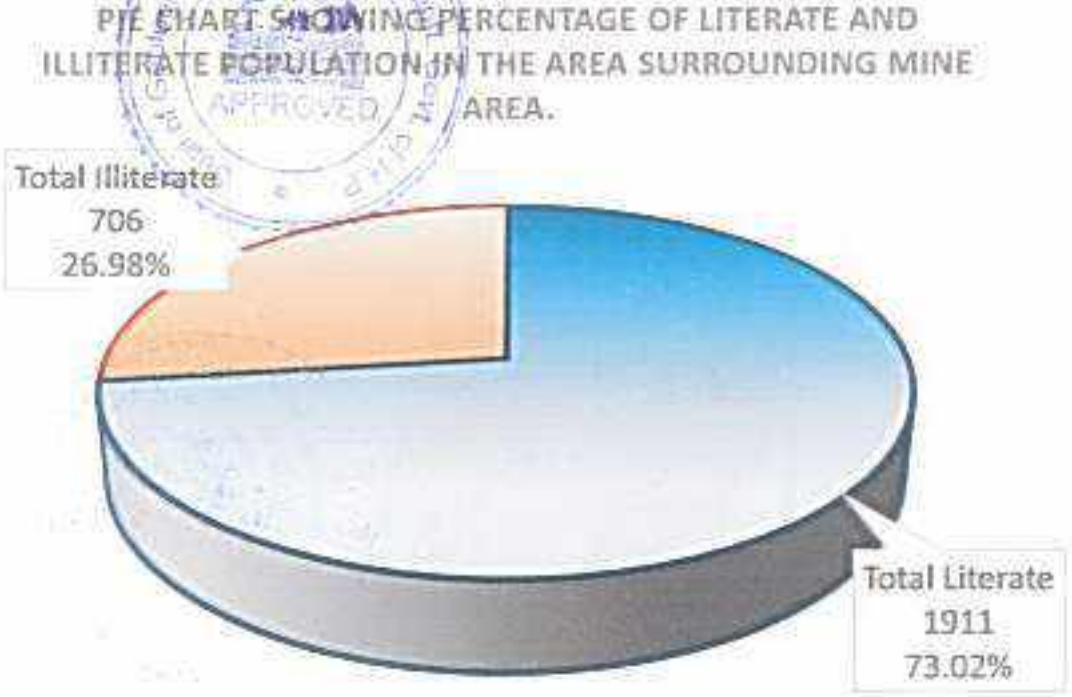


Figure 30: showing Percentage of literate and illiterate POPULATION in the Surrounding mine area

1.3. Land Use Pattern

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

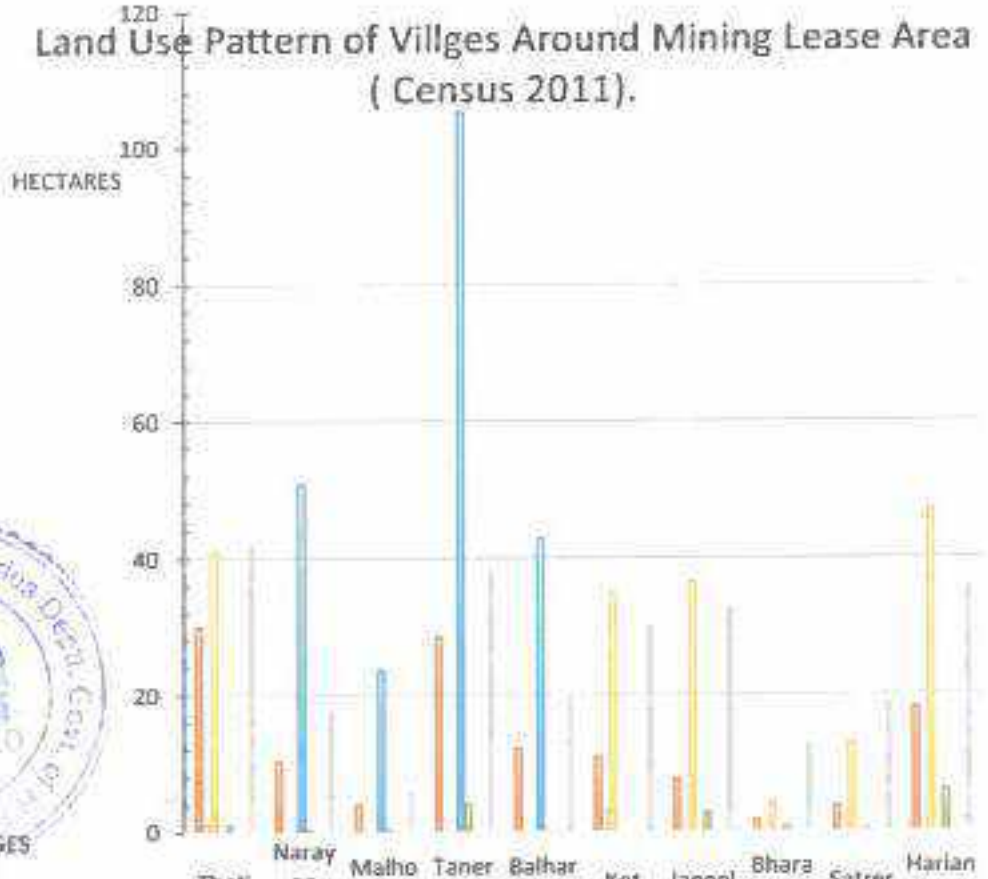
i. Forest
ii. Grass and Scrub Land (partially agriculture)
iii. Water Bodies (Stream and corridor)
iv. Agriculture land
v. Waste land
vi. Urban Settlement

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.



	Thati (107)	Narayan Garh (103)	Malhod (104)	Taner h (102)	Balhara (101)	Kot (109)	Jangel (111)	Bharauri (110)	Satreh (99)	Harian Nal (91)
Forest Area (in Hectares)	0	0	0	0	0	0	0	0	0	0
Area under Non-Agricultural Uses	30	10.36	3.99	28.48	12.16	11	7.57	1.6	3.61	18
Barren & Un-cultivable Land Area	1	0	0	0	0	3	0	0	0	0
Permanent Pastures and Other Grazing Land Area	41	0	0	0	0	35	36.39	4.31	12.99	47
Land Under Miscellaneous Tree Crops etc. Area	0	50.82	23.76	105.28	42.92	0	0	0	0	0
Culturable Waste Land Area	1	0.39	0.32	4	0.08	0	2.82	0.66	0.28	6
Fallows Land other than Current Fallows Area	0	0	0	0	0	0	0	0	0	0
Current Fallows Area	0	0	0	0	0	0	0	0	0	0
Total Unirrigated Land Area	42	17.62	6.03	37.92	19.98	30	32.87	12.76	18.78	36
Area Irrigated by Source	0	0	0	0	0	0	0.49	0	0	0

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

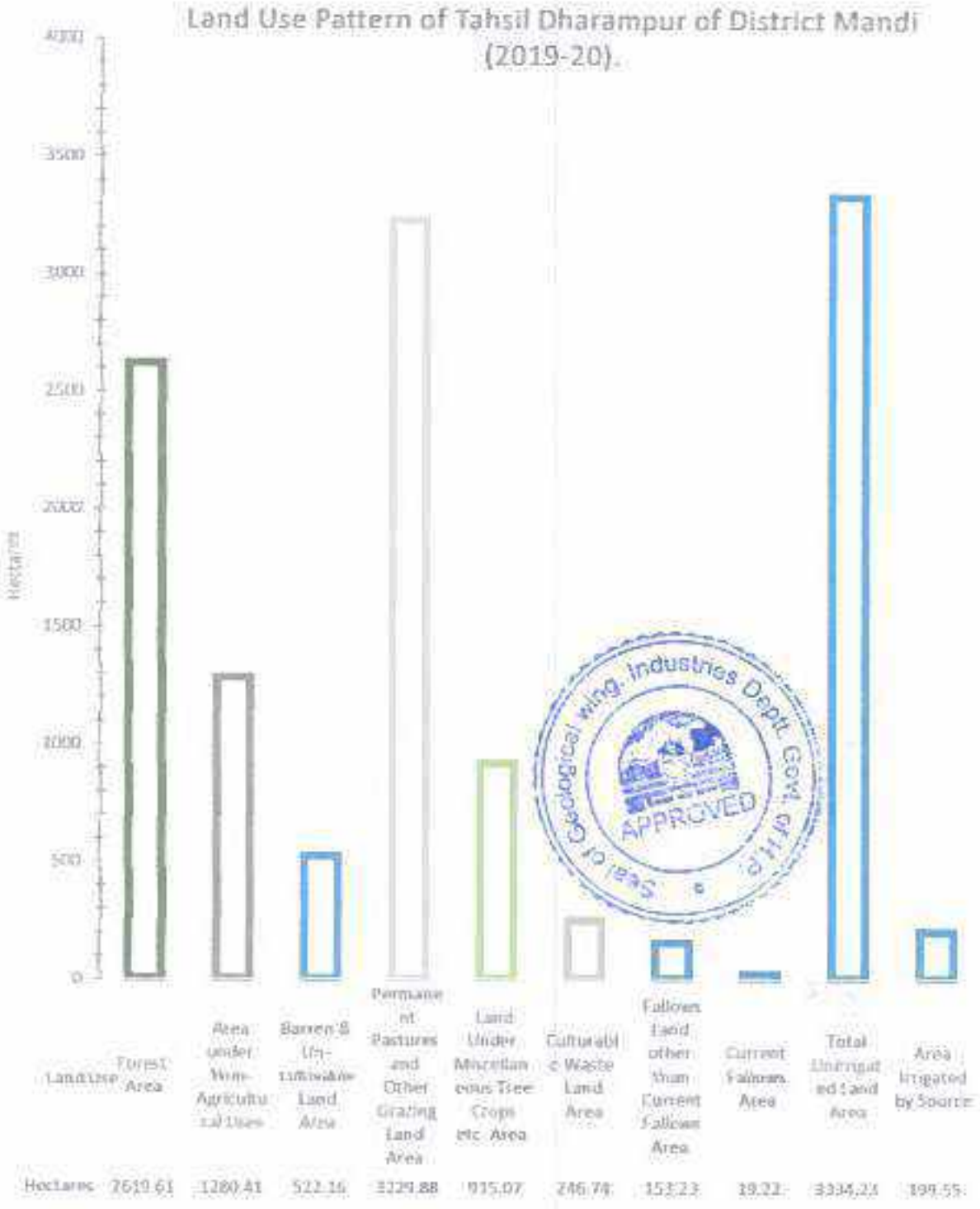


Figure 33: Land Use Pattern of Tahsil Dharampur of District Mandi.

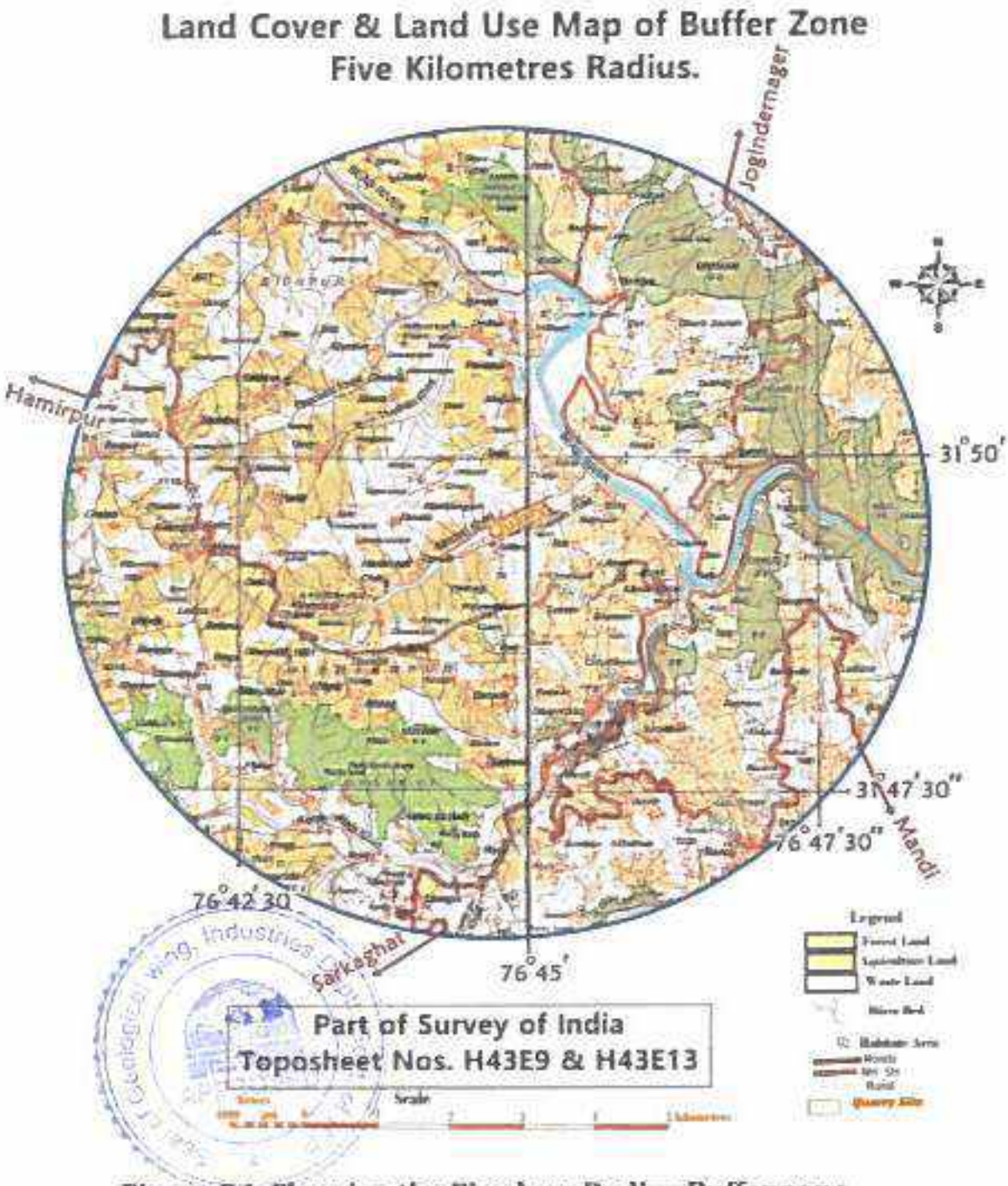


Figure 34: Showing the Five kms Radius Buffer zone.

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 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: -35.

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

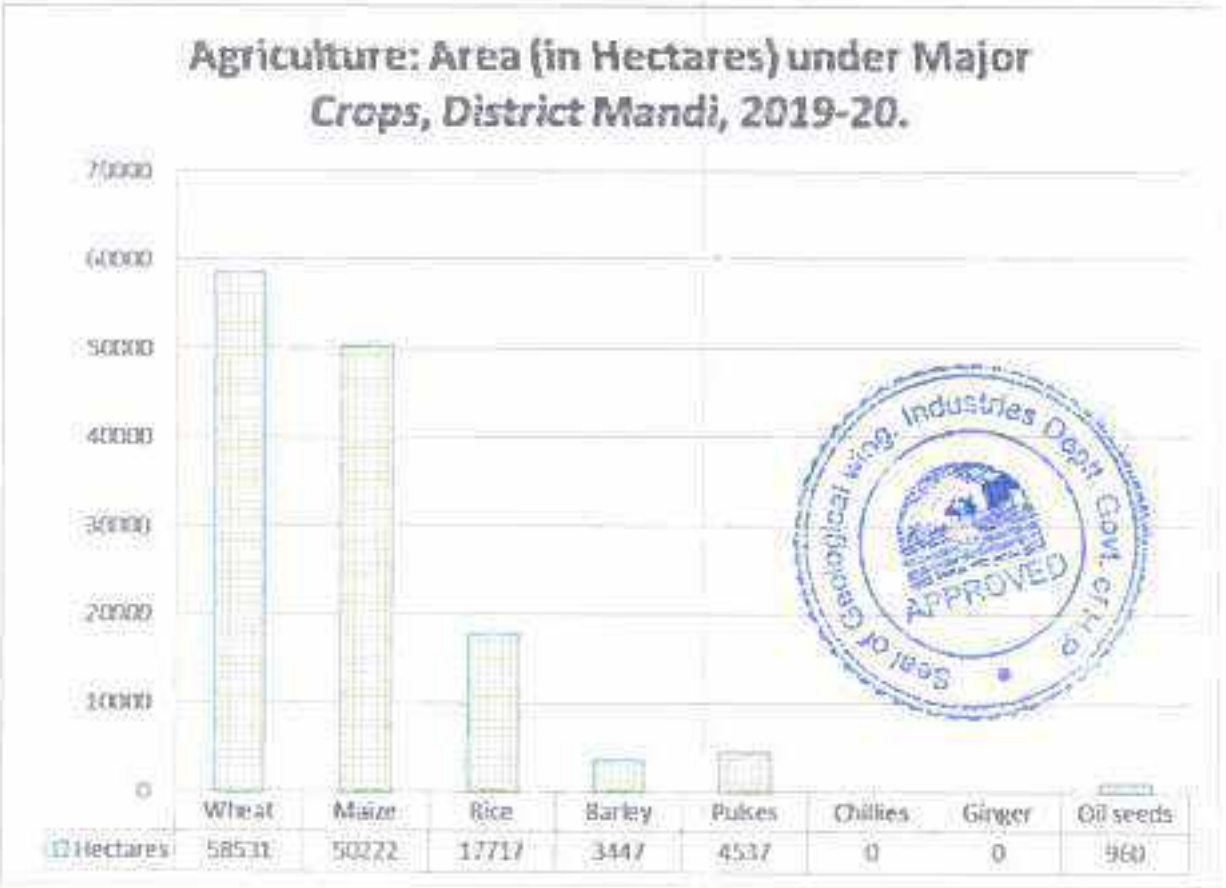


Figure 35:: Showing area under different crops in Mandi District

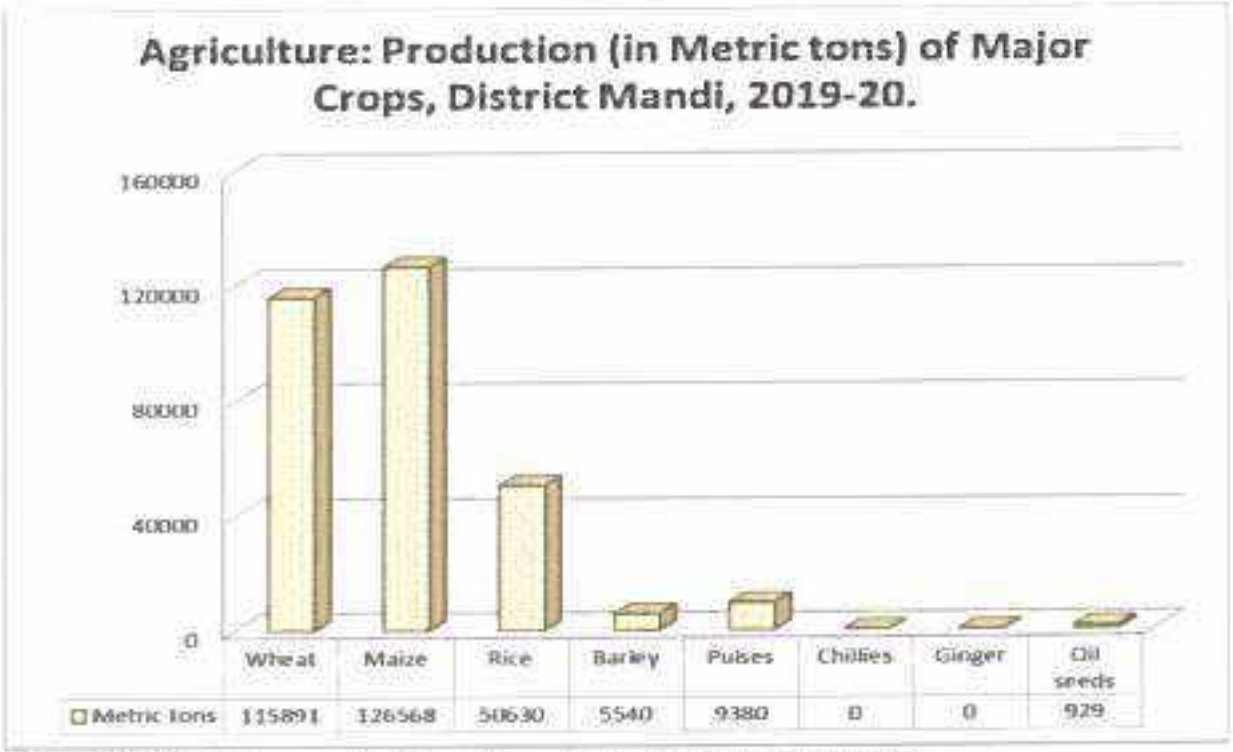


Figure 36 Showing production of each crop in District Mandi.

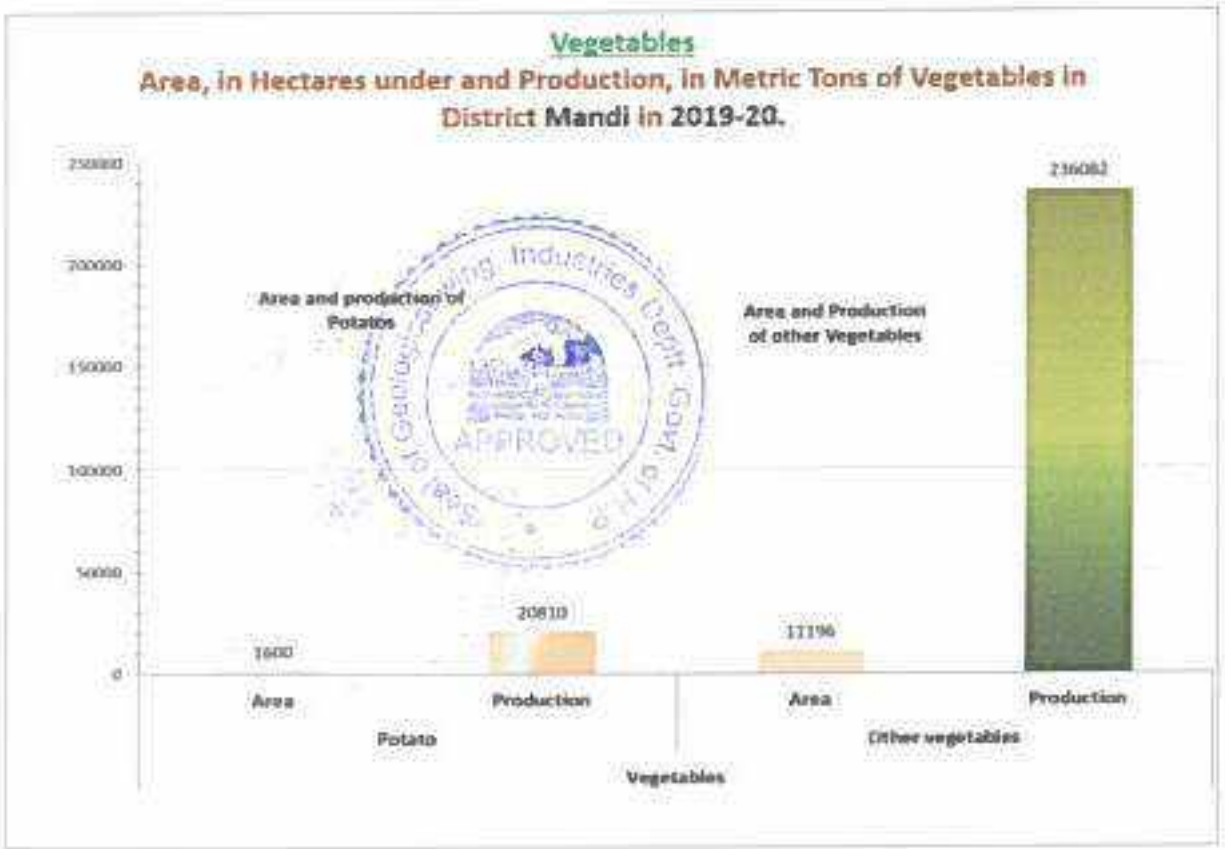


Figure 37: Showing area under vegetable, in Hectare and Production, in Metric tons, of District Mandi.

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	220
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: -38. The population of the Buffaloes and Cattle in District Mandi is given in the figure: -39

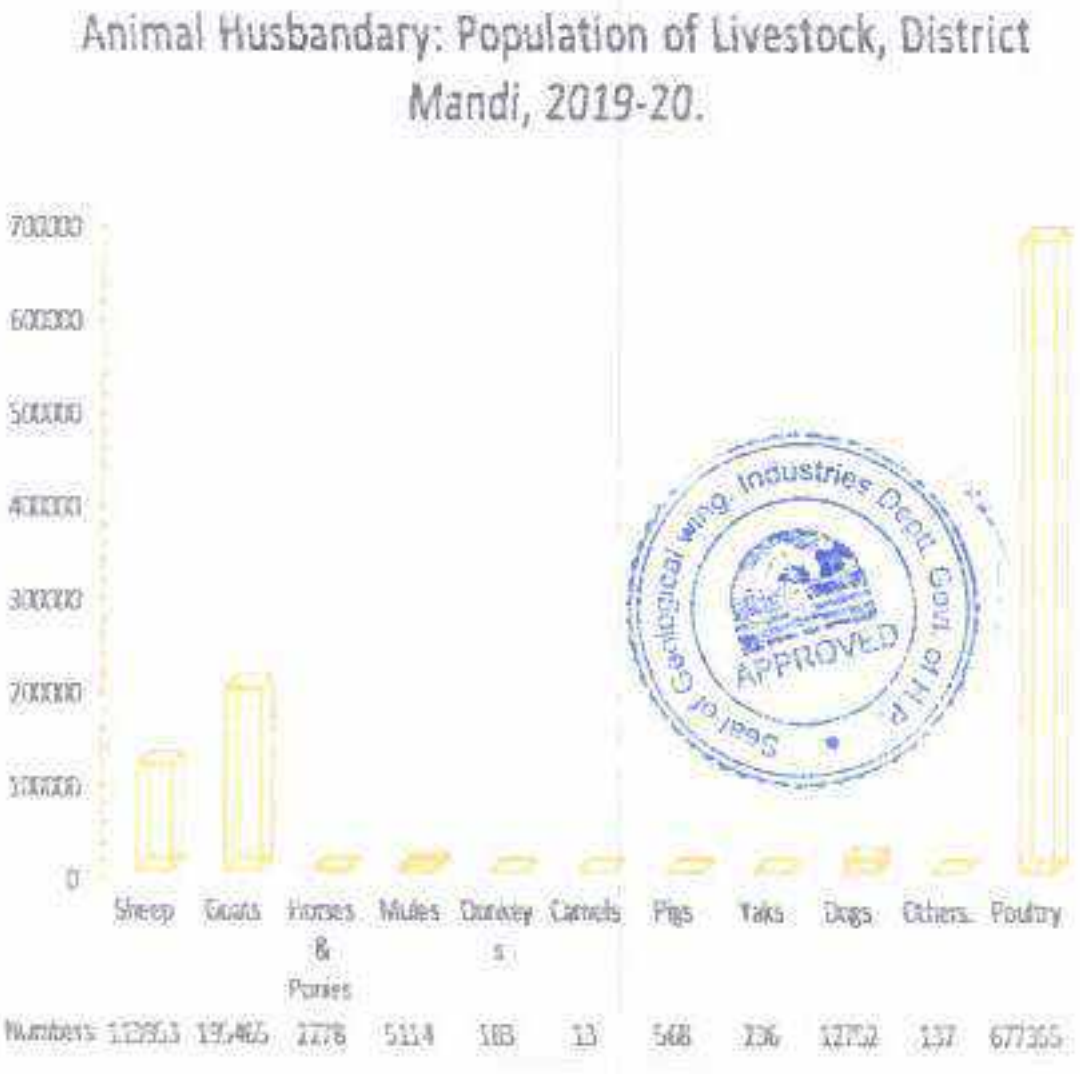


Figure 38:Livestock population of District Mandi.

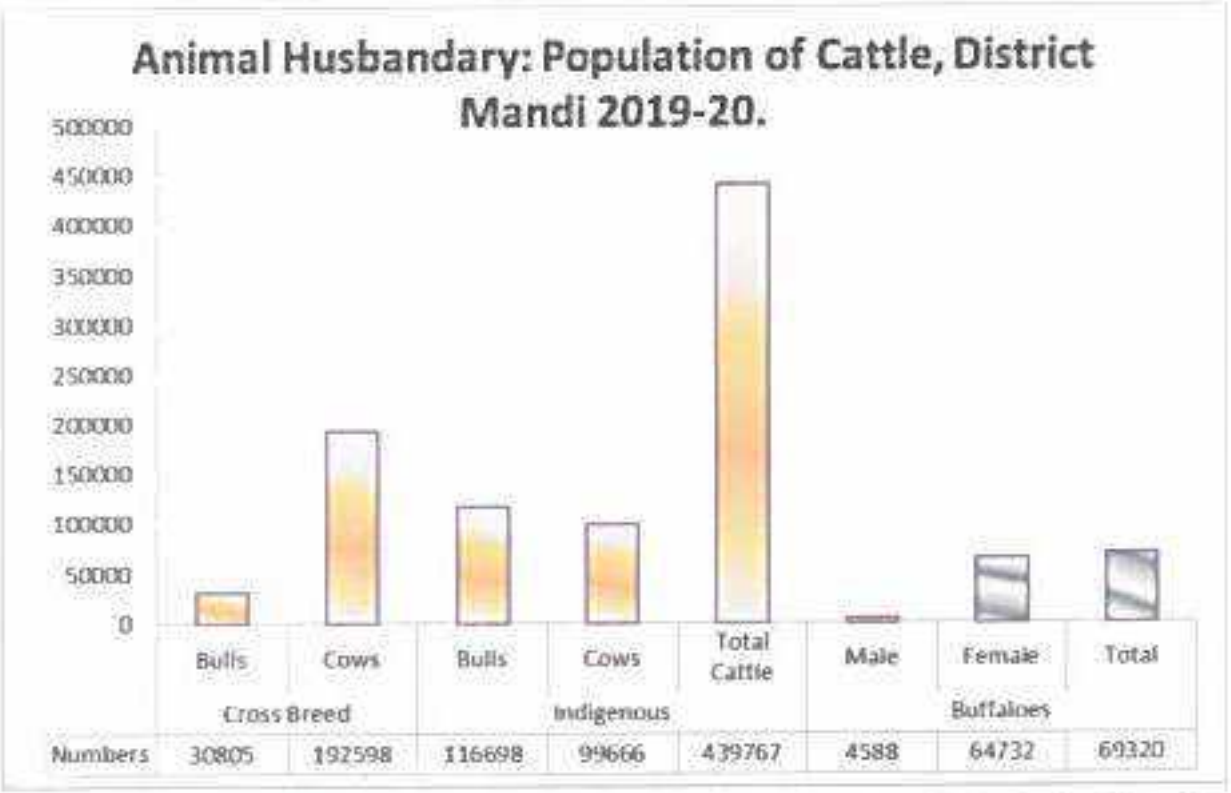


Figure 39: Showing Population of Cattle Buffaloes in District Mandi.

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 trought 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 trought fishing.

No perennial stream passes through the area under consideration.

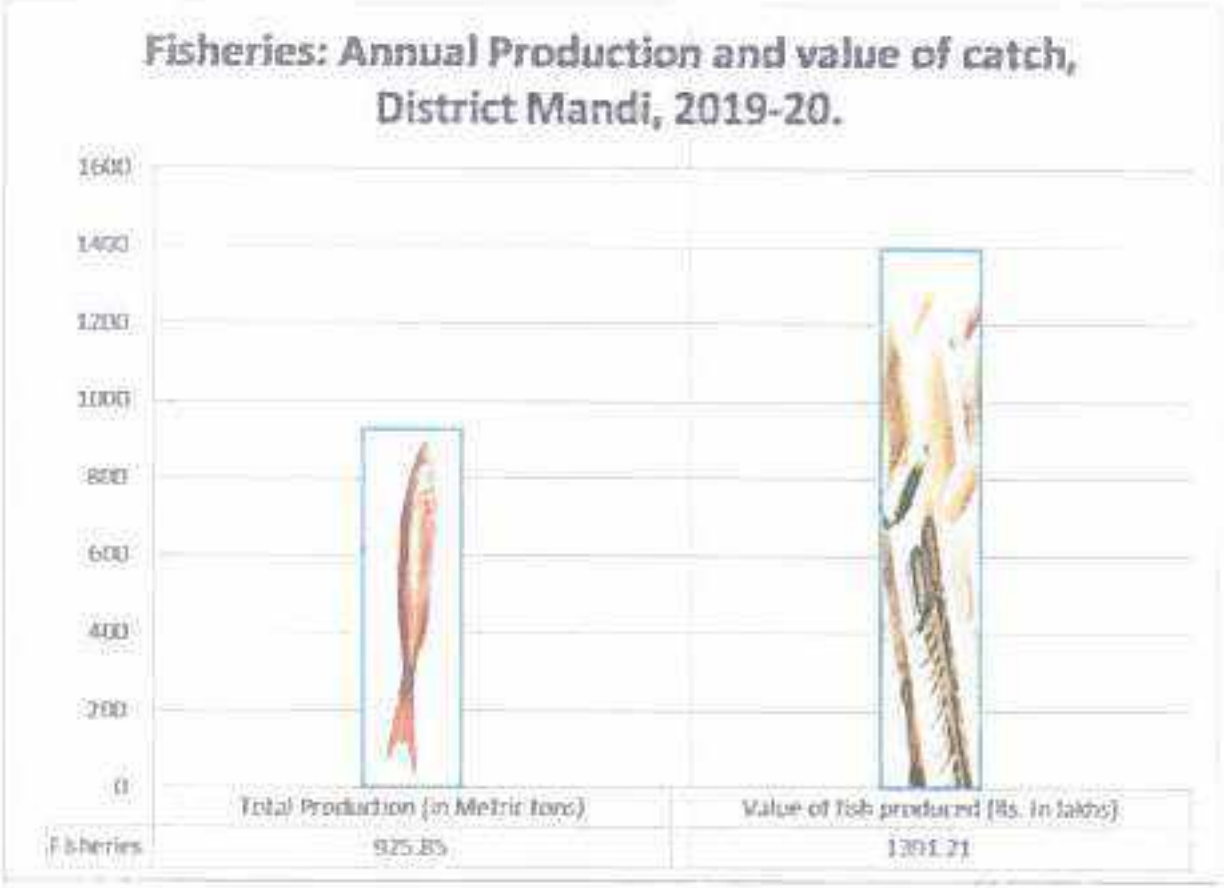


Figure 40: Showing Fish catch / production and its sale value in 2016-17.

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 (Bombex malabaricum),
Mango (Magniferaindica)
Tun (Cedrela toona)
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 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**
Milvus migrants	Vulture	Cheel, Gidh, Eell
Eudynamys scolopacca	Koel	Koel
Columbia livia	Pigeon	Kabuttar
Coracias bengalensis	Blue jay	Nilkantha

Columns livia	Hawk	Baj
Francolius francolinus	Black partridge	Kala Tittar
Francolius pondicerians	Grey partridge	Safed Tittar
Paya crisslatus	Peacock	Mor
Coturnix coturnix	Common quail	Bater
Alectoris graeca	Chakor	Chakor
Crovus splendens	Crow	Kanwa
Prattacula Kamen	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
Dryocopus javensis	Woodpecker	
Muscicapa subrubra	Himalayan Fly Catcher	
Acidotheres tristis	Common Myna	Ghatari
Terpsiphone paradisi	Paradise flycatcher	Choti Fa
Passer domesticus	House sparrow	
Carduelis spinoides	Himalayan Green Finch	Chiria

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 expenence 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 Sundernager. 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

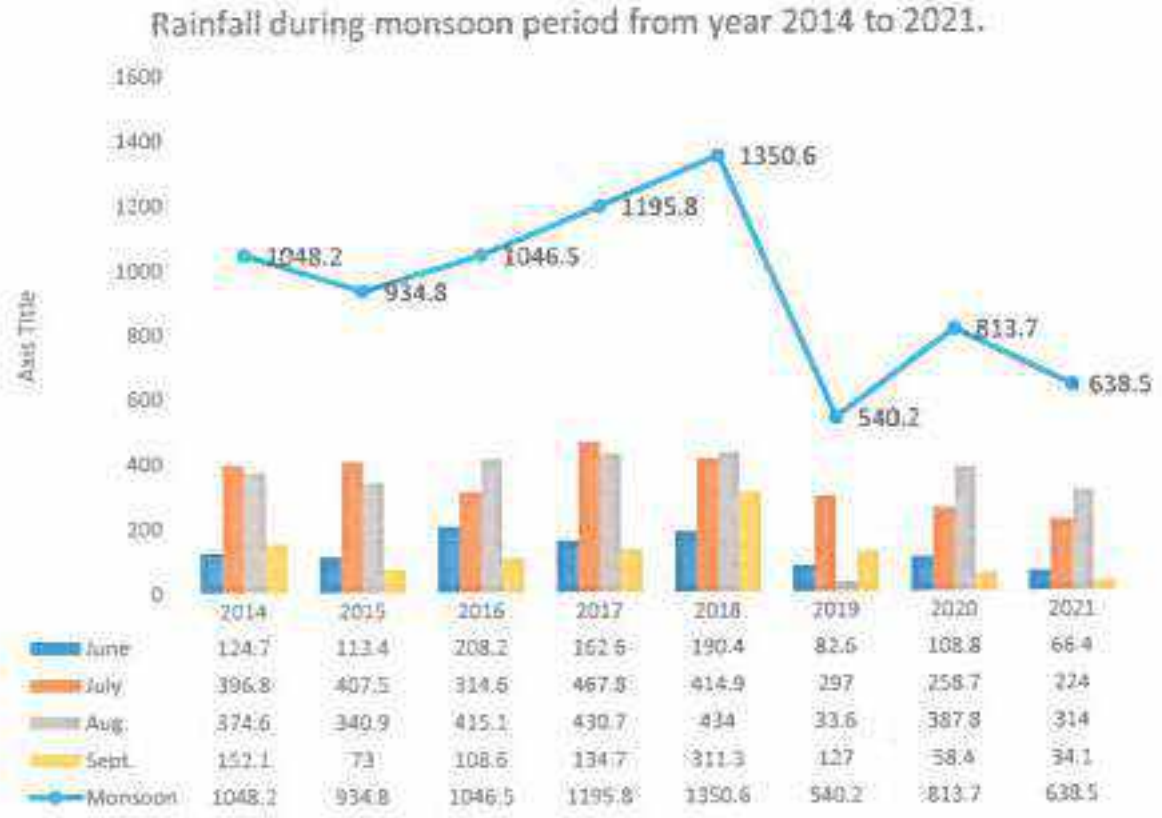


Figure 41:Yearly monsoon Rainfall from year 2014 to 2021.

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 757 metre above mean sea level.
- The lowest point is at 640 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 126800 square metres of the 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 1056 metric tons of stone, Bajri and sand with silt-clay per day.
- 118 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. 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 – Seog rural road is about 100m through the Khad track. The mined material is transported through tracks made in the Khad. About 1056 metric tonnes of material shall be transported per day with an average of 118 tipper truck trips. The movement of 118 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 757 metre above mean sea level.
- The lowest point is at 640 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. 8.5 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 the rocky condition of riverbanks, no check walls are required to be constructed. There is a rural road passing along the Khad for some distance leading to village Saklain. 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 300 metres costing about Rs.100000/=.

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	100	15	3000
Second	250	30	10000
Third	250	30	12000
Fourth	400	40	18000
Fifth	500	55	25000
Total	1500	170	68000

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 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:

Supervisor	2
Drivers and JCB operators	12
Unskilled workers	106

Thus, total generation of Employment will be to a tune of 120 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. 1401, 1402, 1798, 974, 1409/222 and 681 measuring 20.4956 Hectares, falling in Mauza/Mohal Balda, Tanehad Kot & Thathi, 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

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 Nos. 1401, 1402, 1798, 1409/222 & 681, measuring 20.4956 Hectares, falling in Mauza/Mohal – Balda, Tanehad, Kot & Thathi, 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

Deptt. 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

Saklain Khad Quarry

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

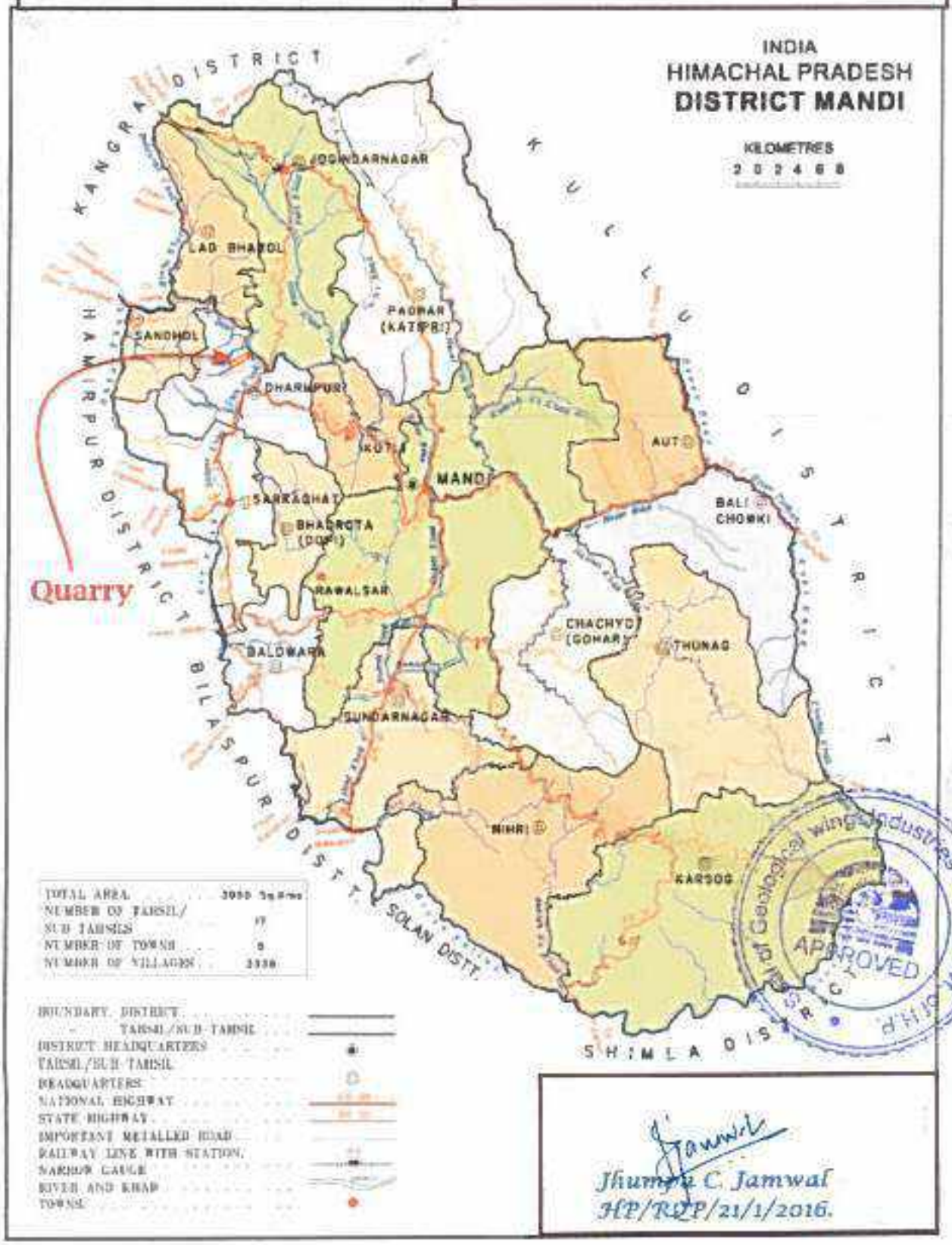
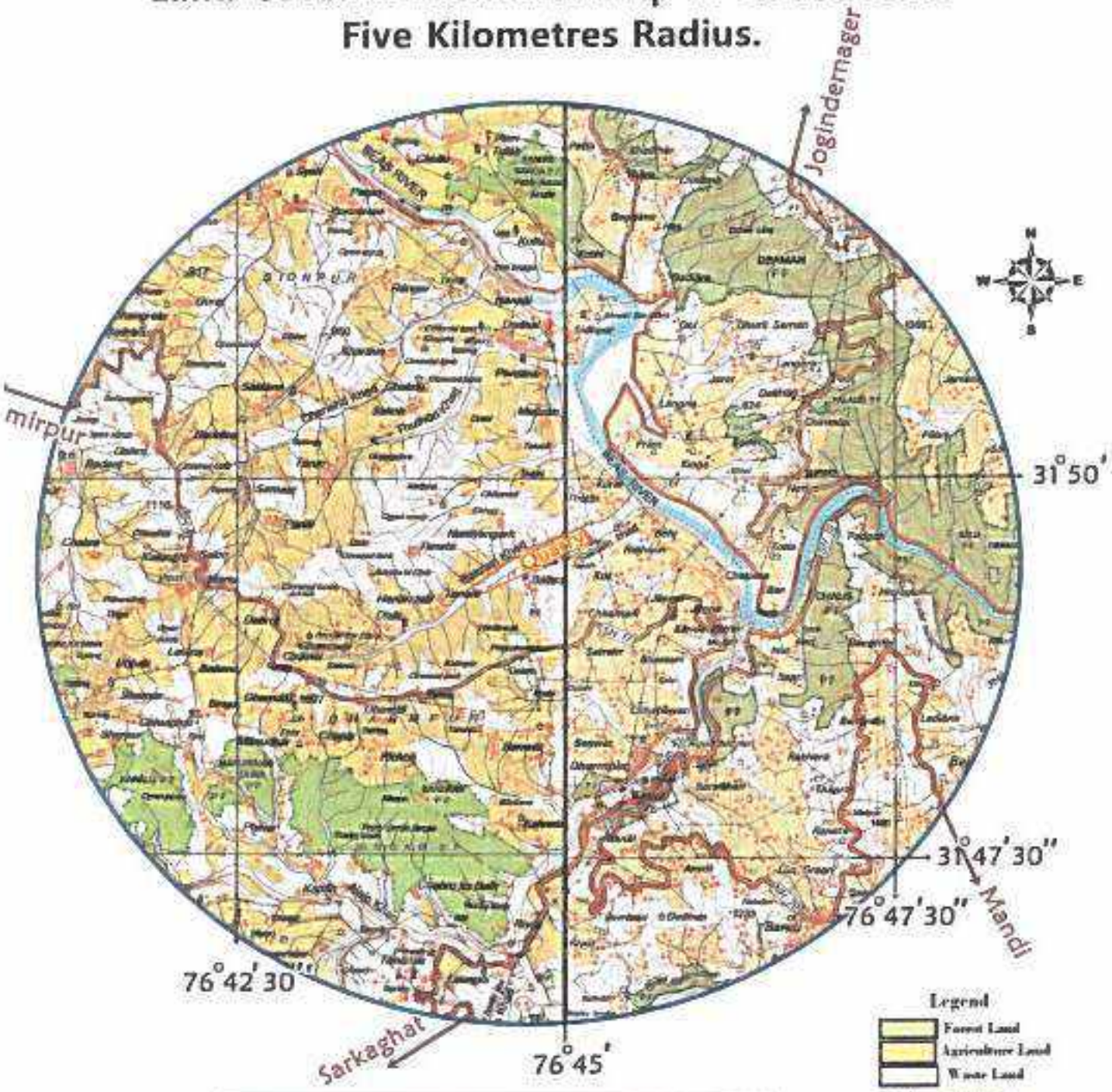


Plate 4

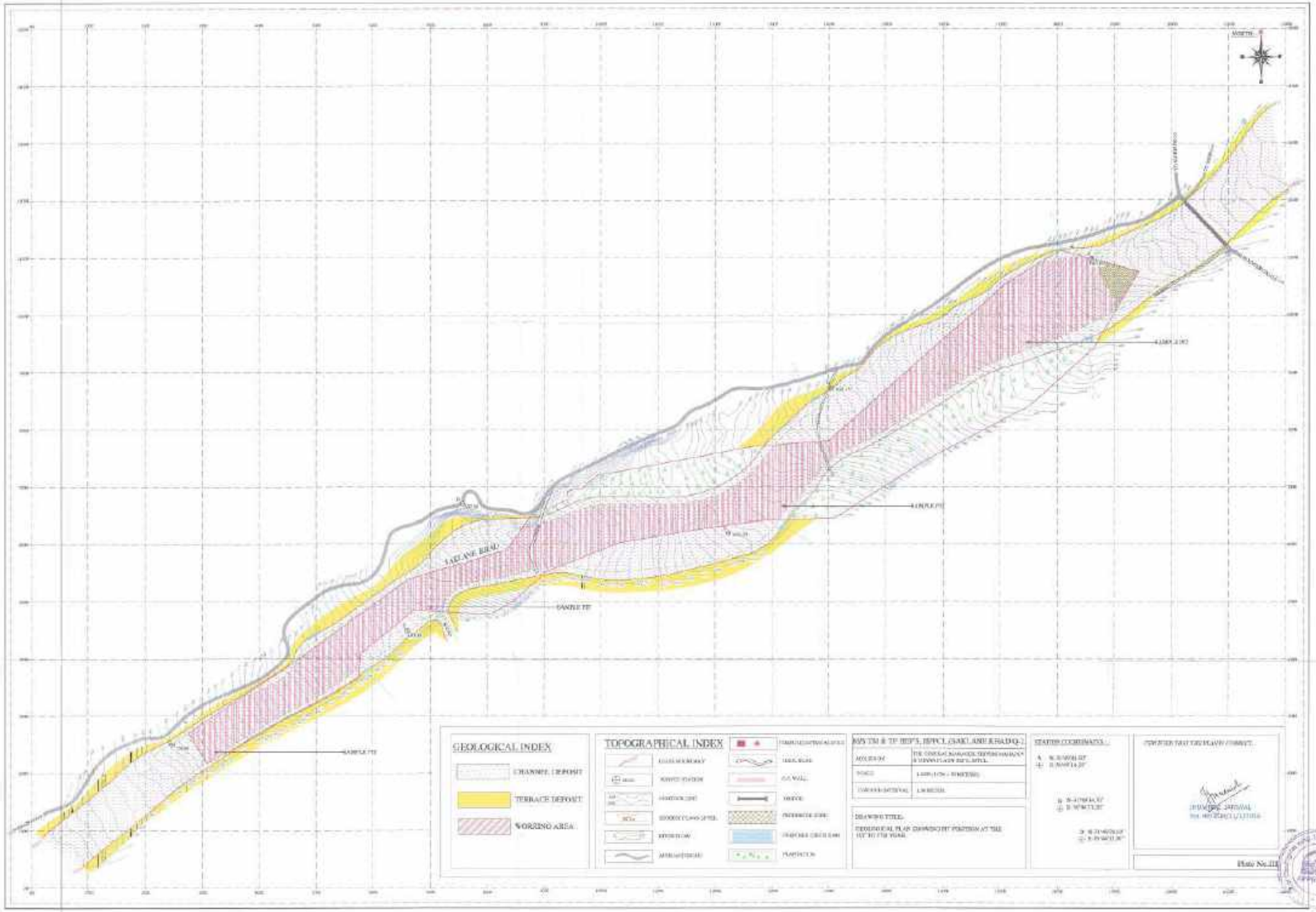
Land Cover & Land Use Map of Buffer Zone Five Kilometres Radius.

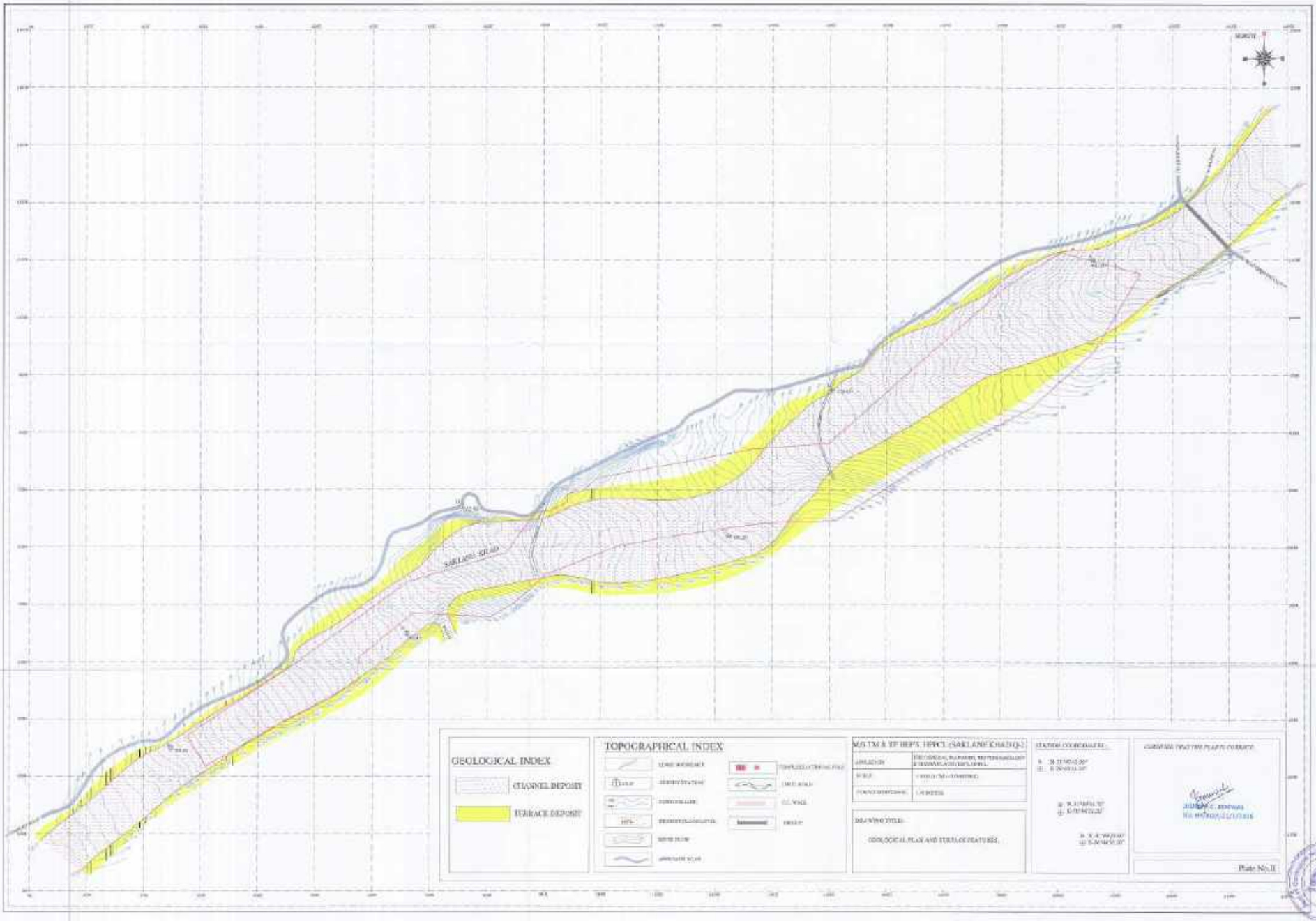


Part of Survey of India
Toposheet Nos. H43E9 & H43E13

Scale

Lessee The General Manager Triveni Mahadev & Thana Plaun HEP's, Himachal Pradesh Power Corp.Ltd., Tehsil Kotli, Distt. Mandi.	Jhumpa C. Jamwal HP/RQP/21/1/2016.


NORTH
SAFLANE ROAD
GEOLOGICAL INDEX
CHANNEL DEPOSIT
TERRACE DEPOSIT
WORKING AREA
TOPOGRAPHICAL INDEX
Plate No.III


NORTH
SAKLANG ROAD
GEOLOGICAL INDEX
CHANNEL DEPOSIT
TERRACE DEPOSIT
TOPOGRAPHICAL INDEX
Plate No.II

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

INDEX

MAP INDEX

Declaration
Certificate of RQP

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

भूविज्ञान शाखा
उद्योग विभाग हिमाचल
Geological wing
Dept. of Industries
Shimla

APPROVED
With Conditions
शर्तों के साथ अनुमोदित
Vide Letter No. उ.वि.(भू-वि)लघु-4/2016-4302
Dated
दिनांक 21-7-23

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

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 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' 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

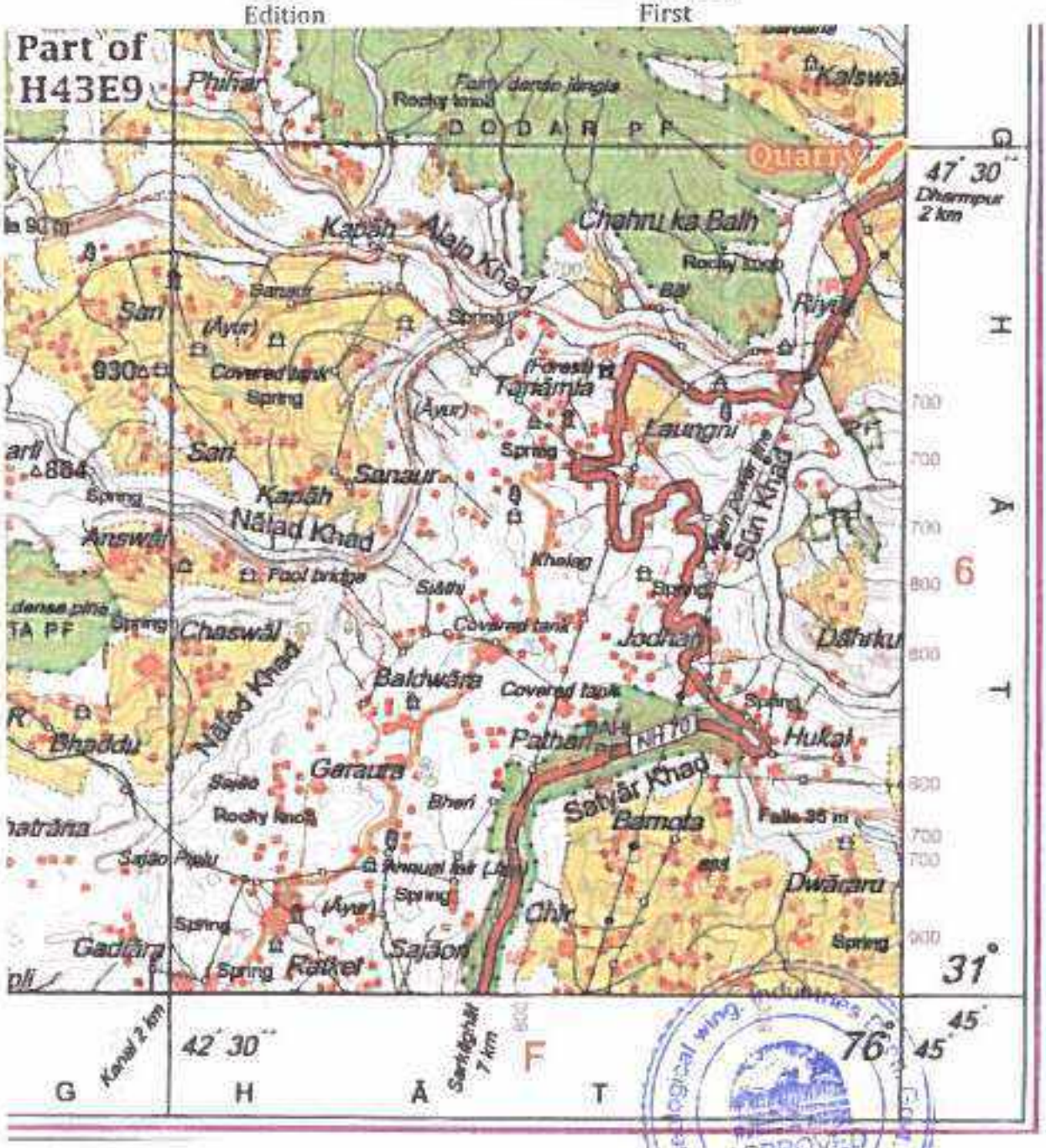


Figure 1: Location of the Mining Lease area.

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

Point	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"

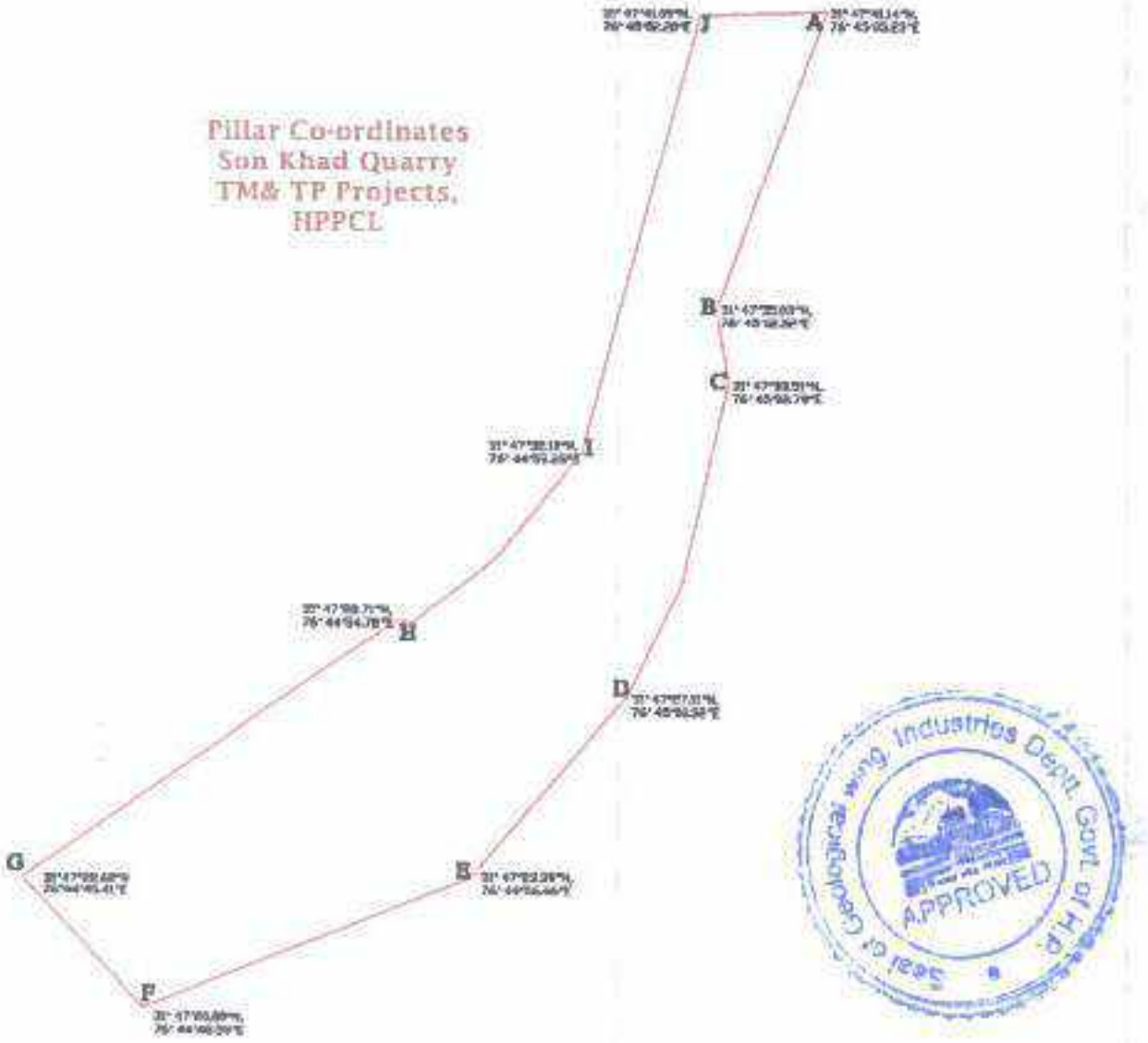


Figure 2: Calculated Coordinates of Boundary Pillars

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

Administrative Office	Village: -	Banal & Riyur
	Patwar circle:	Banal
	Post Office: -	Banali
	Tahsil: -	Dharampur
	District: -	Mandi
	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.m.)
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: -

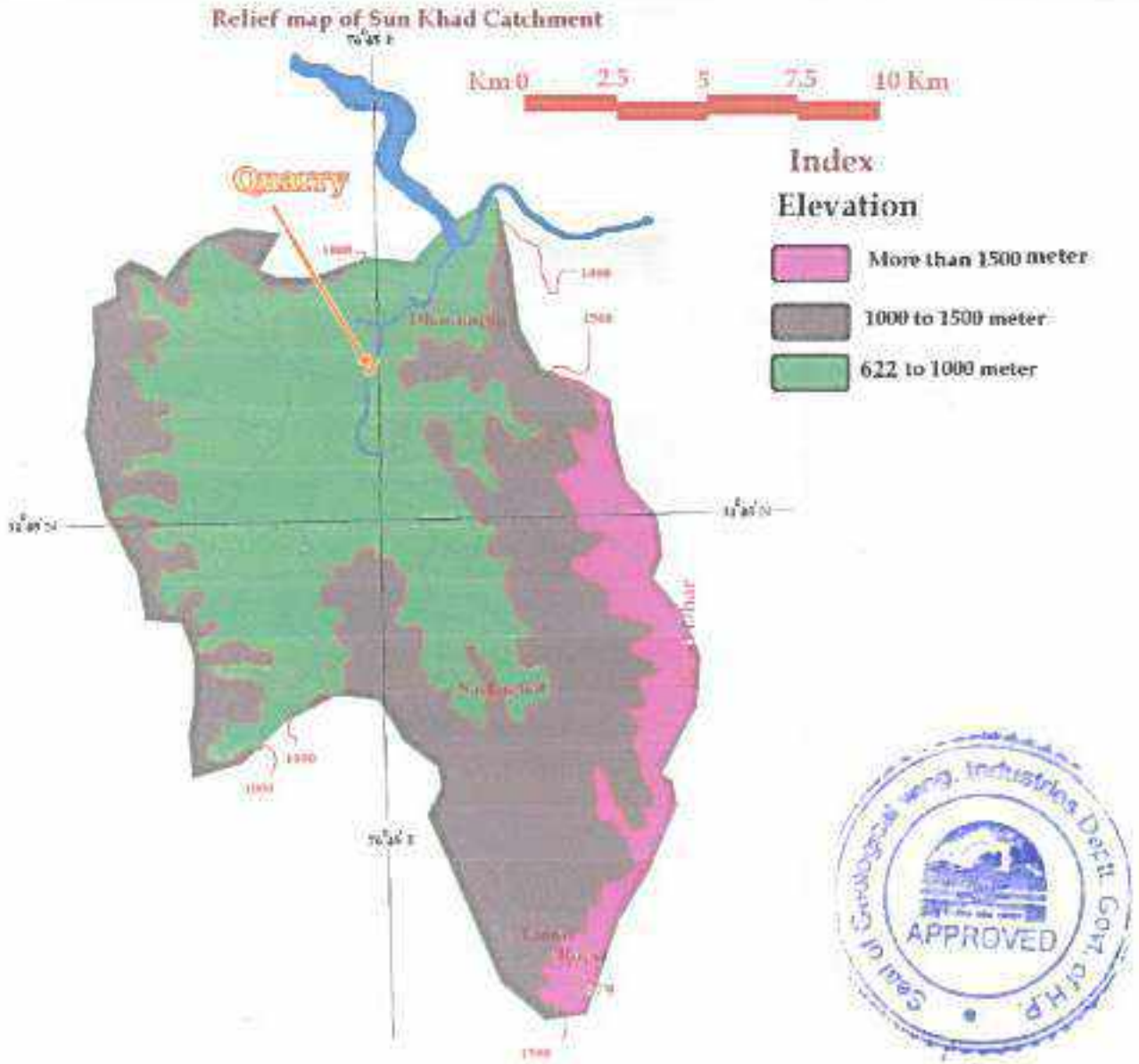


Figure 4: The broad Geo-Morphological Divisions of the Son Khad Catchment.

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.

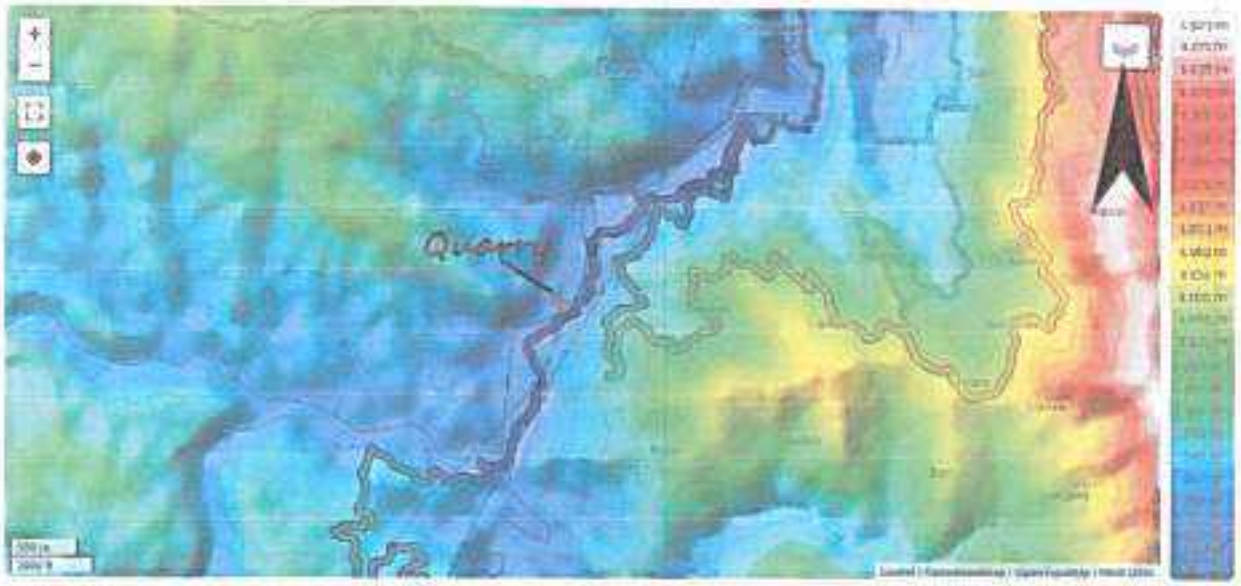


Figure 5: Terrain Map of the Area.

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.

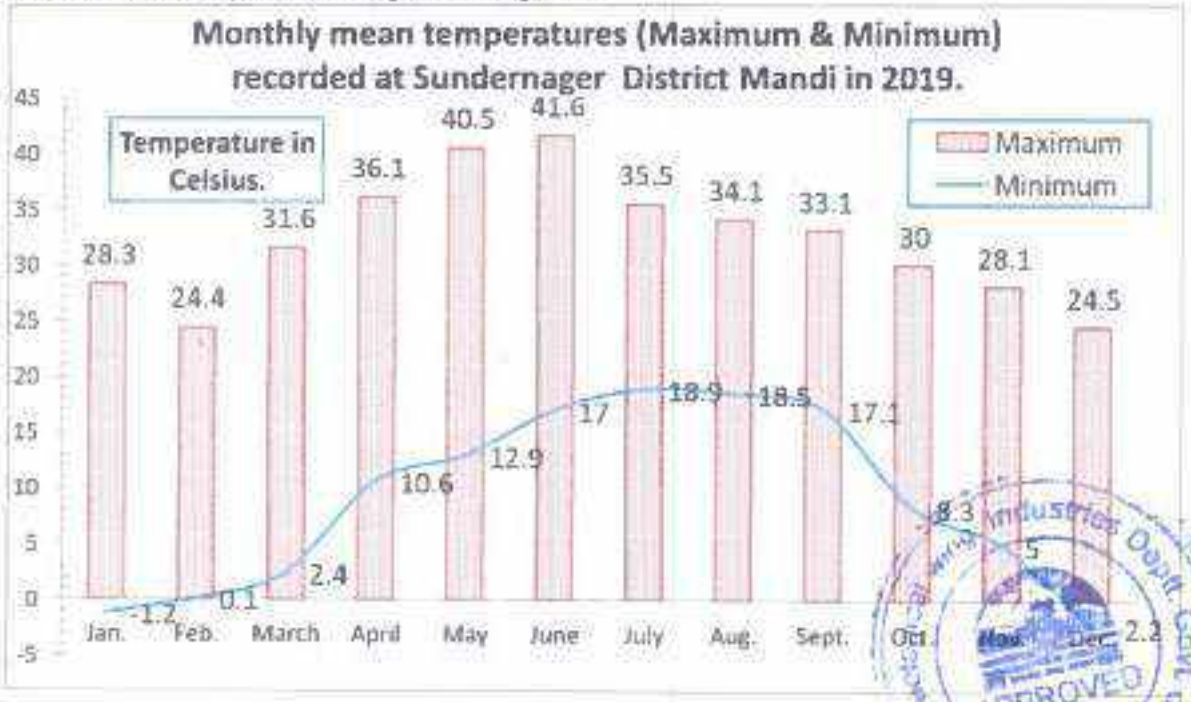
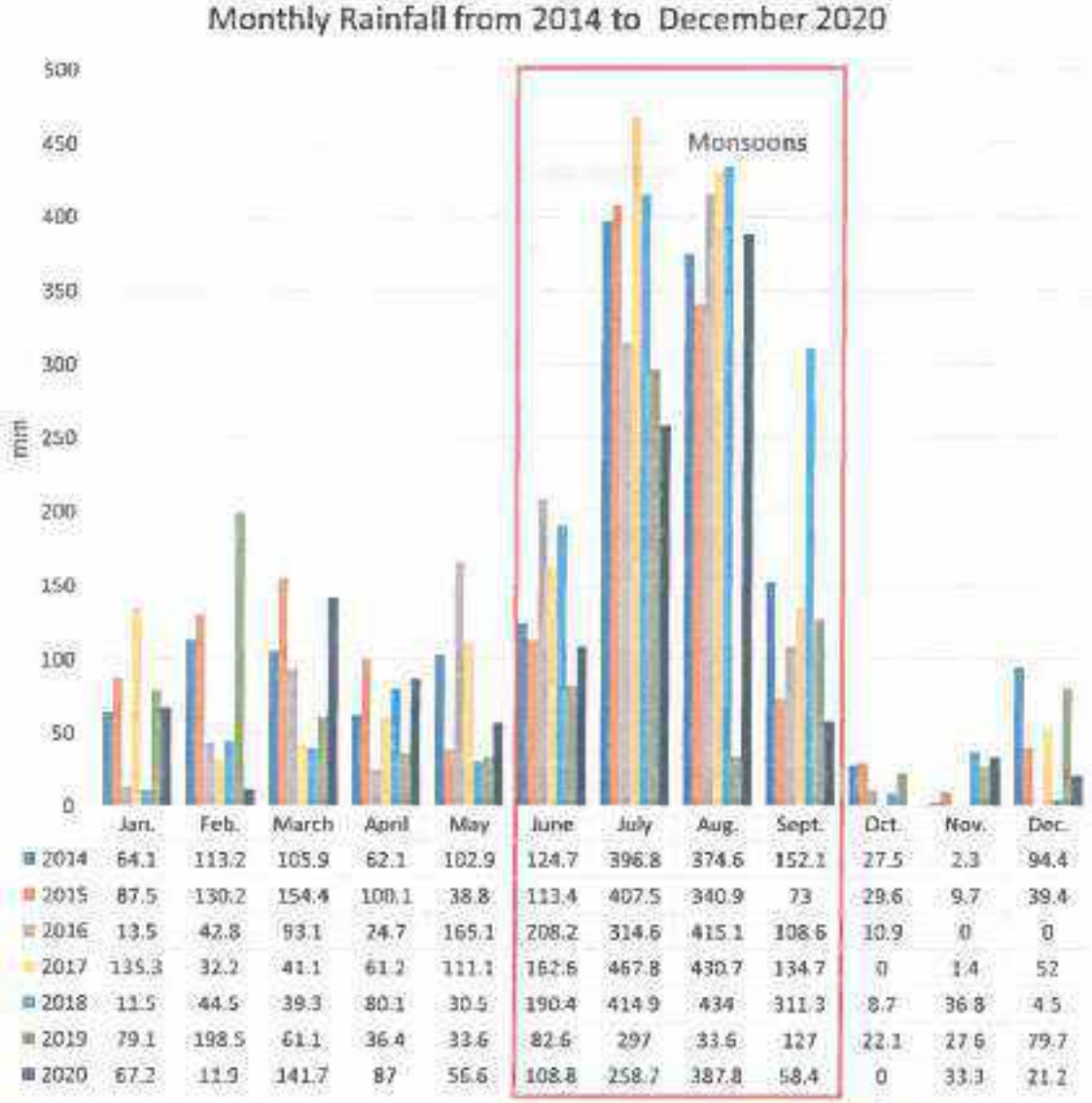


Figure 6: Mean monthly maximum and minimum temperature recorded at IMD station at Sundernager.

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.

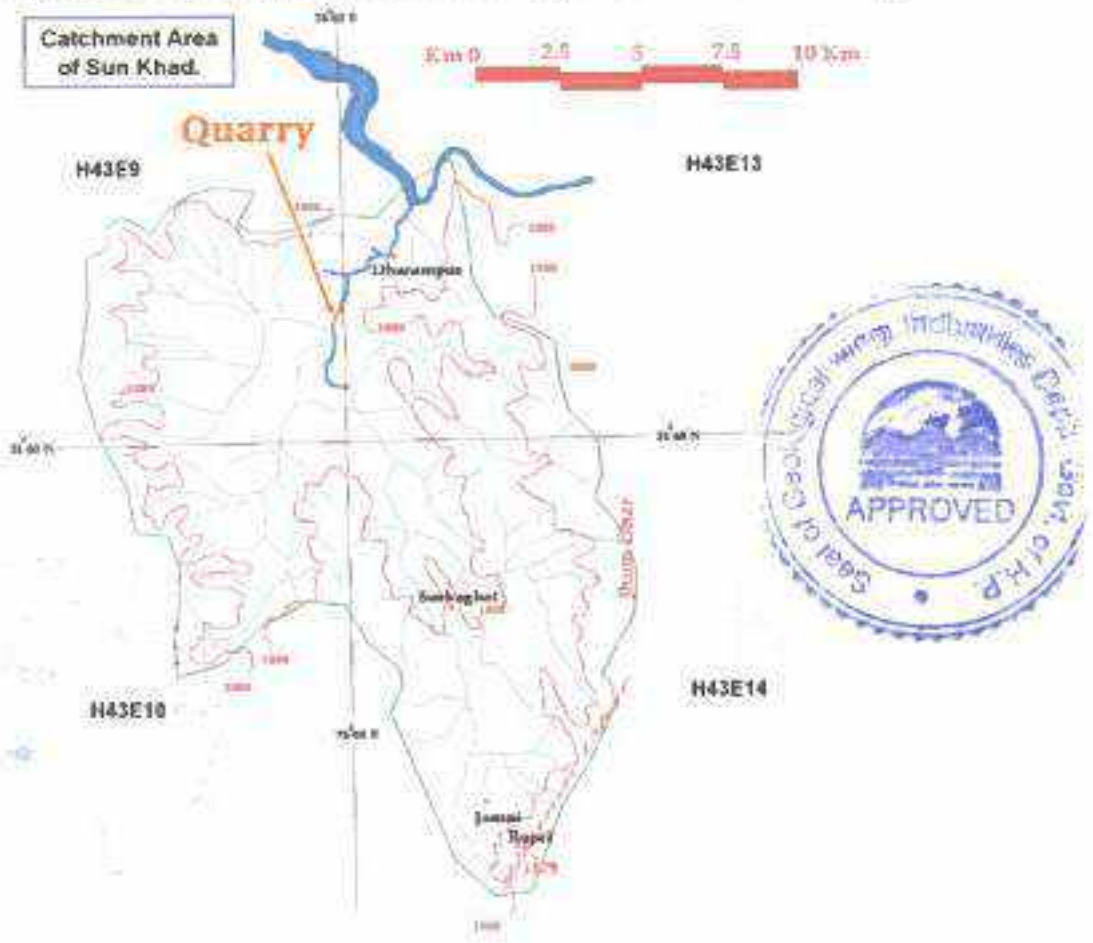


Figure 8: Catchment area of Son Khad.

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

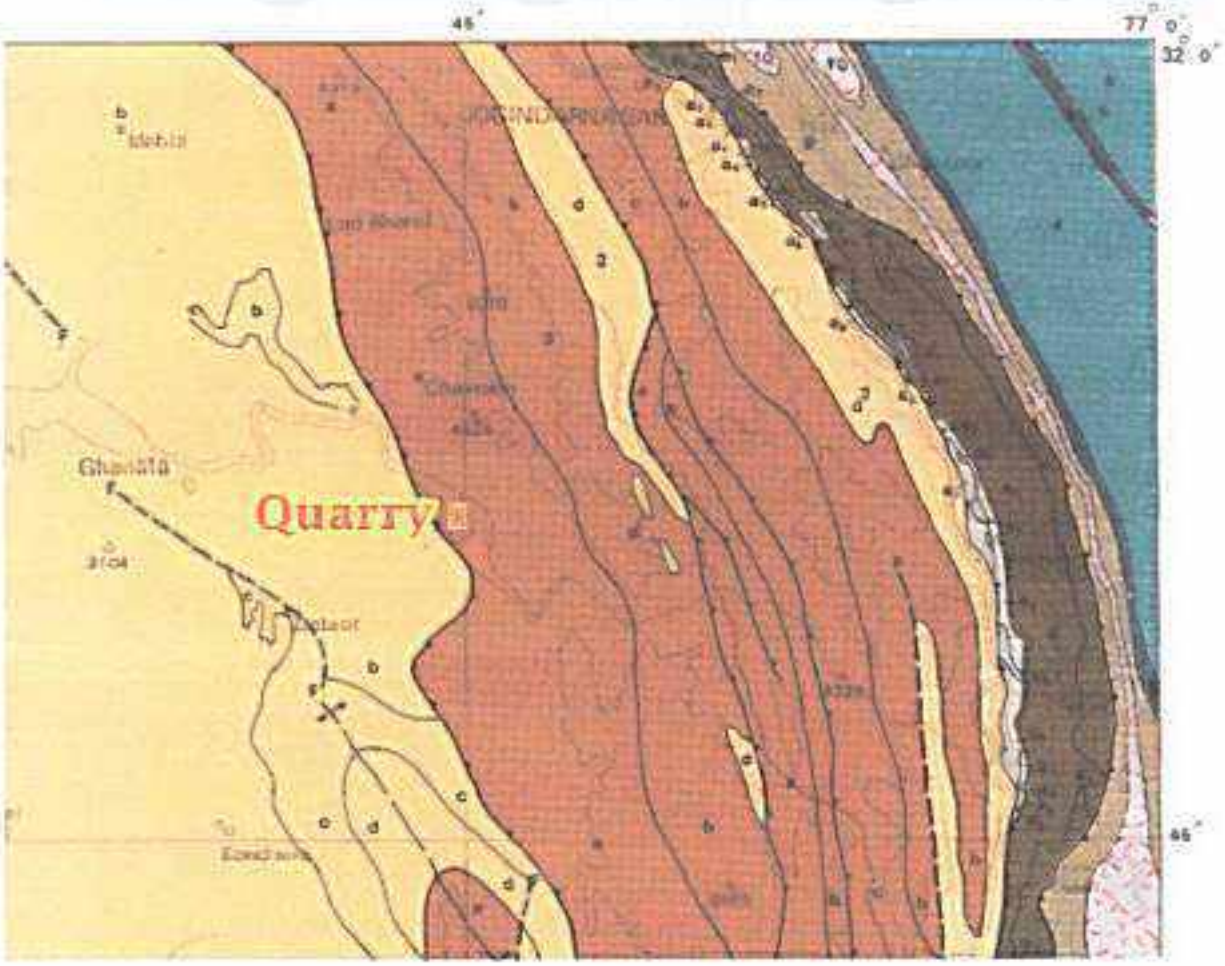
2.1 Regional Geology

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 Eocene - 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:

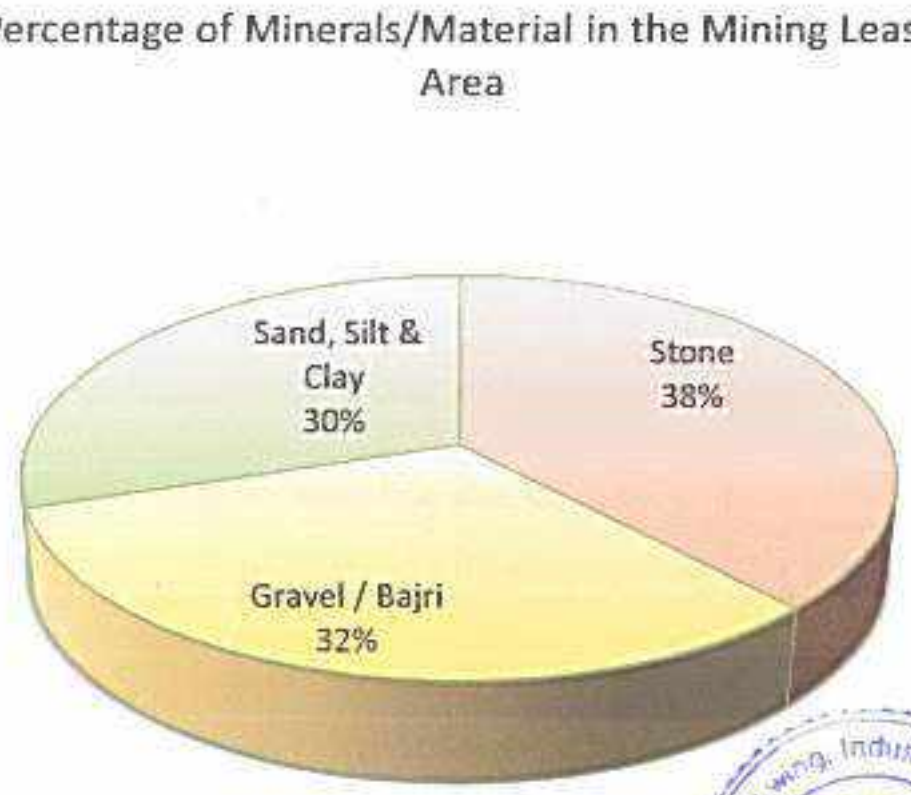


Figure 10: Percentage of each category of mineral present in the leased area

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	160900
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.***

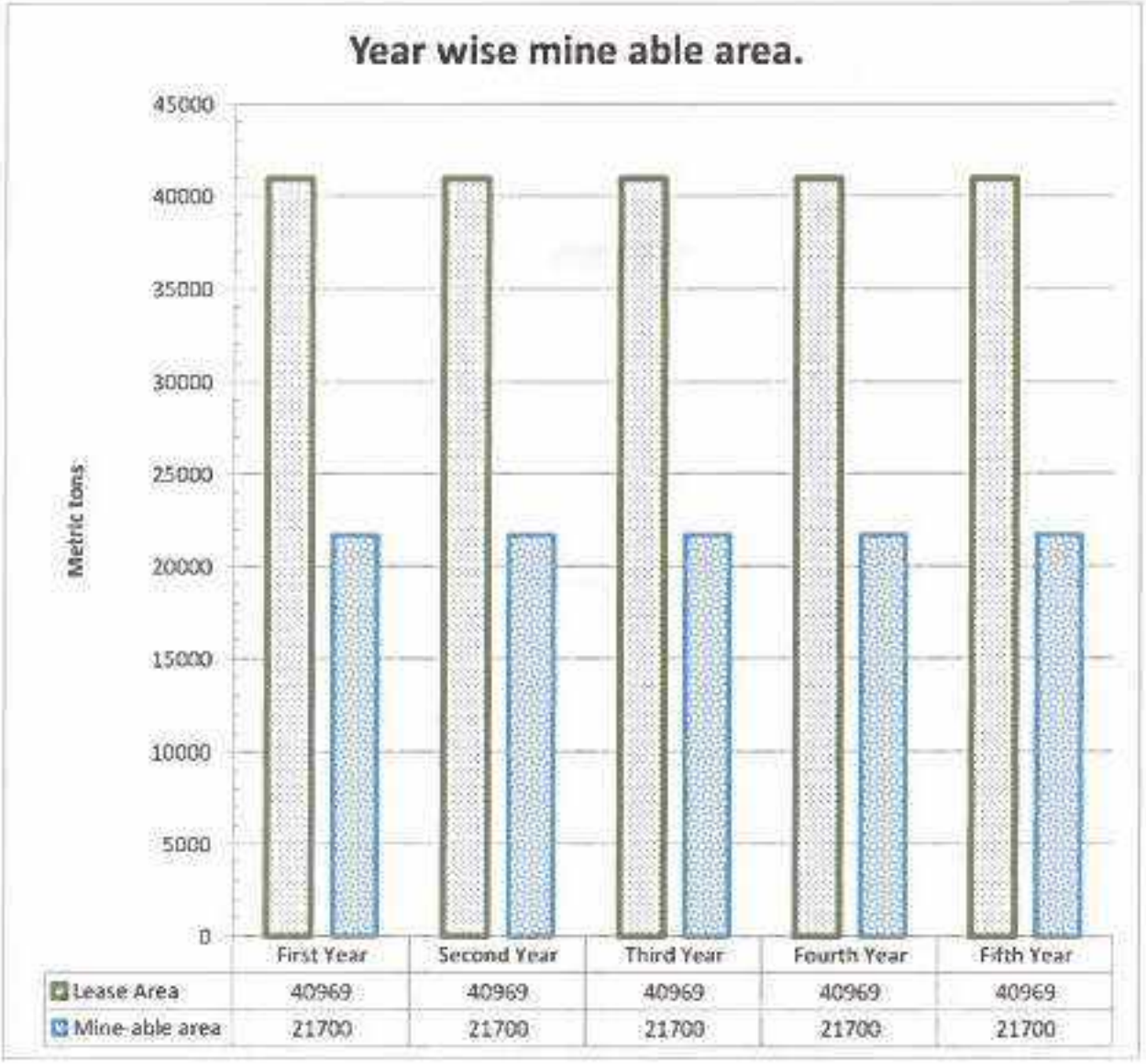


Figure 11: Mineable area.

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

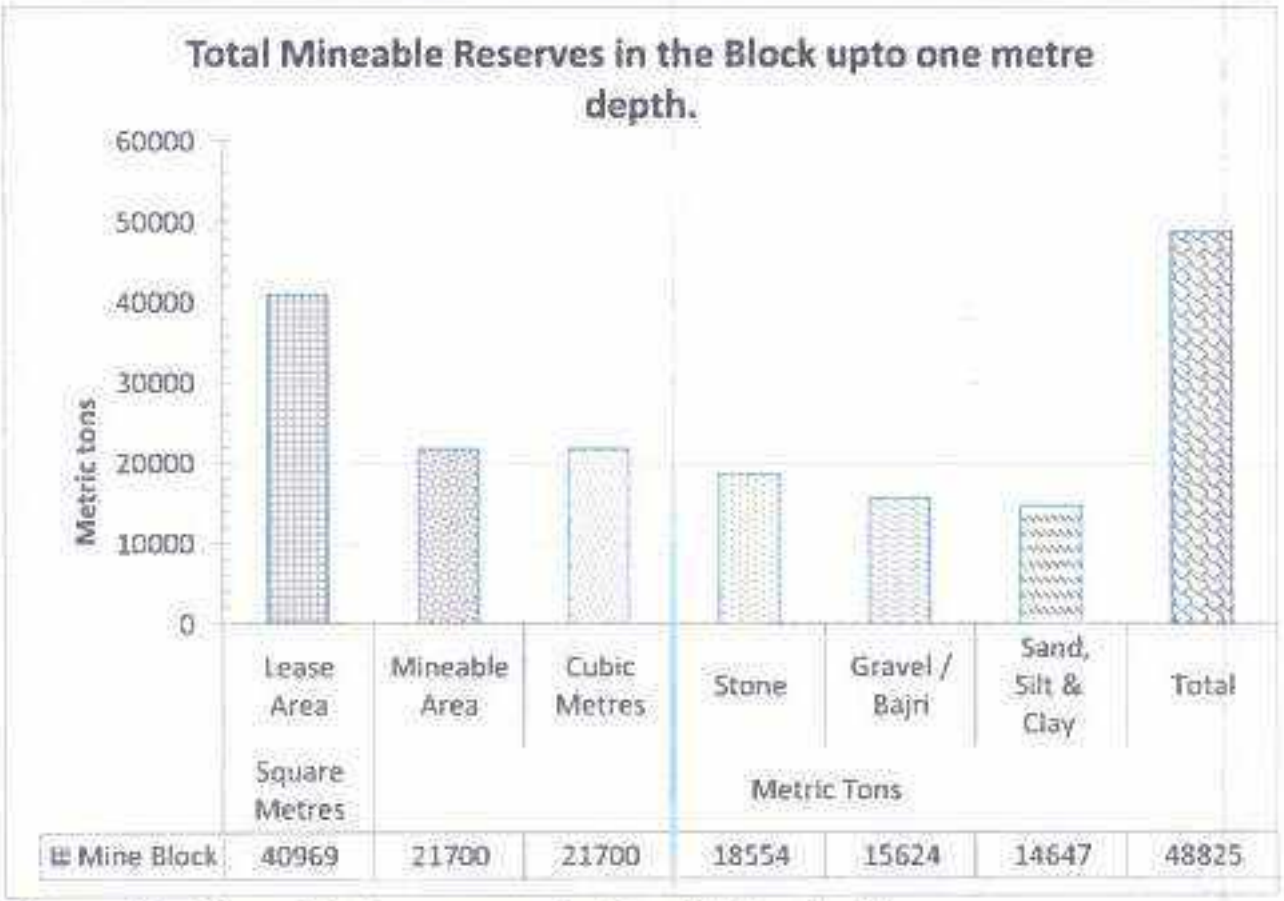


Figure 12: Mineable Reserve up to One Metre depth

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.

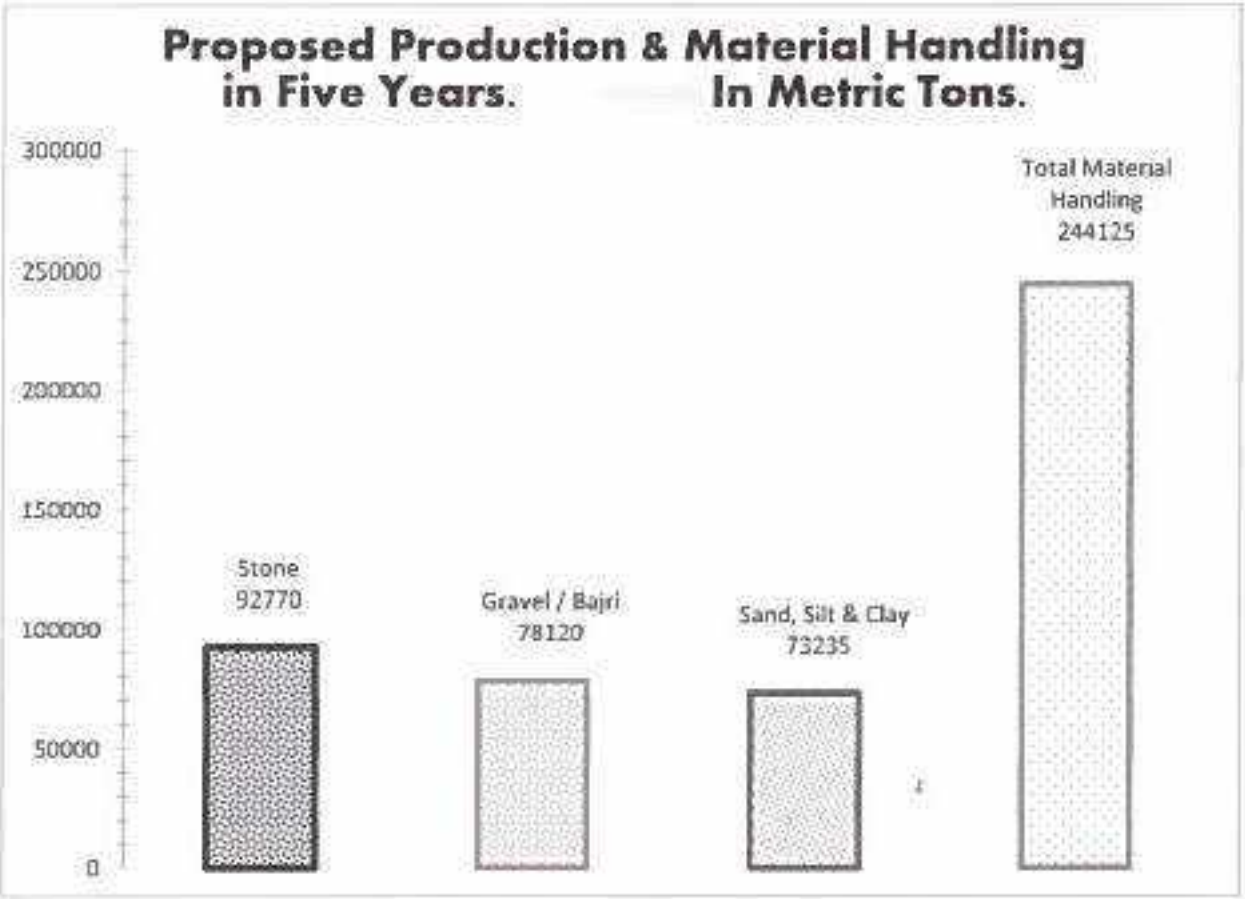


Figure 13:Proposed production of total material in five years

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

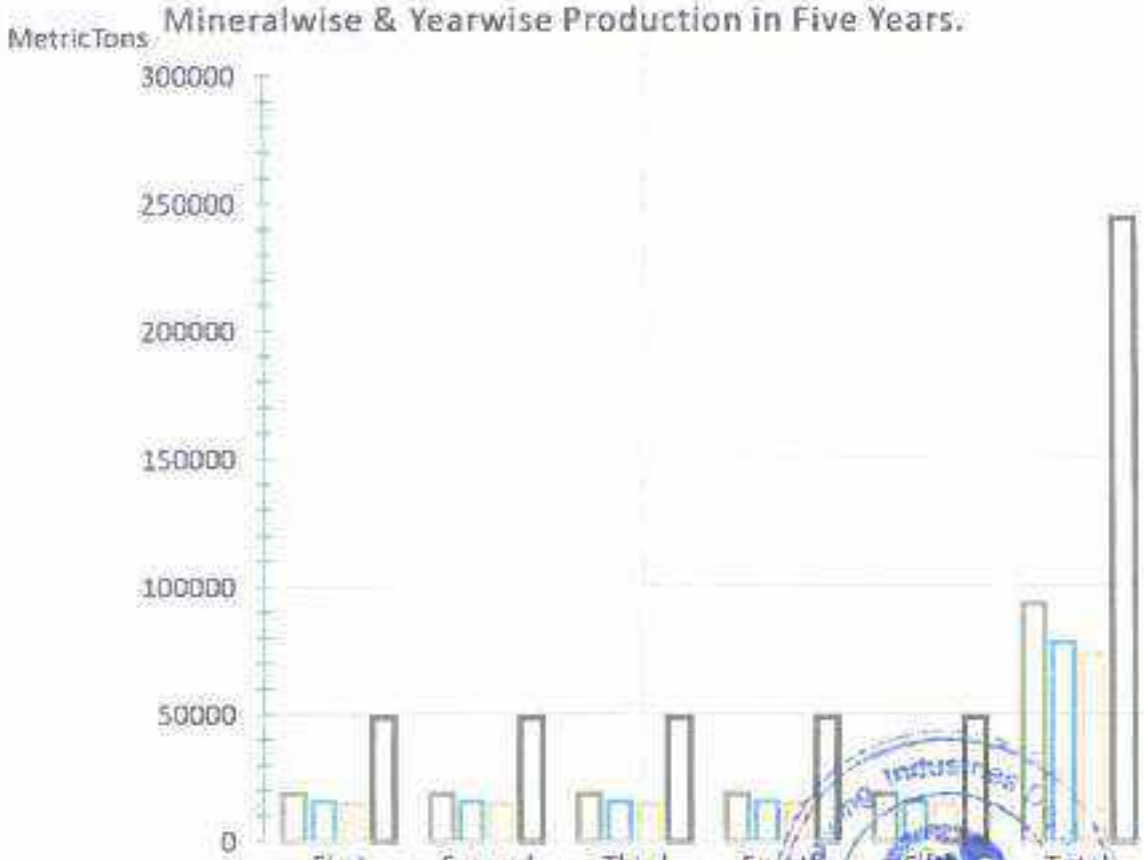
- No blasting is required.
- Only manual/semi mechanically extraction of RBM (River Borne Material) will be undertaken.

- 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.

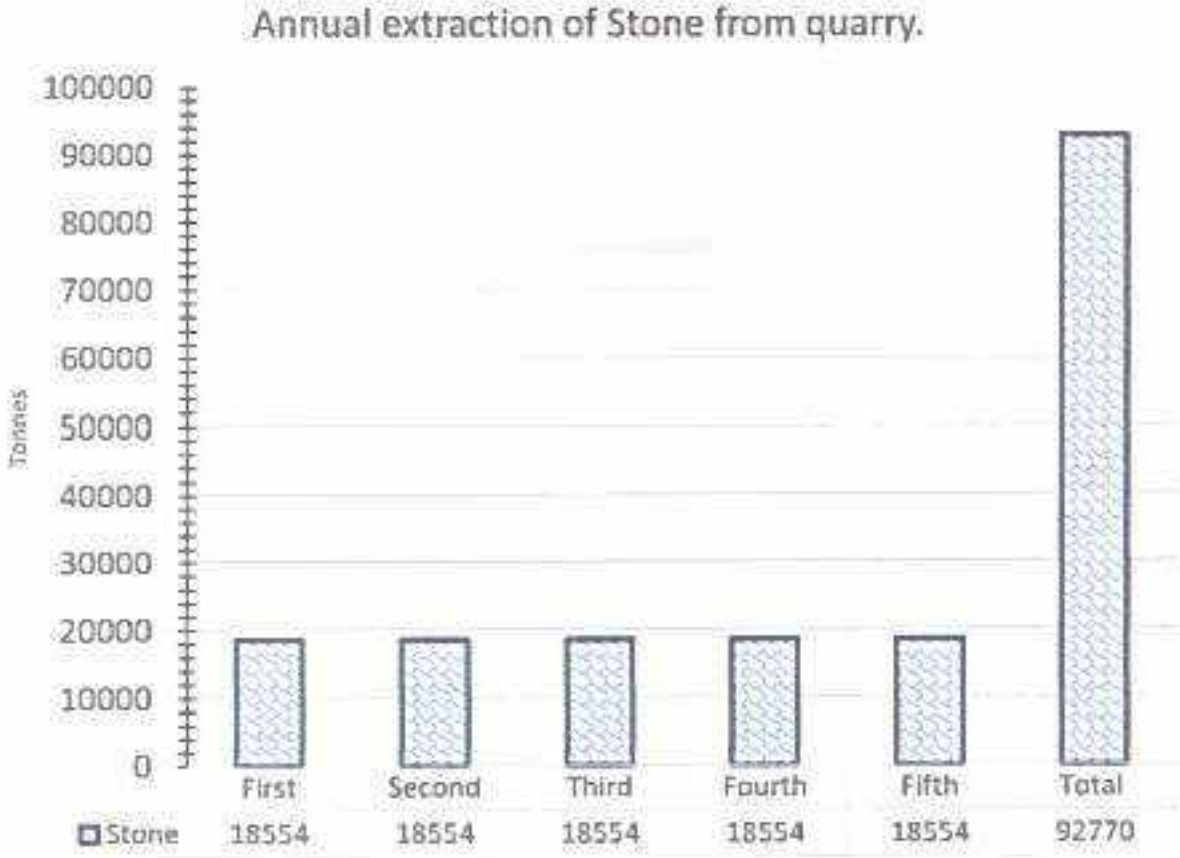


Figure 20: Year wise production of Stone.

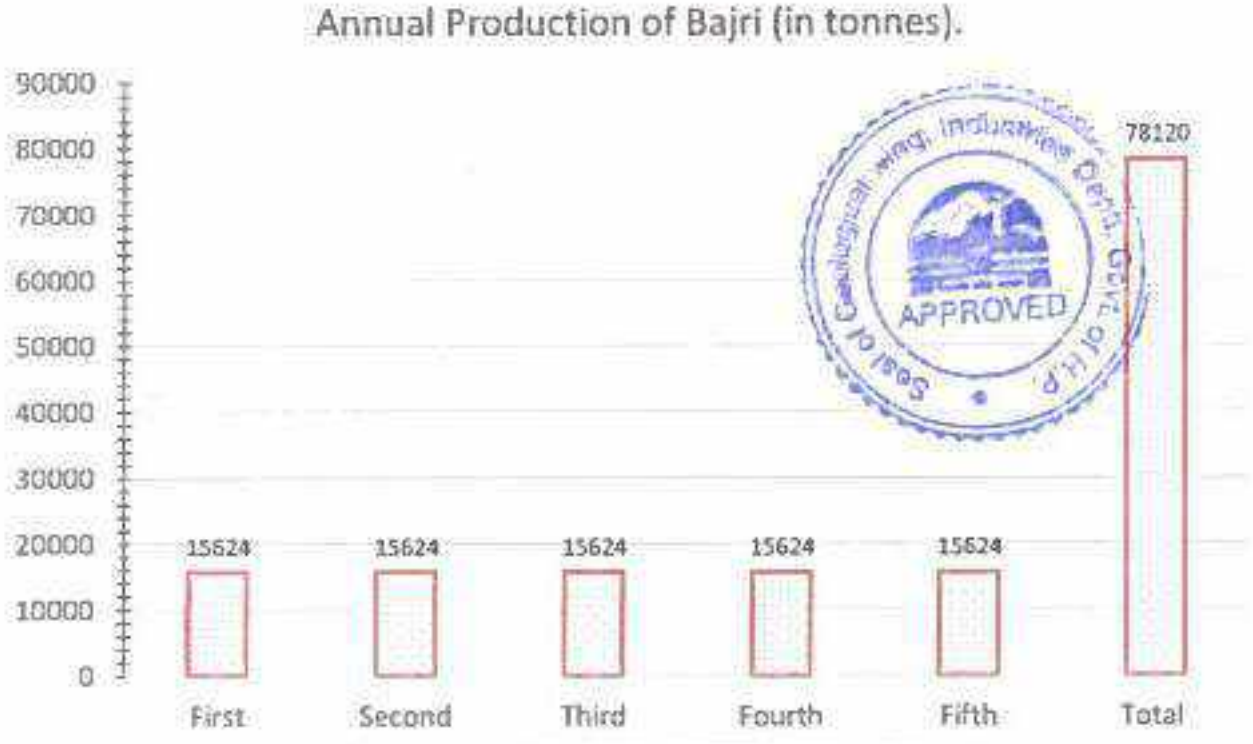


Figure 21: Annual Production of Bajri.

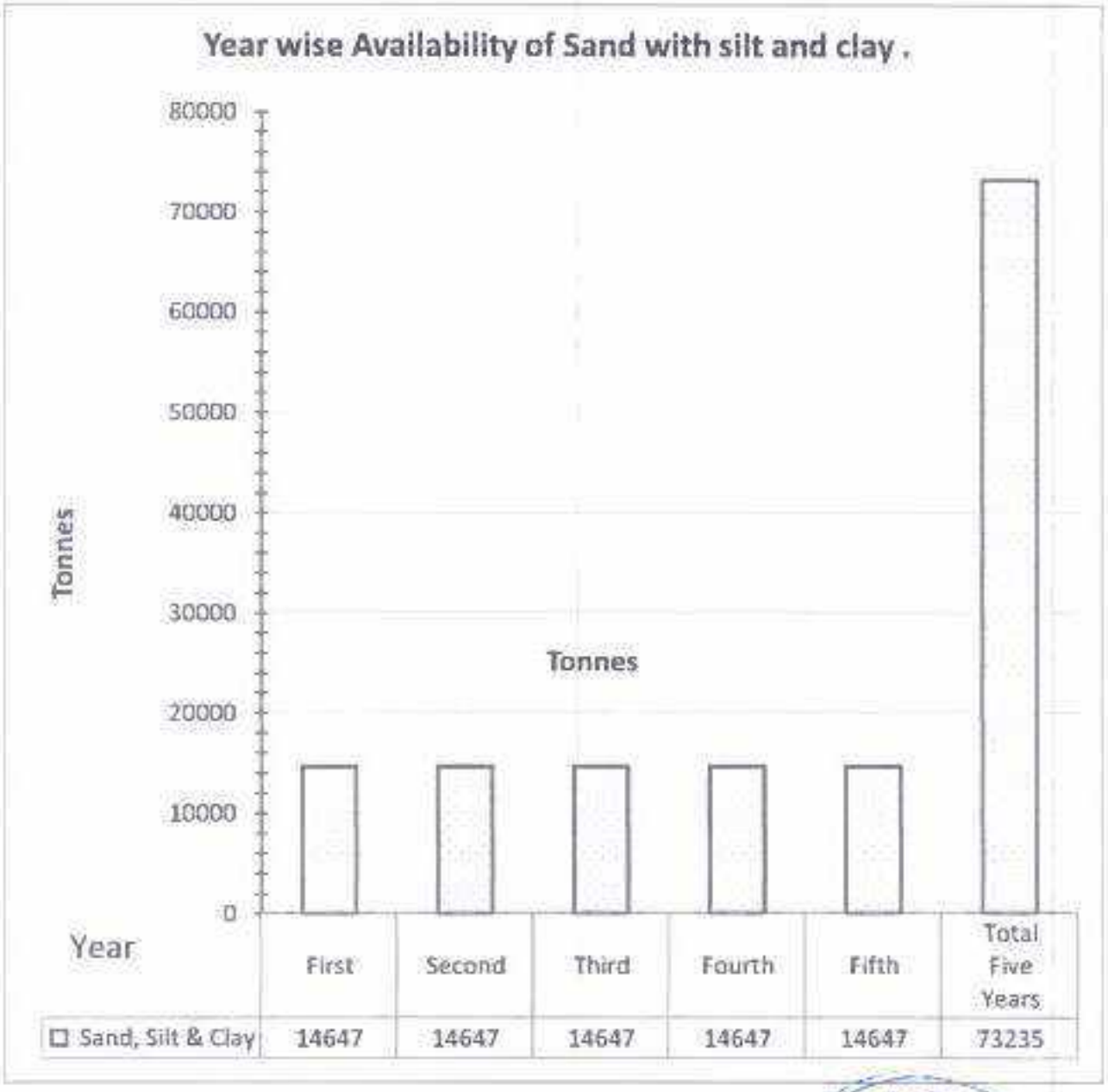


Figure 22: Annual production of sand along with silt & clay

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

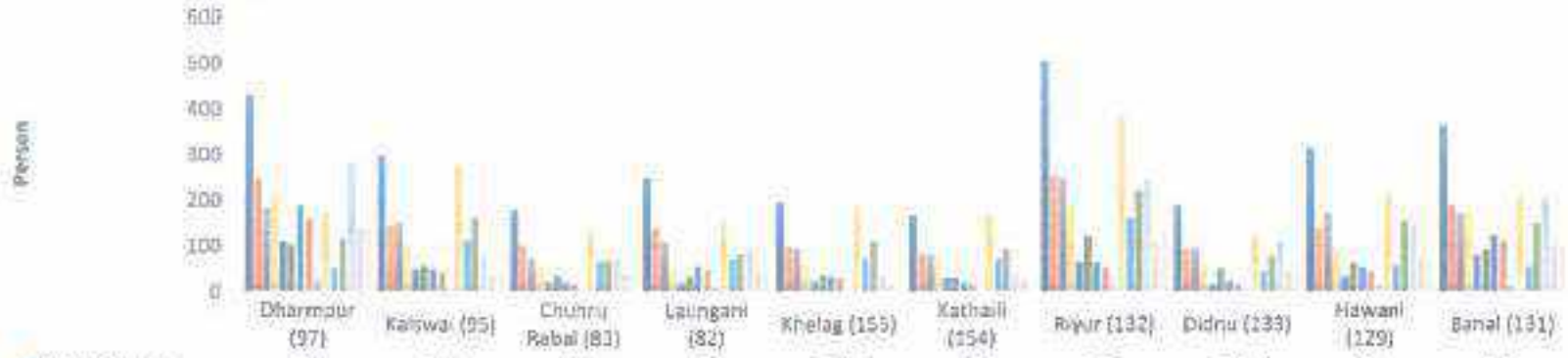
1.1. Demography of the area

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)	Kaiswai (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

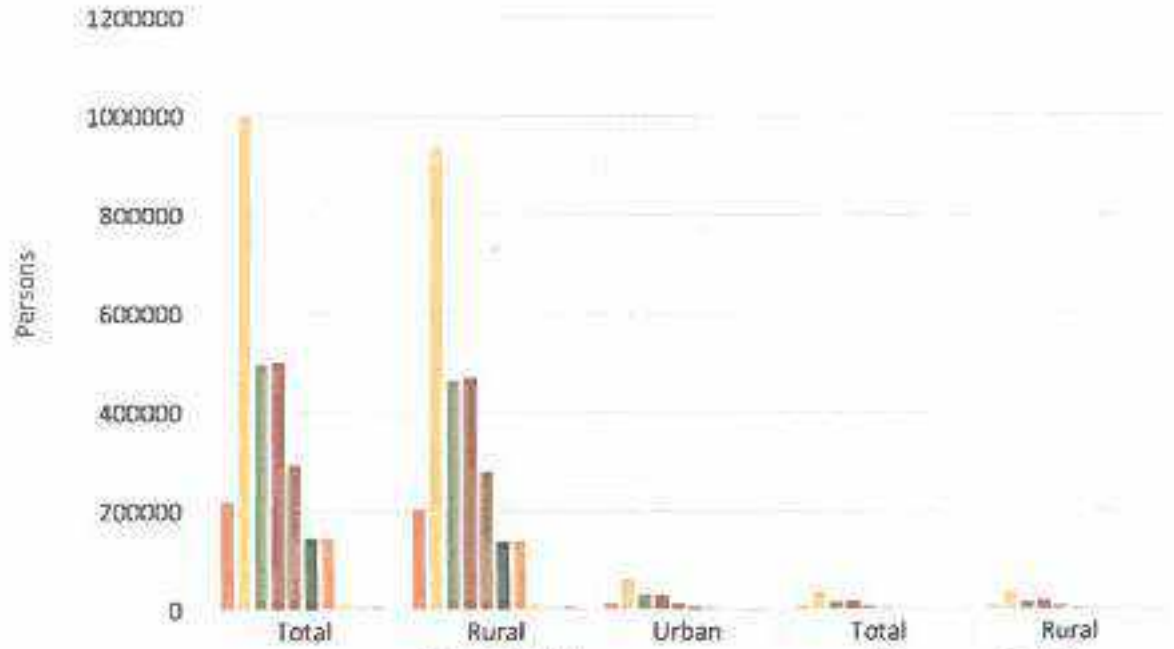
Figure 24; Population of the villages of the zone of influence.

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



	Dharmpur (97)	Kaliwar (95)	Chuhru Rabal (83)	Laungani (82)	Khelag (155)	Kathaili (154)	Rajur (132)	Didnu (133)	Hawani (129)	Banal (131)
Total Literate	429	298	177	249	195	165	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
Male 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	159	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	75	91	34	41	245	109	143	204
Non Workers M	144	38	40	43	17	25	110	47	74	103
Non Workers Fe	139	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.

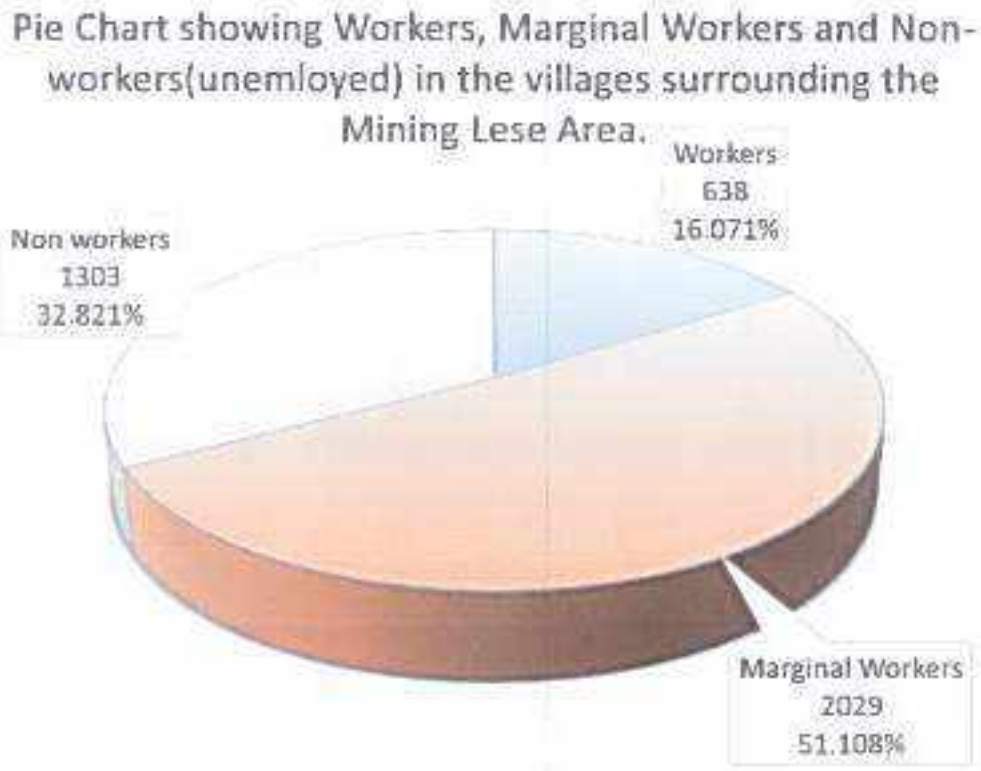


Figure 27: Employment percentage in adjoining villages.

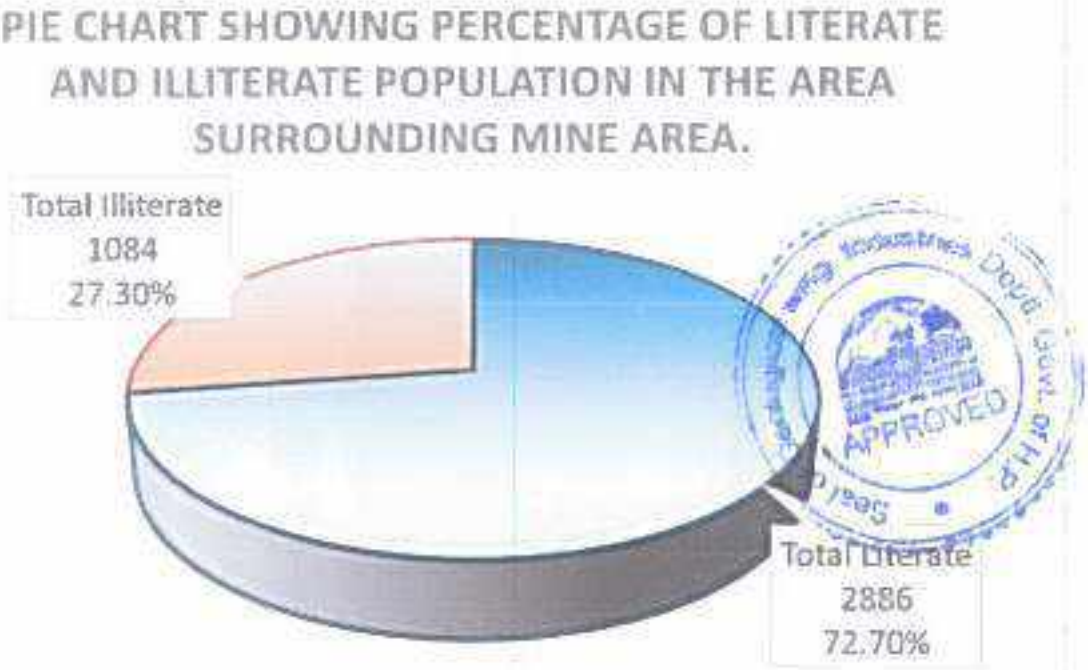


Figure 28: showing Percentage of literate and illiterate POPULATION in the Surrounding mine area

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

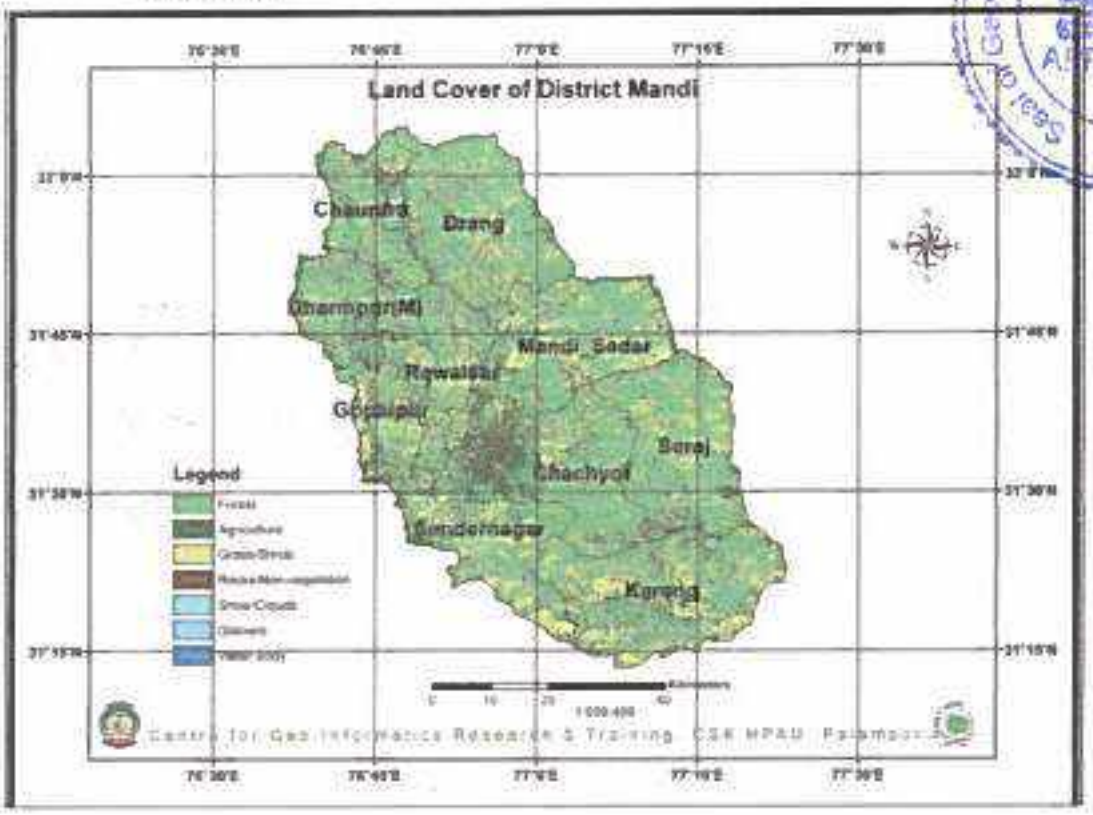
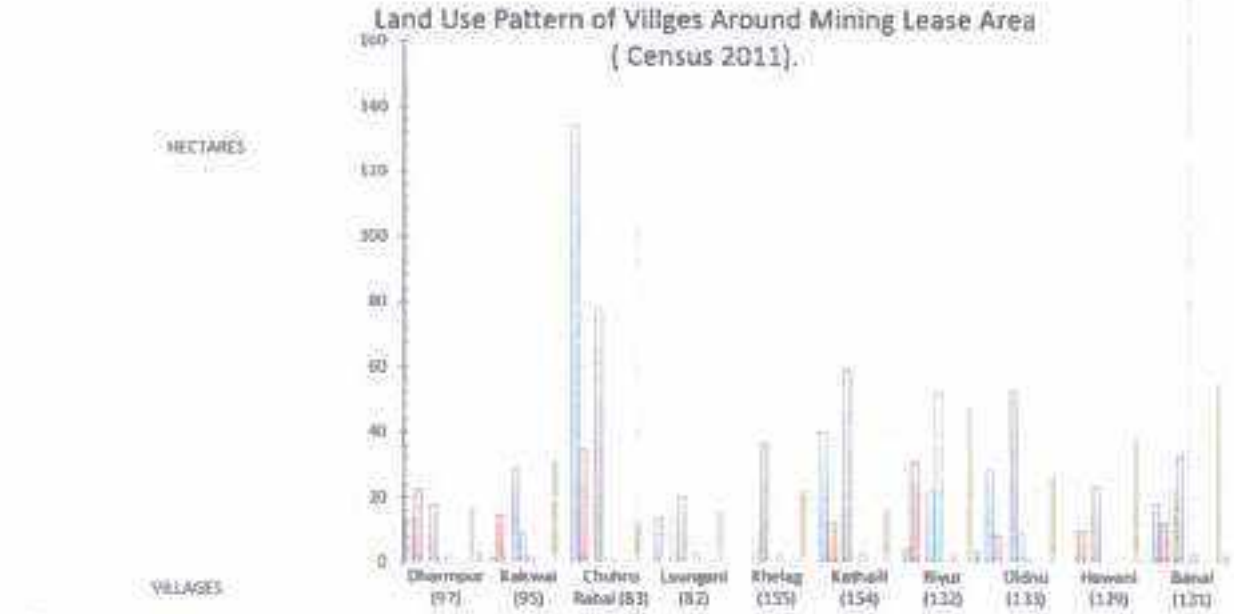


Figure 29: Showing General Land Use Pattern of the District Mandi.

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



	Dharmpur (97)	Rakwar (95)	Chuhro Rabal (83)	Lauregani (82)	Kherag (155)	Kathaili (154)	Riyur (132)	Didnu (133)	Hawani (139)	Banal (131)
Forest Area	13.4	1.44	134	34	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	21.26	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	1	1	2.93	0	1.29	0.71	1.15
Fallows Land other than Current Fallows Area	0	0	0	0	0	0	1.45	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	36.64	39.27	55.05
Area Irrigated by Source	1.29	0	0	0	0	0	3.77	0	0.06	3.41

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

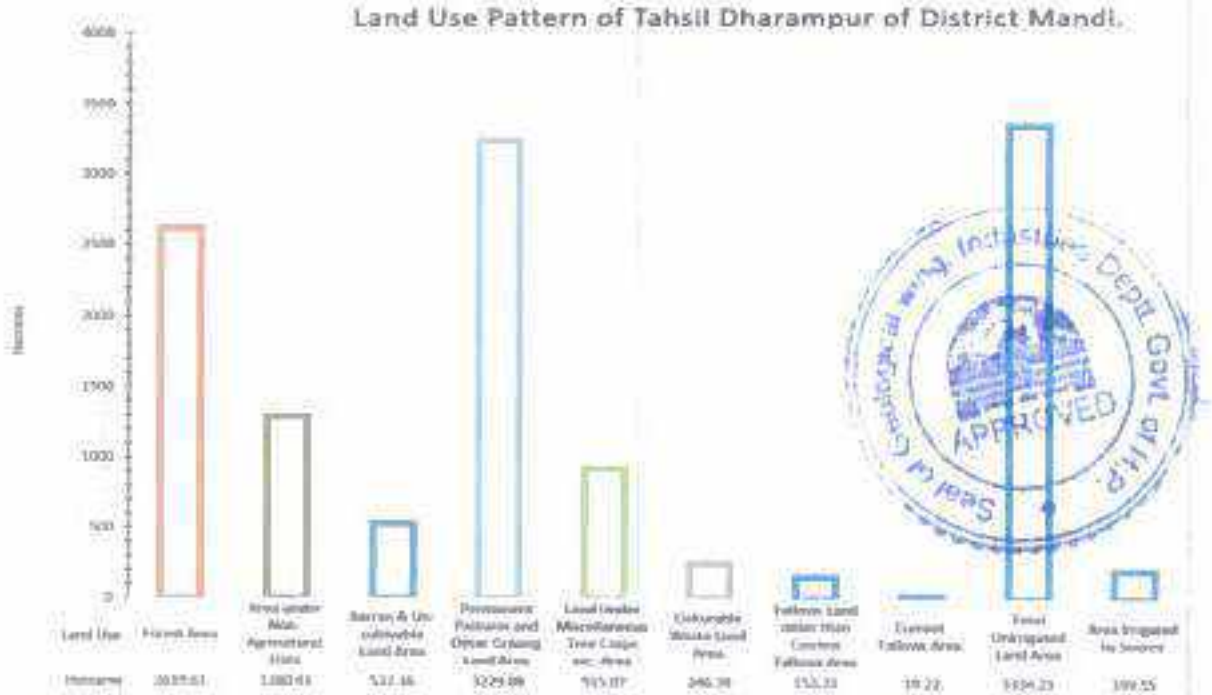


Figure 31: Land Use Pattern of Tahsil Dharmpur of District Mandi.

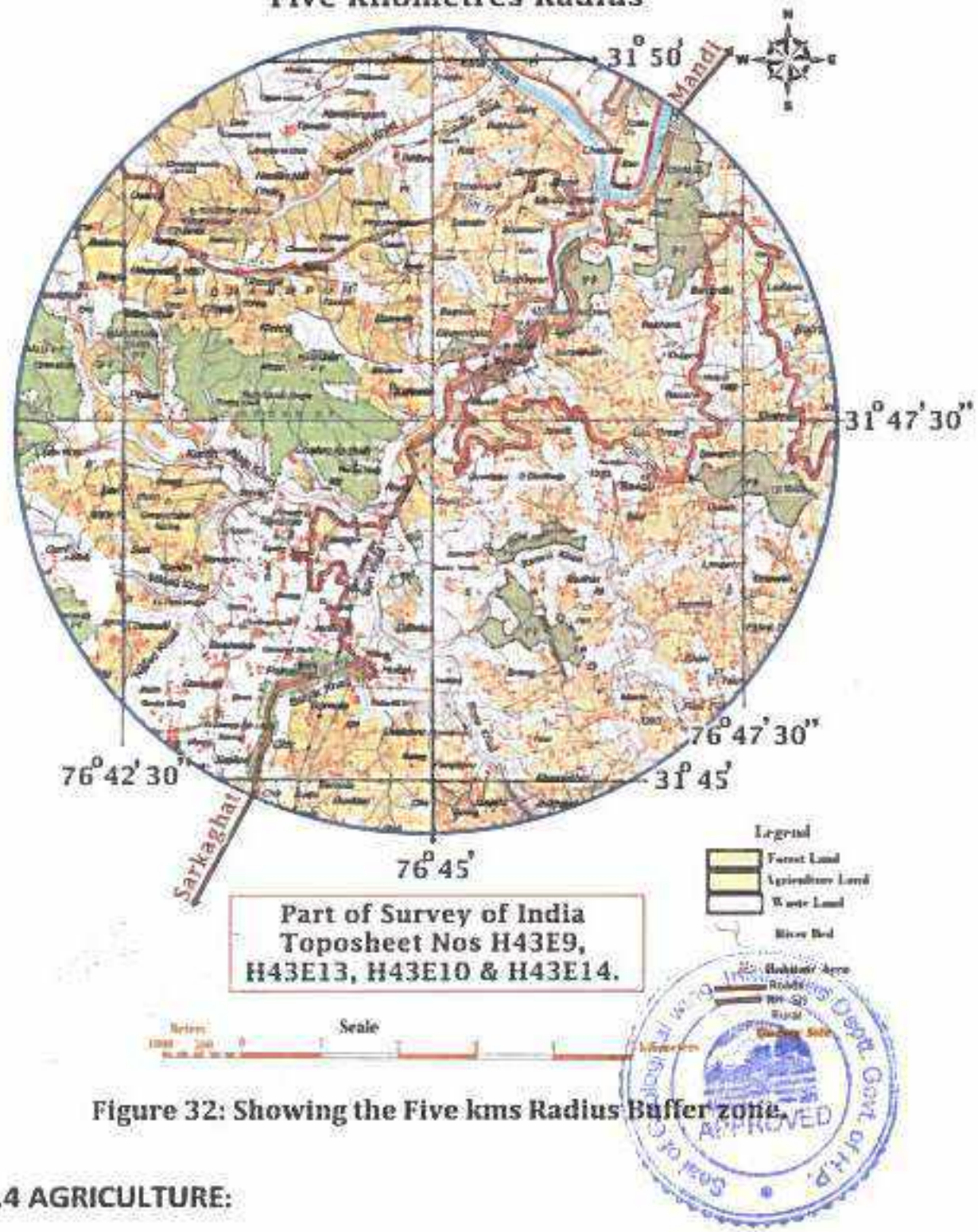


Figure 32: Showing the Five kms Radius Buffer zone.

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.

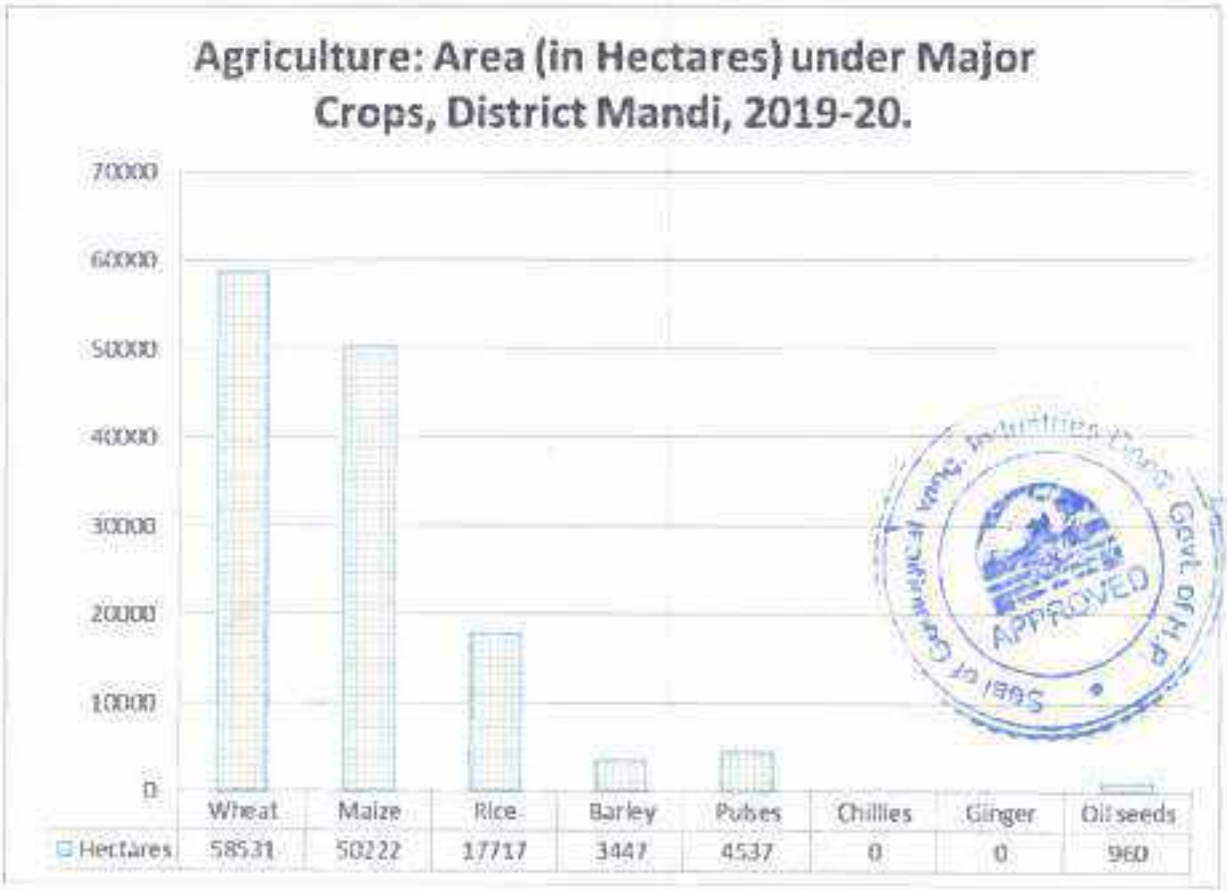


Figure 33: : Showing area under different crops in Mandi District

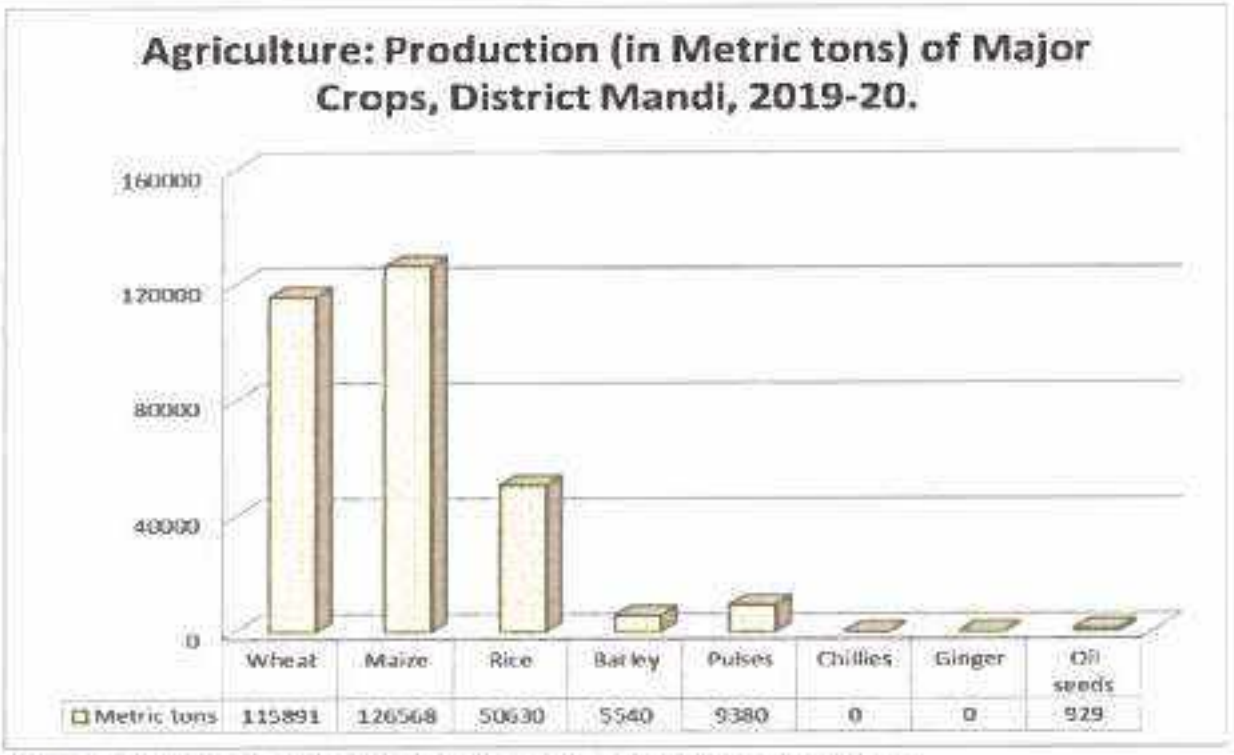


Figure 34 Showing production of each crop in District Mandi.

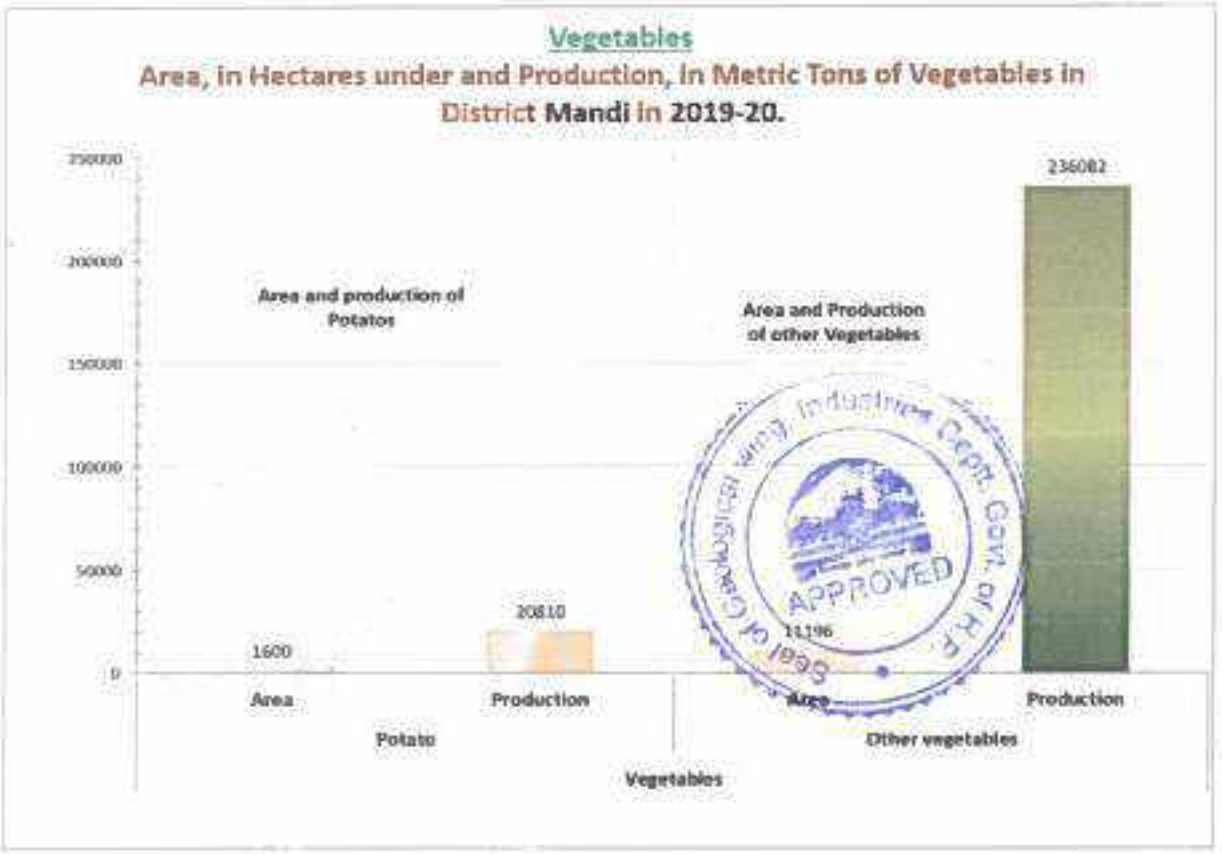


Figure 35: Showing area under vegetable, in Hectare and Production, in Metric tons, of District Mandi.

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.

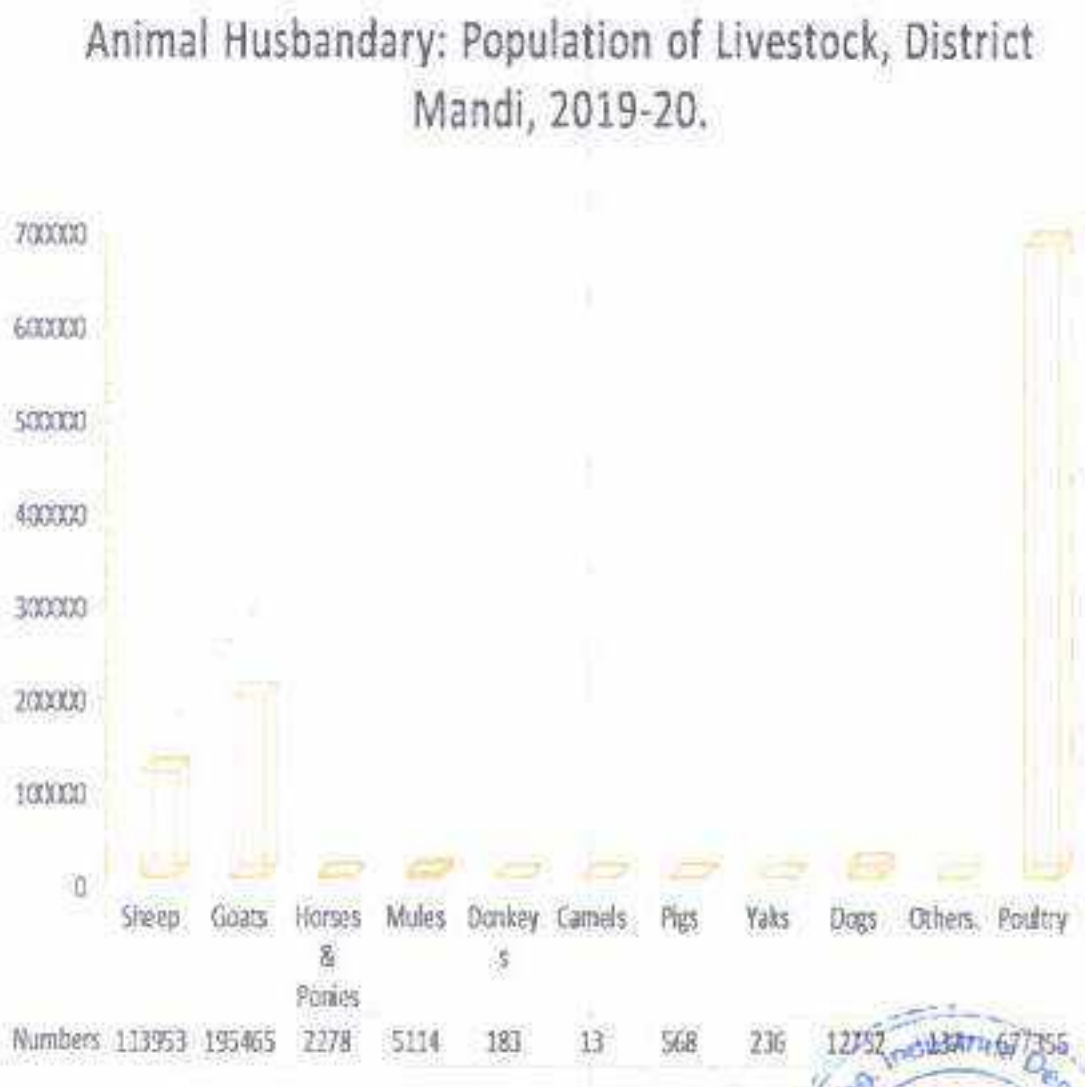


Figure 36:Livestock population of District Mandi

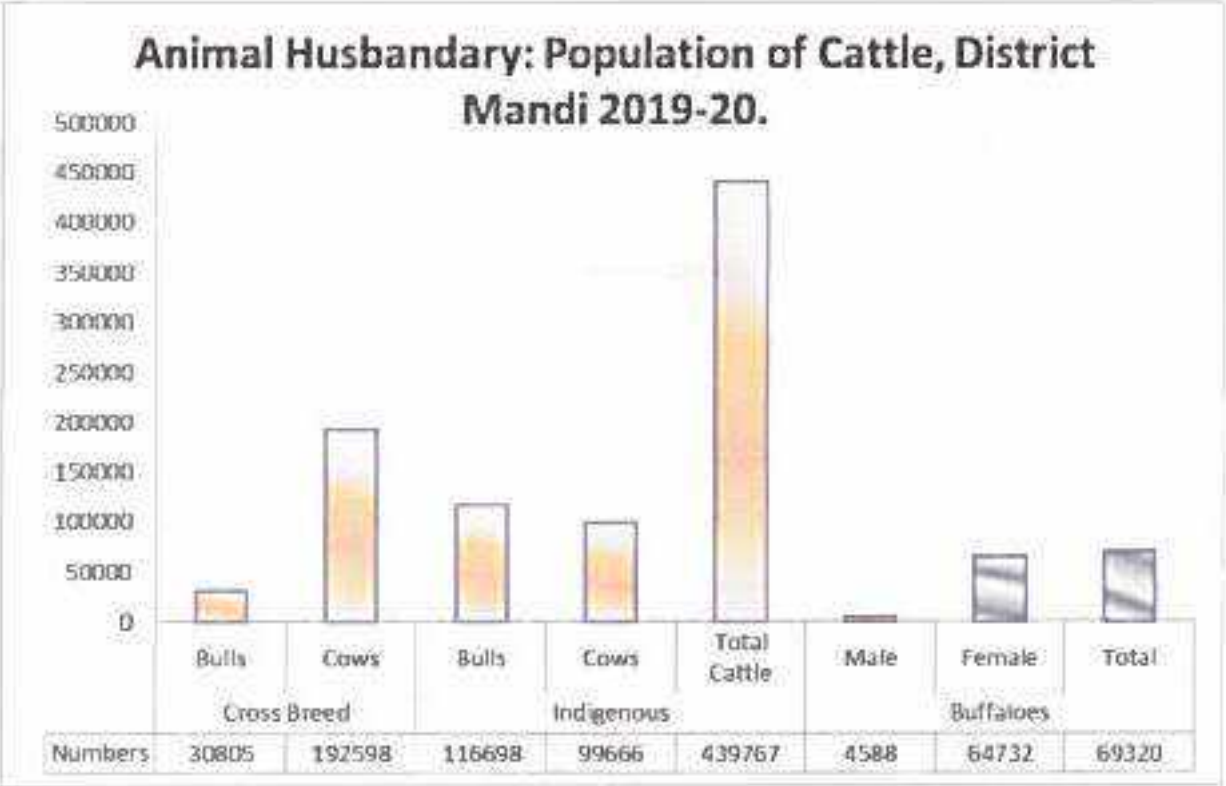


Figure 37: Showing Population of Cattle Buffaloes in District Mandi.

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.

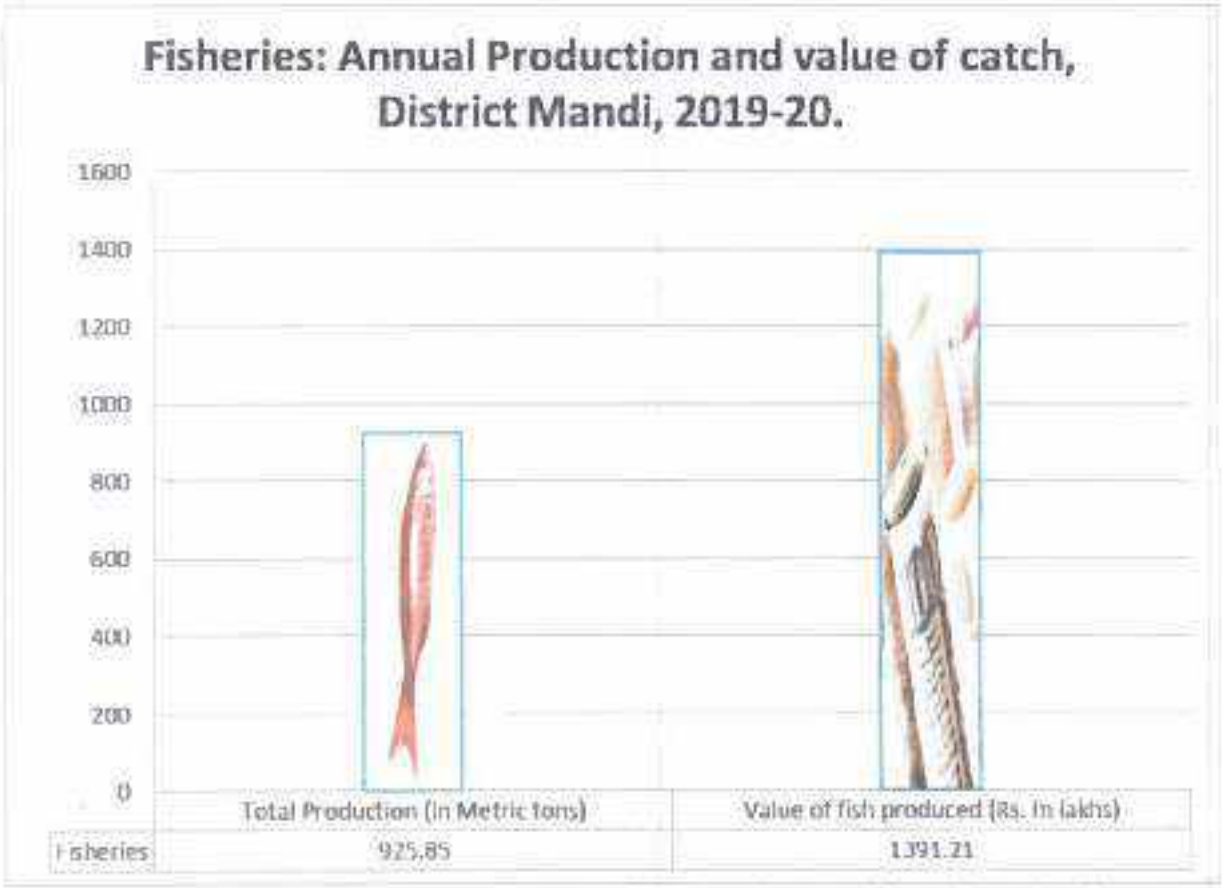


Figure 38: Showing Fish catch / production and its sale value in 2016-17.

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

Columa livia	Hawk	Baj
Francolius francolinus	Black partridge	Kala Tittar
Francolius pondicerions	Grey partridge	Safed Tittar
Payo crisslatus	Peacock	Mor
Coturnix coturnix	Common quail	Bater
Alectoris graeca	Chakor	Chakor
Crovus splendens	Crow	Kanwa
Prattocula 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

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 moschiferus	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**

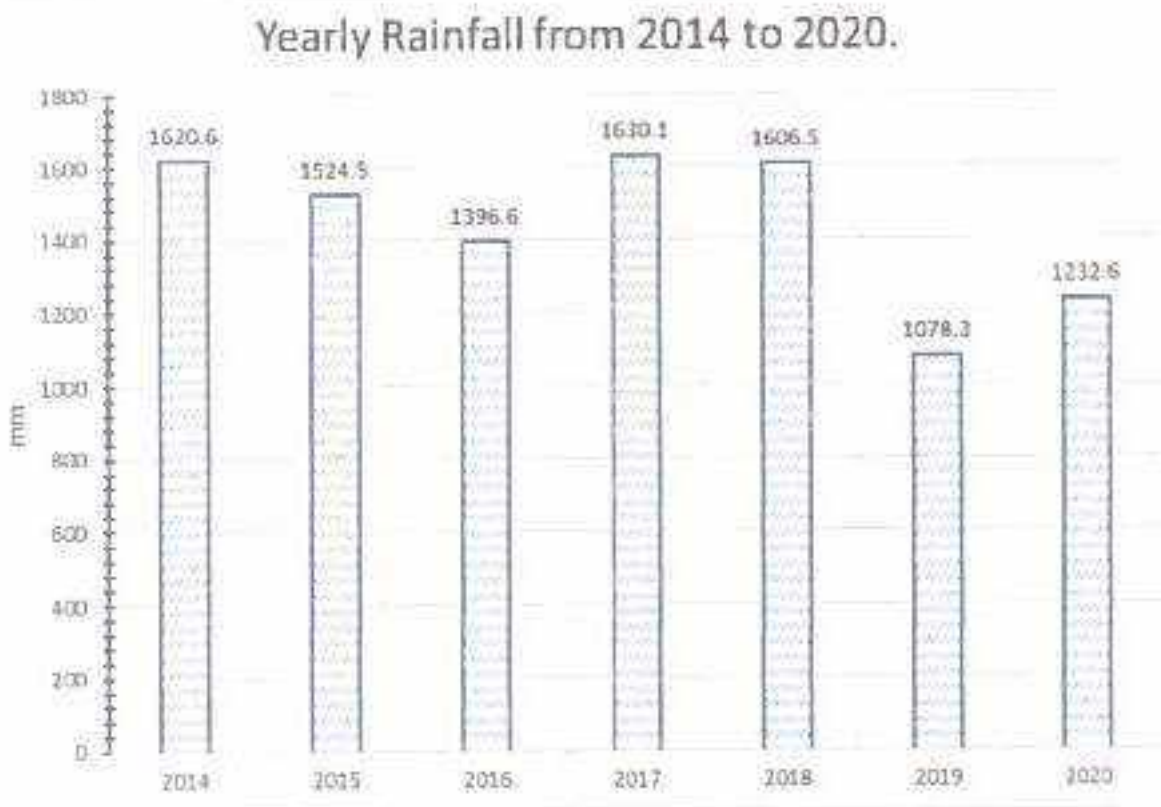


Figure 39:Yearly Rainfall from year 2014 to 2020.

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
Drivers
Unskilled workers
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**

APPROVED

General Manager
TM & TP HEPs HPPCL

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.

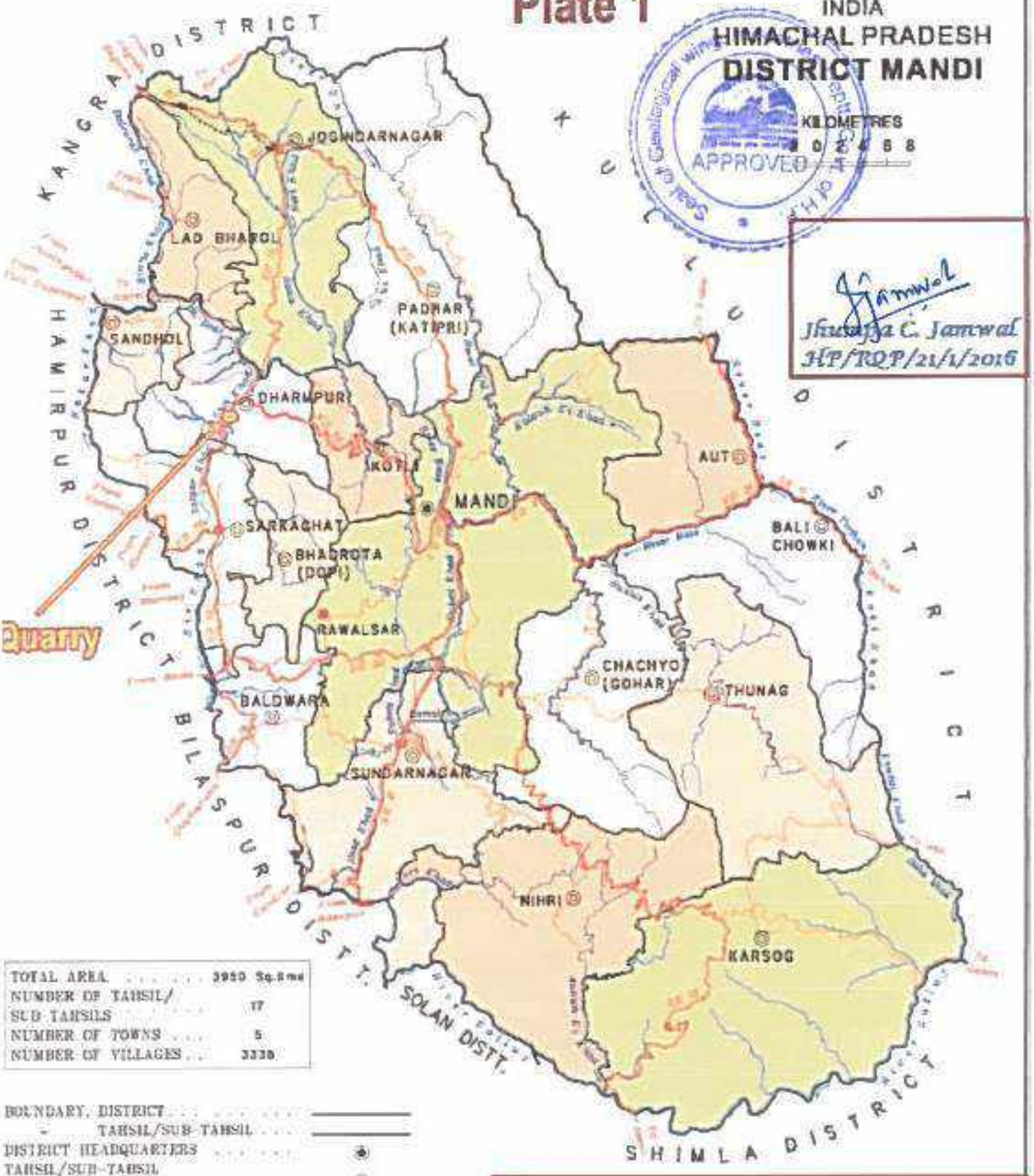
Date
Place: Shimla

Seal of Geological Wing, Industries Dept. 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

INDIA
HIMACHAL PRADESH
DISTRICT MANDI



TOTAL AREA	3950 Sq.Kms
NUMBER OF TAHSIL/ SUB TAHSILS	17
NUMBER OF TOWNS	5
NUMBER OF VILLAGES	3338

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

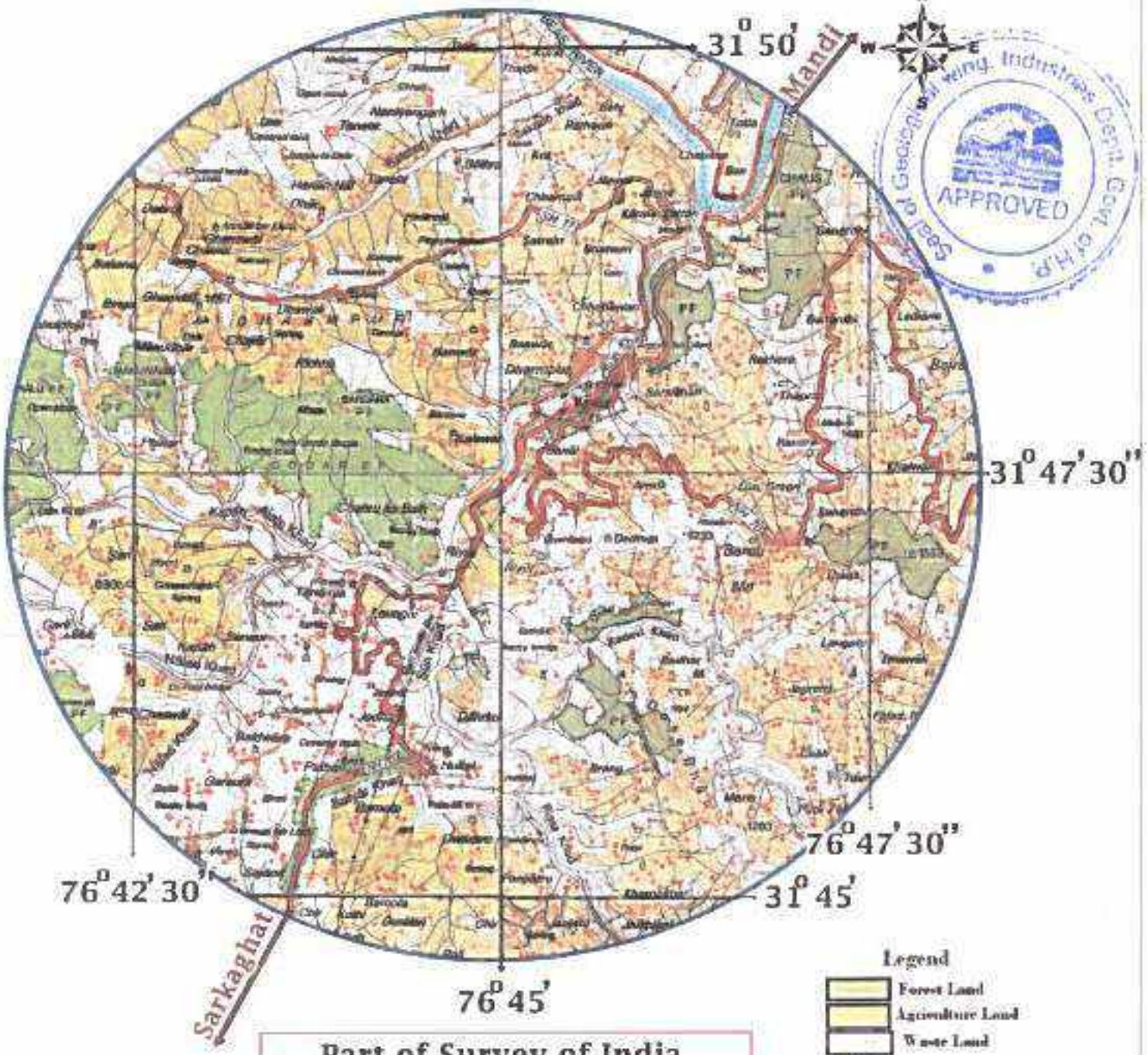
Seal of Geological Wing, Himachal Pradesh
APPROVED

Jhulaja C. Jamwal
HP/TQP/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

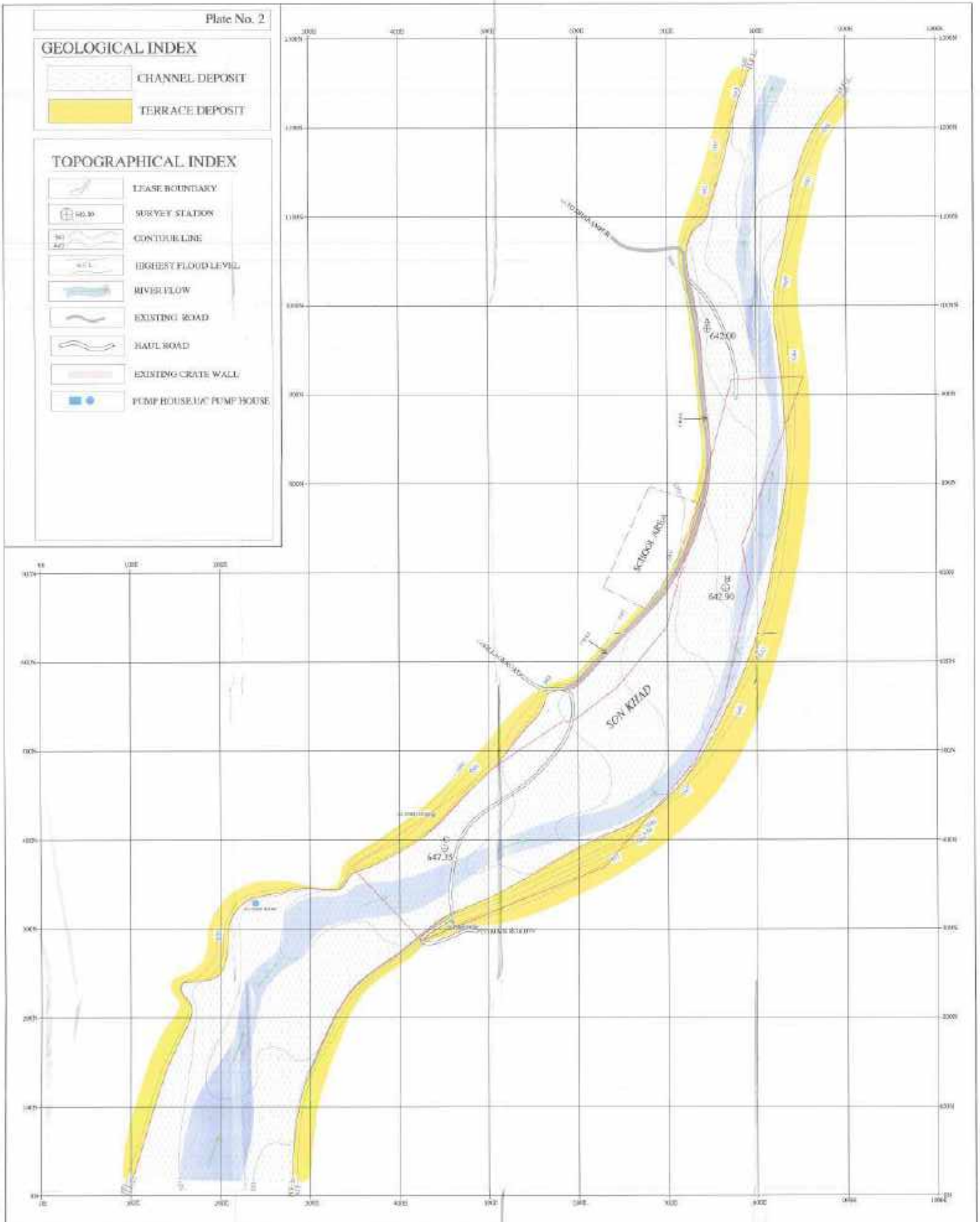
Plate No. 2

GEOLOGICAL INDEX

- CHANNEL DEPOSIT
- TERRACE DEPOSIT

TOPOGRAPHICAL INDEX

- LEASE BOUNDARY
- SURVEY STATION
- CONTOUR LINE
- 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 & TIJANA 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°45'01.25"

B N-31°47'23.50"
E-76°45'01.90"

NORTH :-

CERTIFIED THAT THE PLAN IS CORRECT.

Plate No. II.

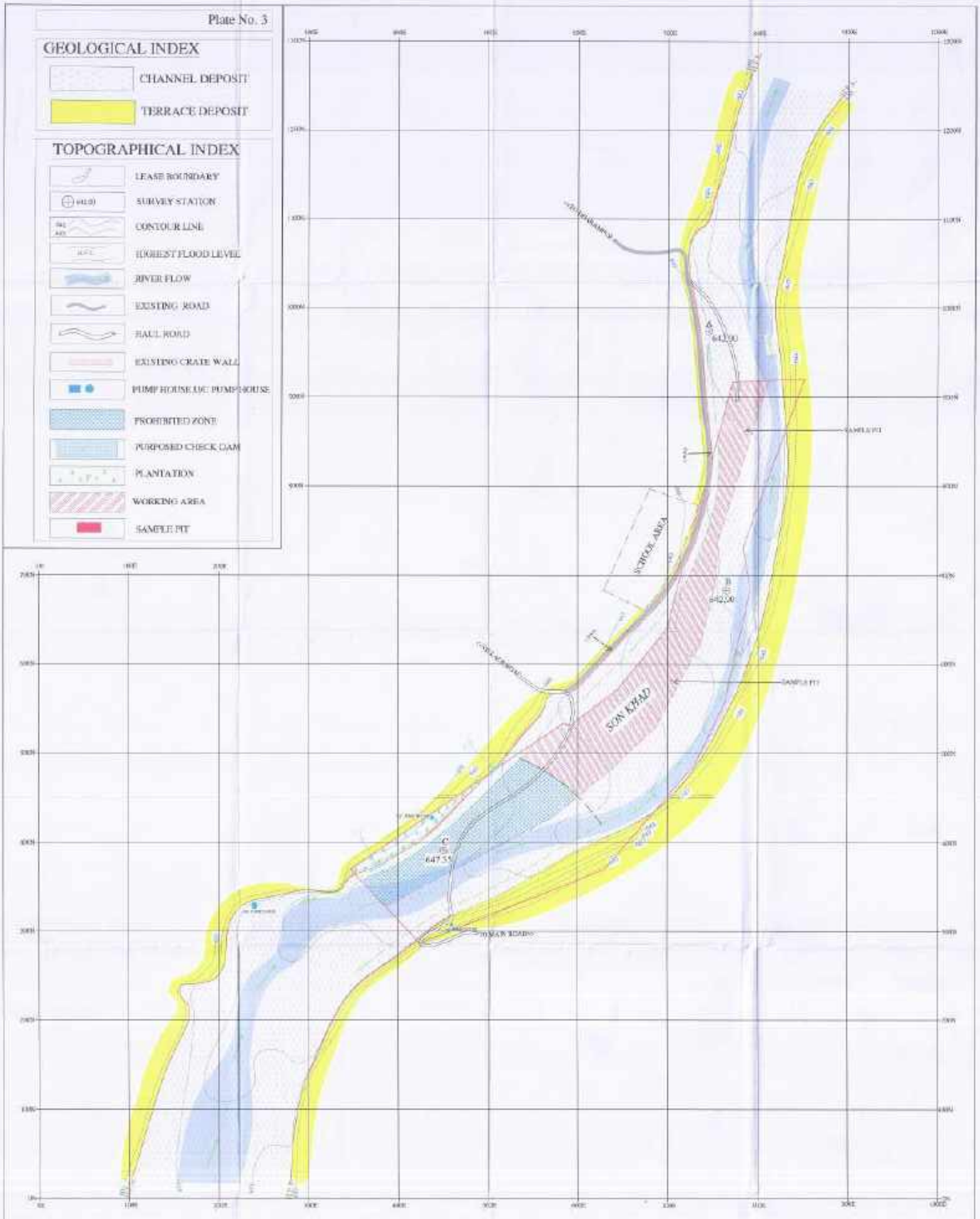
Plate No. 3

GEOLOGICAL INDEX

- CHANNEL DEPOSIT
- TERRACE DEPOSIT

TOPOGRAPHICAL INDEX

- LEASE BOUNDARY
- SURVEY STATION
- CONTOUR LINE
- HIGHEST FLOOD LEVEL
- RIVER FLOW
- EXISTING ROAD
- HAUL ROAD
- EXISTING CRATE WALL
- PUMP HOUSE (DC PUMP HOUSE)
- PROHIBITED ZONE
- PURPOSED CHECK DAM
- PLANTATION
- WORKING AREA
- SAMPLE PIT



M/S TM & TP HEP'S. HPPCL.(SON KHAD Q-1.	
APPLIED BY	THE GENERAL MANAGER, TRIVENI MAHADEV & THANA PLAIN 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°45'01.00"

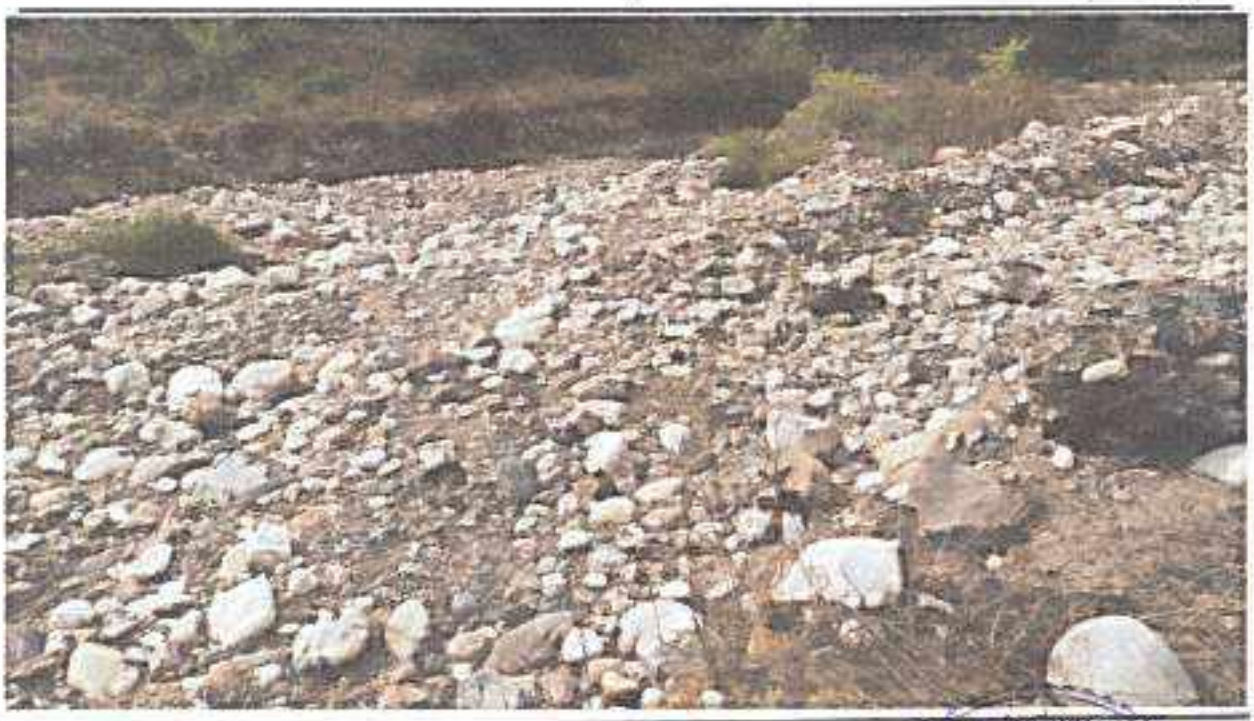
NORTH :-

CERTIFIED THAT THE PLAN IS CORRECT.

Plate No. III

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

2023

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

INDEX

MAP INDEX

Declaration
Certificate of RQP

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

203
29-05-23

भूवैज्ञानिक शाखा
उद्योग विभाग हिमाचल
Geological Wing
Deptt. of Industries
Shimla

APPROVED
With Condition
शर्तों के साथ अनुमोदित
Vide Letter No. उद्यो-खनि-B(Khani-4)/Gashu-541/19-1626
dated
दिनांक 25/5/23

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

SM/AGM/DM(Env.)

MINING PLAN
OF MINOR MINERAL LEASE FOR SAND, STONE & BAJRI SITUATED IN KHASRA NO. 1/1, 1 /2, 5748/5595/1 & 5748/5595/2, MEASURING 9.5030 HECTARE MAUZA TATOLI PRADHANA & SIDHPUR, TEHSIL –DHARAMPUR, DISTT – MANDI (H.P.)

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 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

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 Dhrampur 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	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 boundary pillars (calculated).

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"

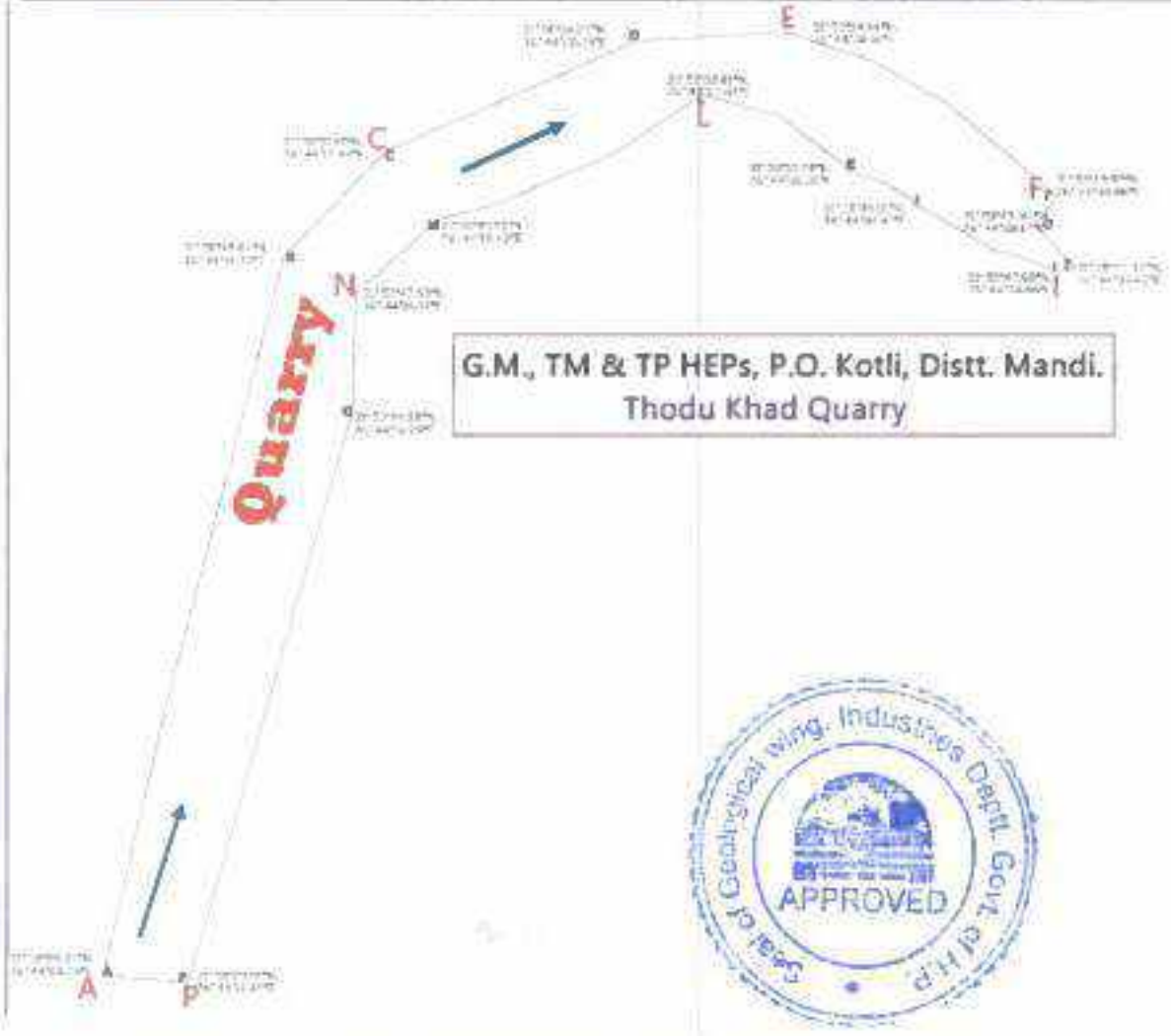


Figure 2: Calculated Coordinates of Boundary Pillars

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 l
1	1/1	1.4911	Government	Gair mumkin khad	Tatoli Pardhana Sidhpur
2	1/2	3.4787			
3	5748/5595/1	1.4911			
4	5748/5595/1	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): -	Jogindernager
Range Office (Forest): -	Sarkaghat
Assistant Engineer (IPH): -	Dharampur
Assistant Engineer (PWD): -	Dharampur
State :	Himachal Pradesh

Administrative Office:-

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	0.400
2	Roadside	Dharampur	9
3		Kotli	53
4		Mandi (District Offices)	73
5		Shimla (State capital)	162
		Airport	165
6		Bunter (Airport)	128

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

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 a link road. Figure below shows the approach map of the area.

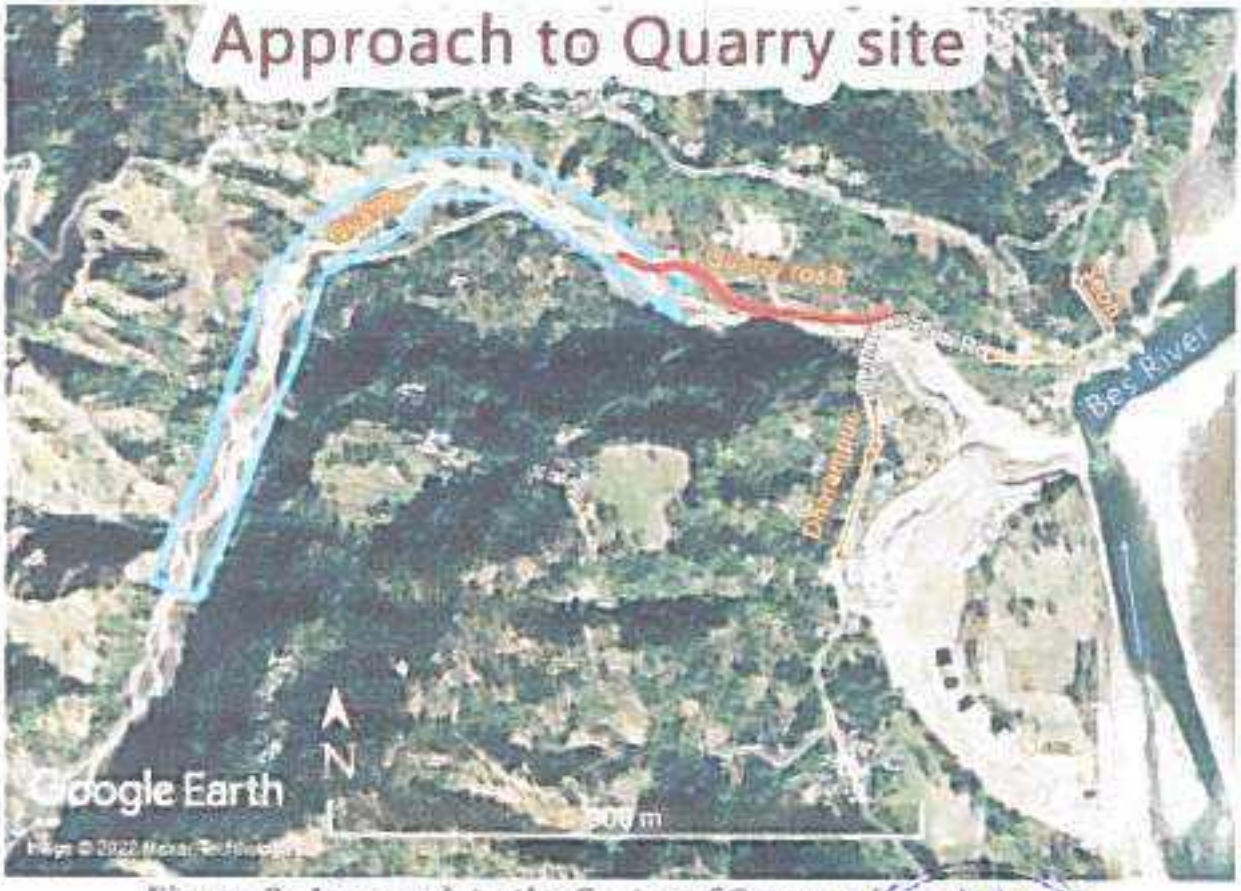


Figure 3: Approach to the Centre of Quarry site

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: -

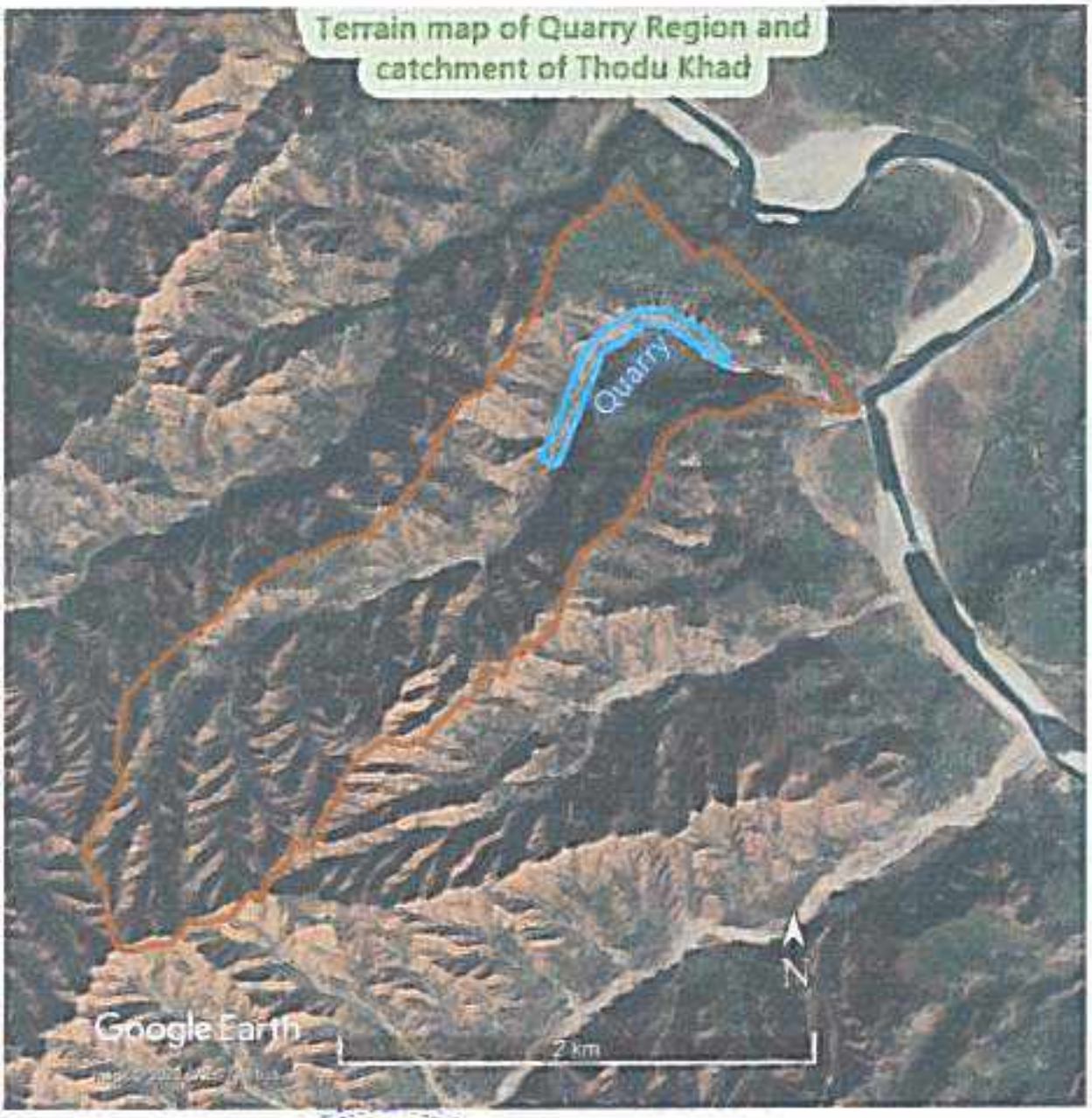


Figure 4: The terrain map of the Thodu Khad region.

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.

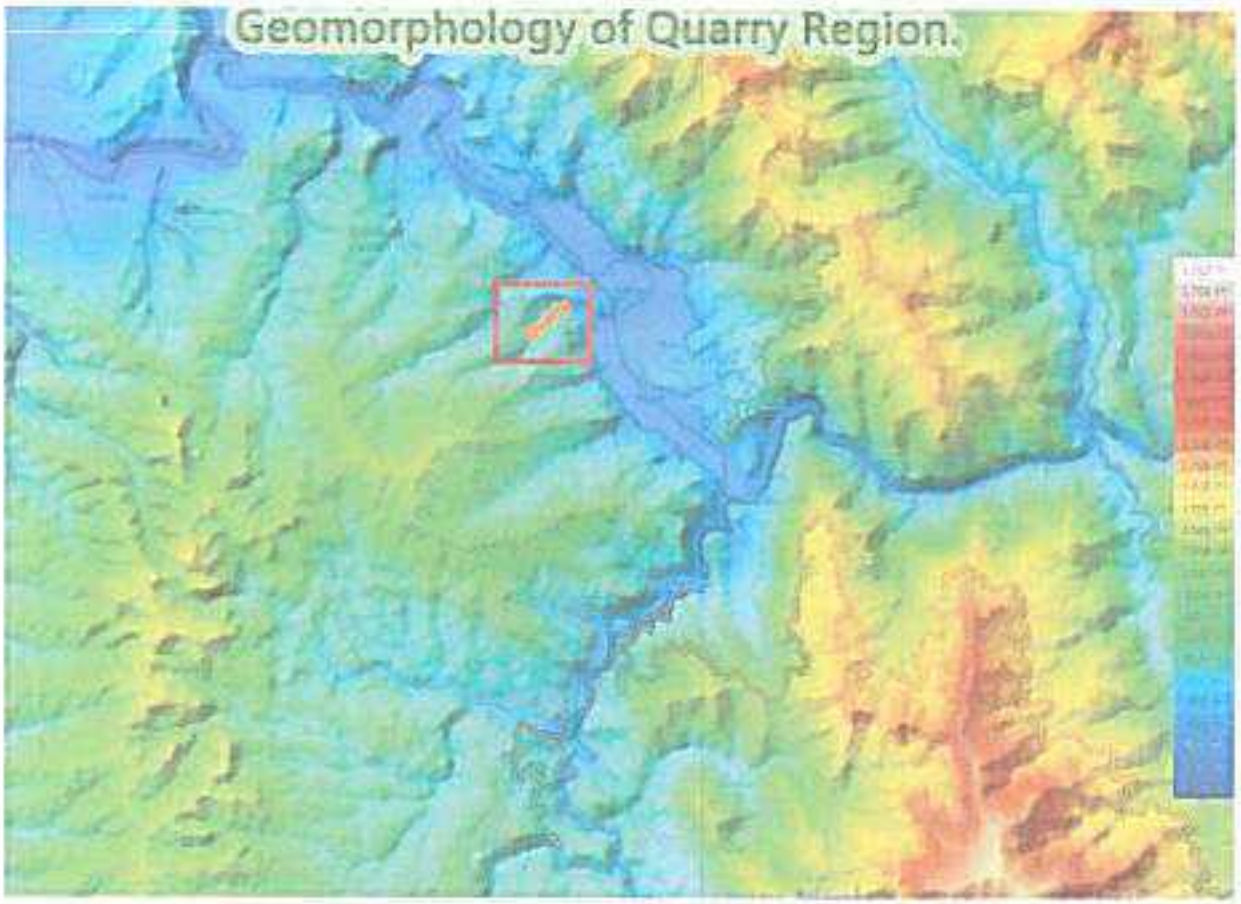


Figure 5: Terrain Map of the Area.

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.

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

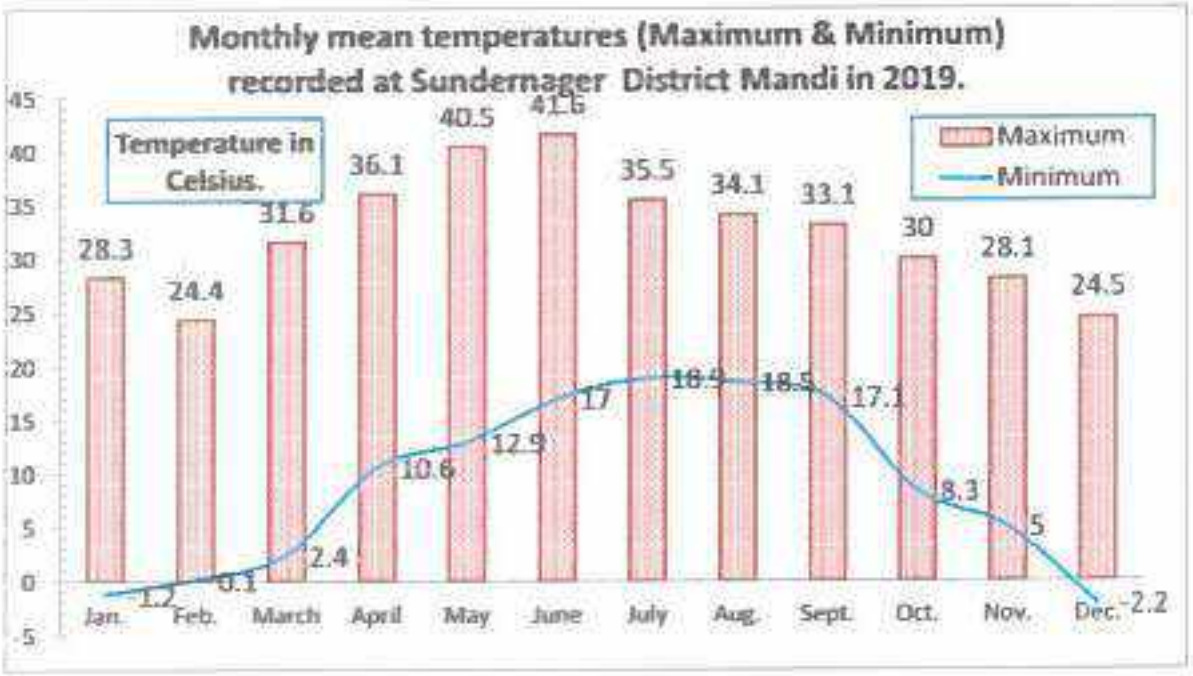


Figure 6: Mean monthly maximum and minimum temperature recorded at IMD station at Sundernager.

3.4 Rainfall

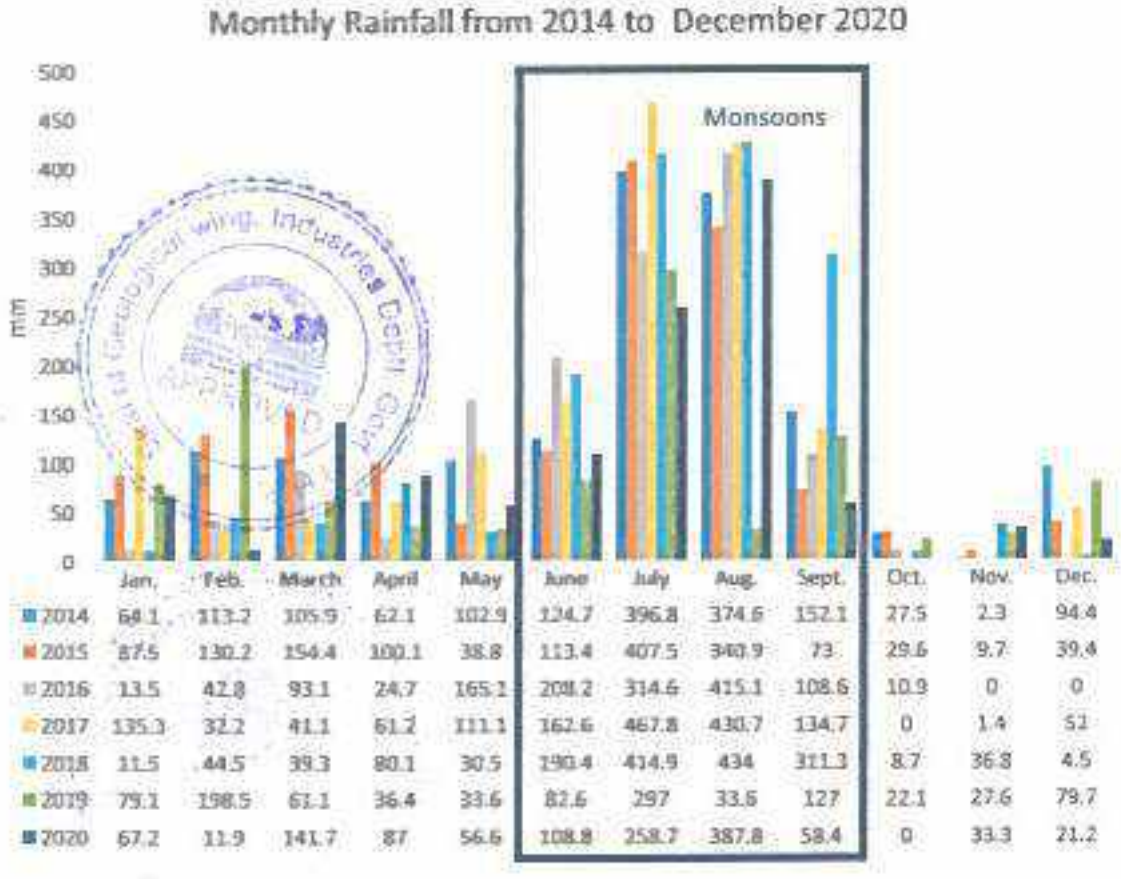


Figure 7: Rainfall of the District.

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 Parial 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.

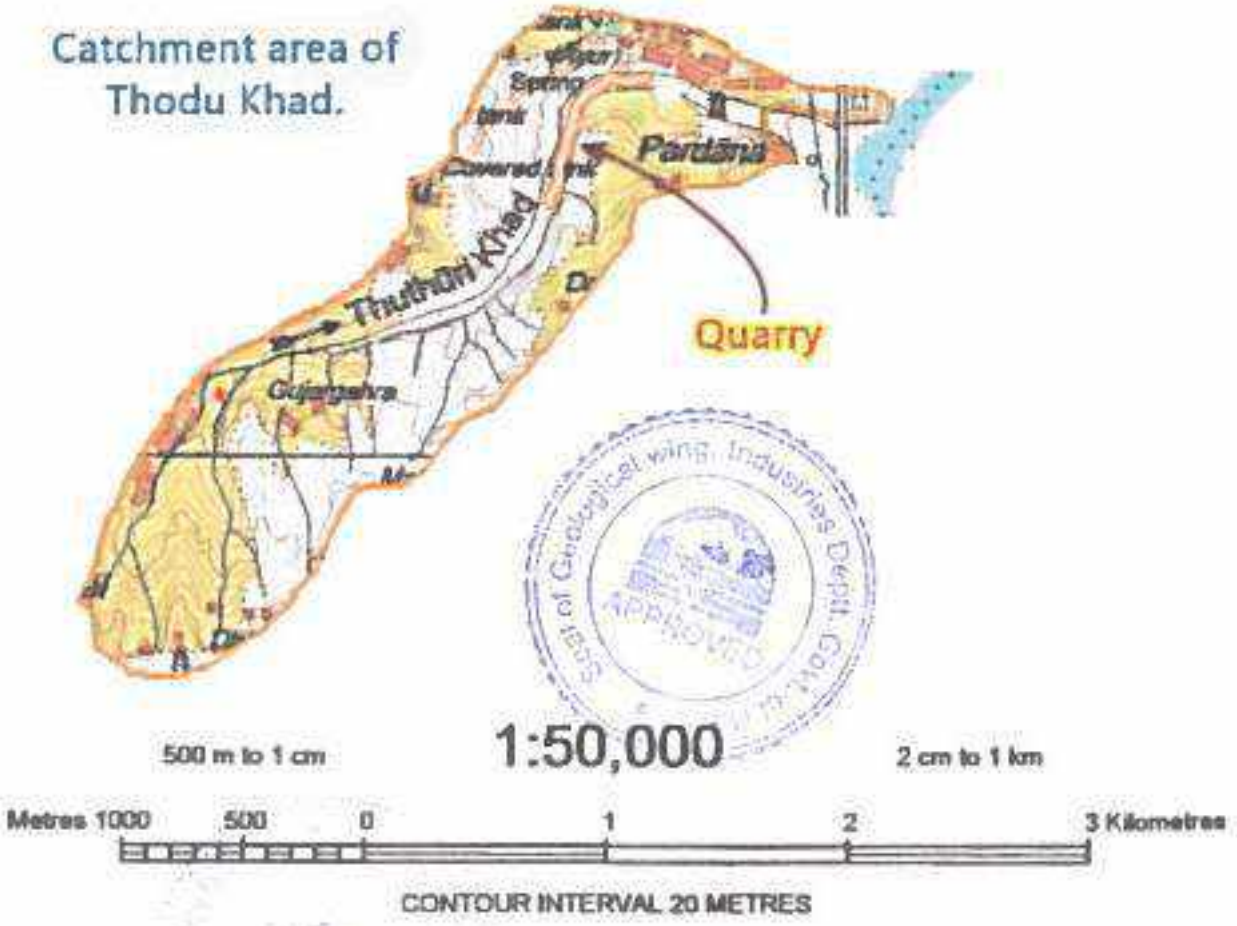


Figure 8: Catchment of Thodu Khad.

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 attitude 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.

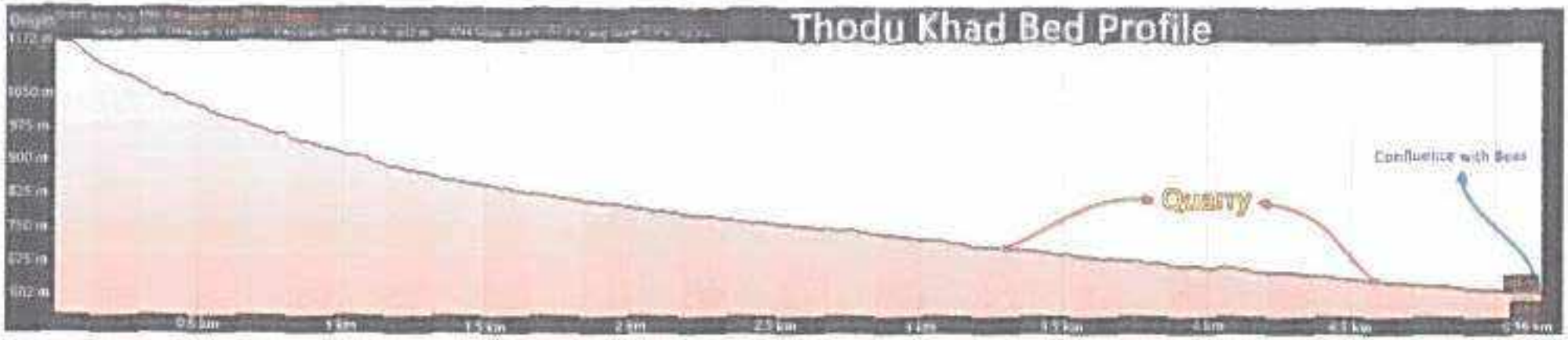


Figure 10 Khad bed profile.

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 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 20 to 34 cm X 16 to 34 cm X 18 to 30 cm (length X breath X height) Figure 10

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

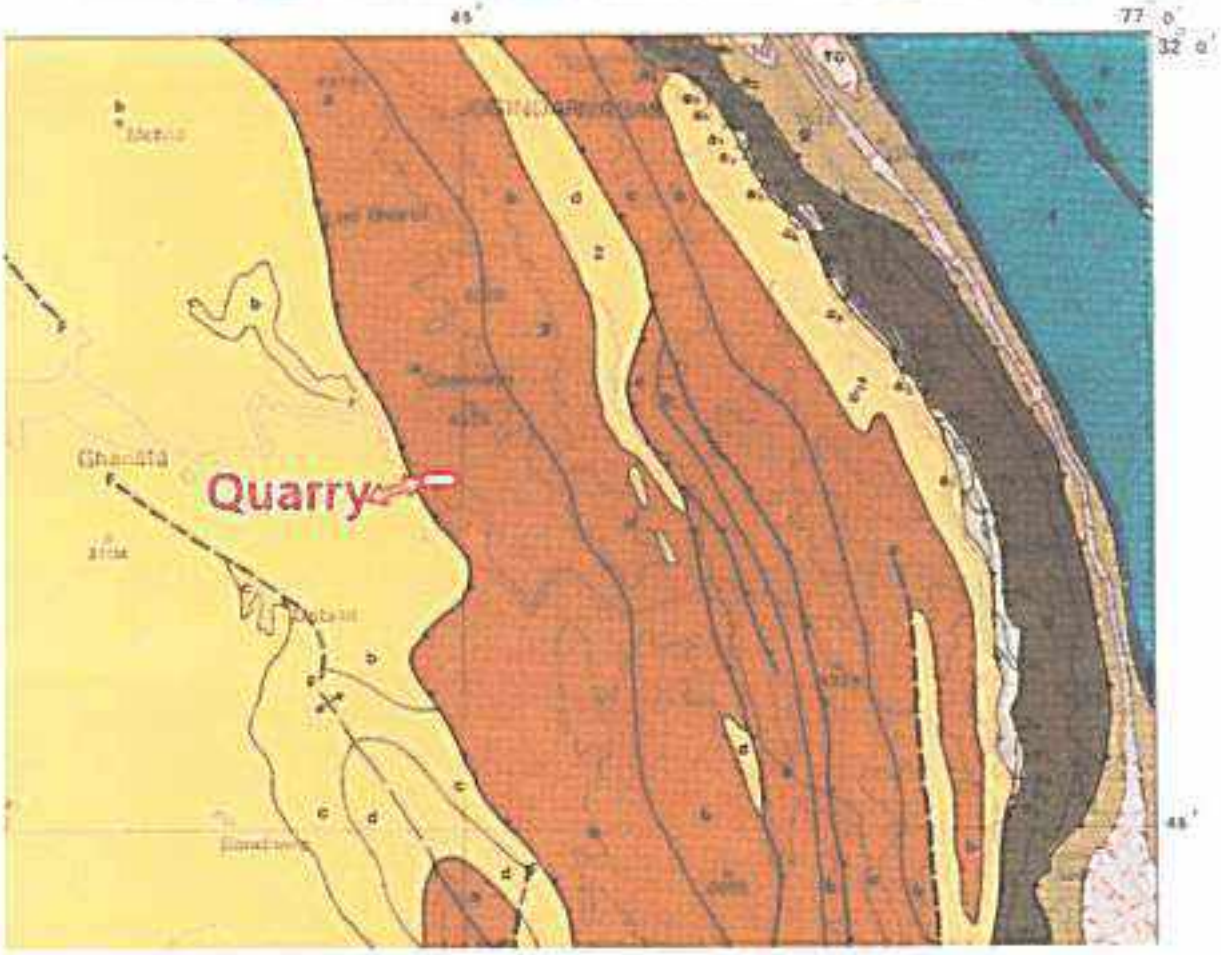
GEOLOGICALLY Himachal Pradesh can be broadly divided into two major geo-tectonic zones viz. the Lesser Himalayan tectogen in the south and the

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 Srikantia (1989). 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 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 with loose 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 11:Geological Map of the Area

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 Sundernagar Syncline.

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.

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 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, got washed in the rainy seasch.

All the deposit comprises quartzite, sand and fractions 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.

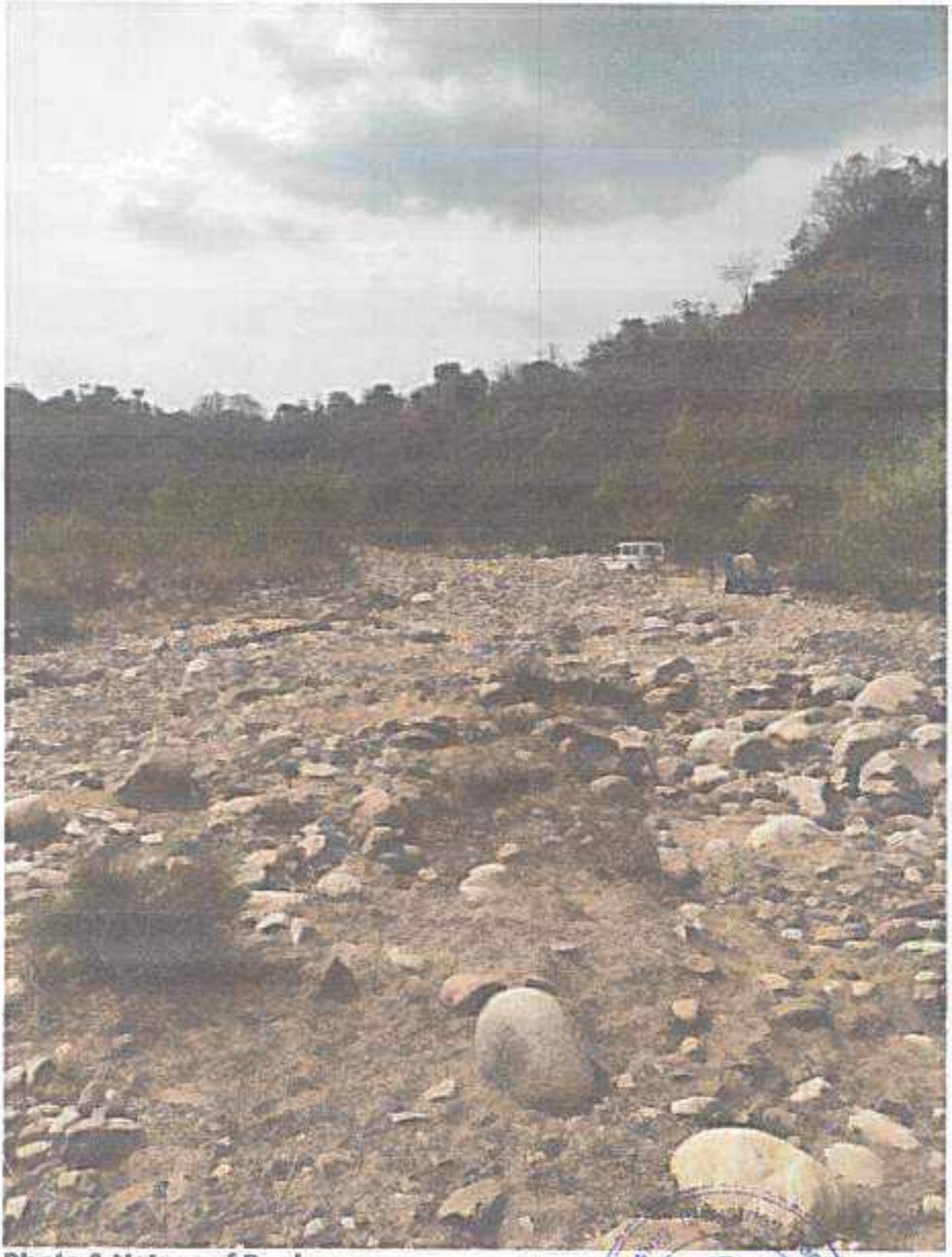


Photo 3:Nature of Banks.

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 caried 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.

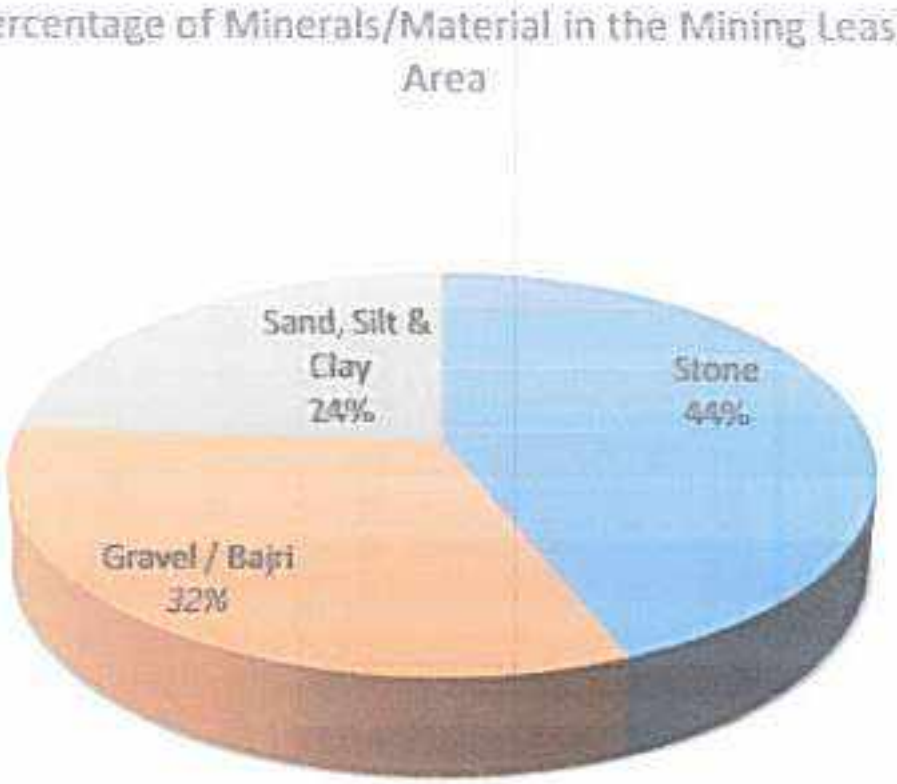


Figure 12: Percentage of each category of mineral present in the leased area.

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

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.***

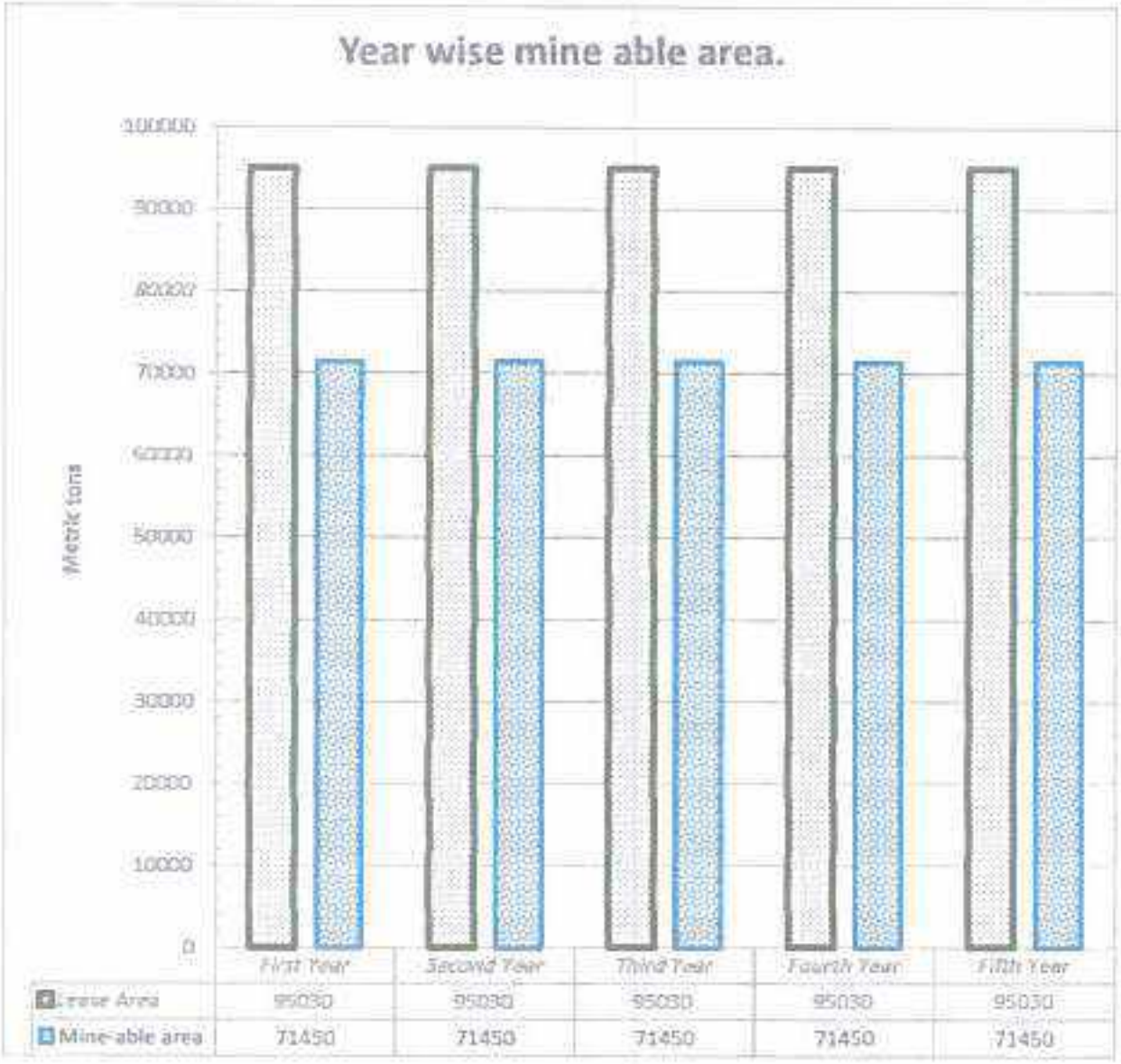


Figure 13: Mineable area.

Table 3 Mineable reserves in the block

Leased Area Sq. metres	Mineable Area Sq. Metres	Stone	Gravel / Bajri	Sand, Silt & Clay	Total
95030	71450	70733	51444	38583	160760

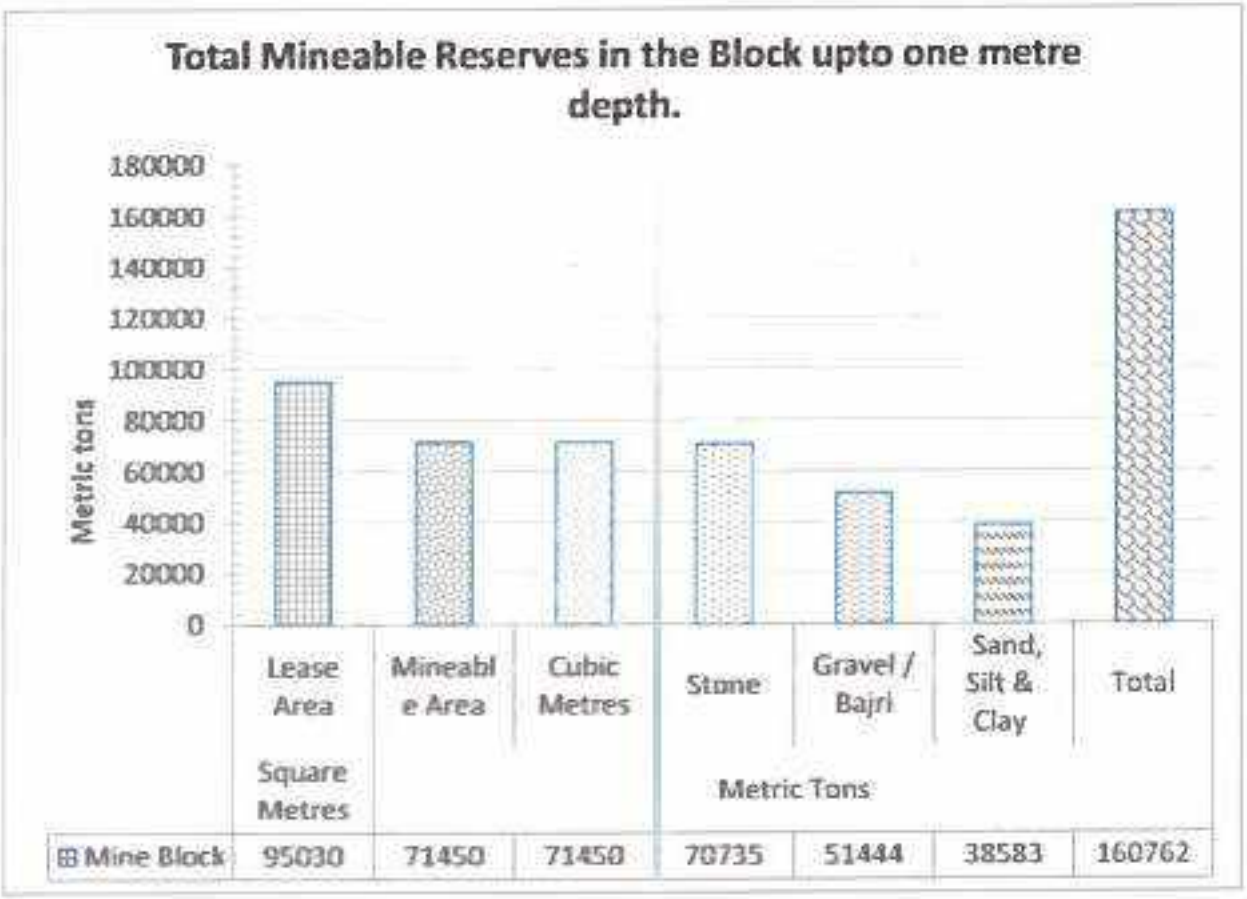


Figure 14: Mineable Reserve up to One Metre depth

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 mine-able 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

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.

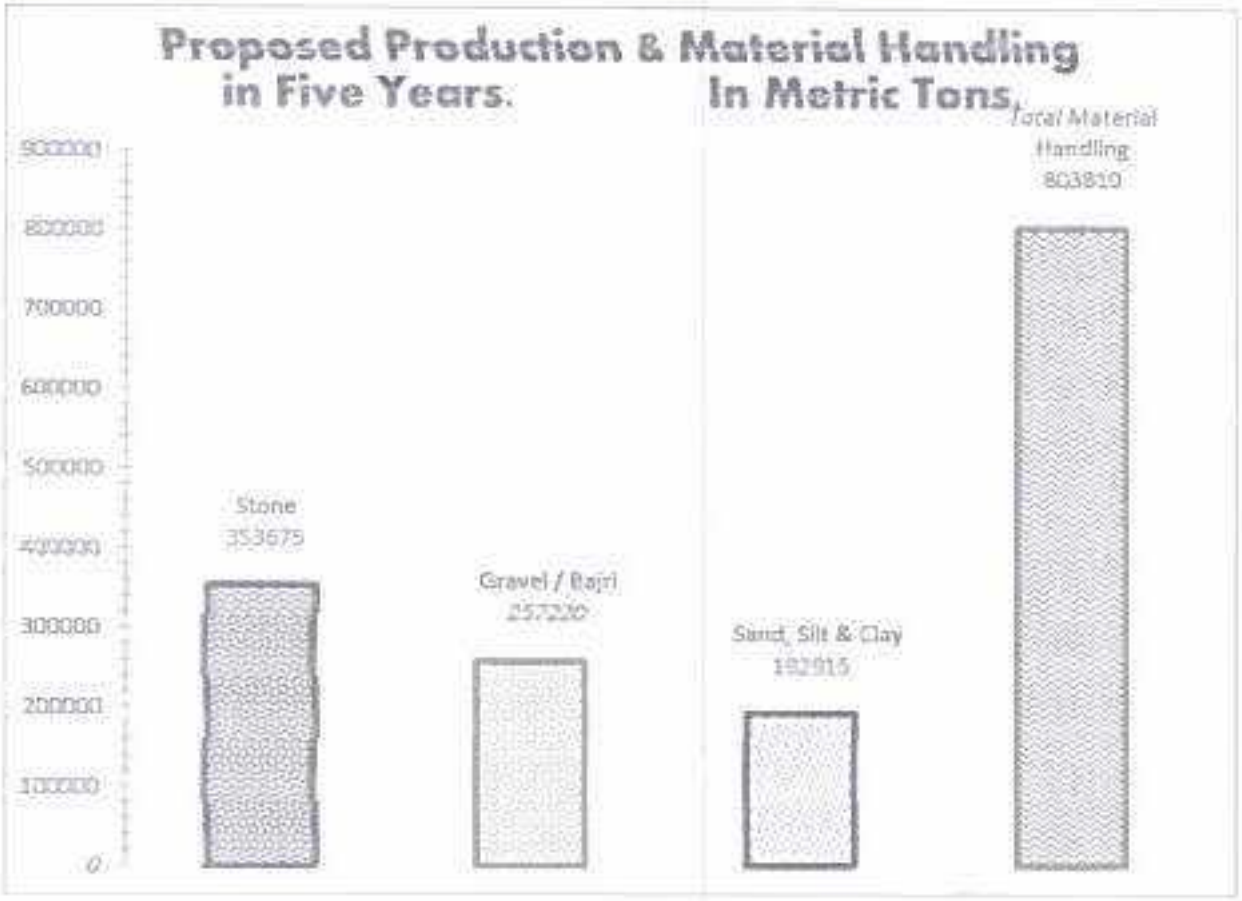


Figure 15:Proposed production of total material in five years

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 o 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 in 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

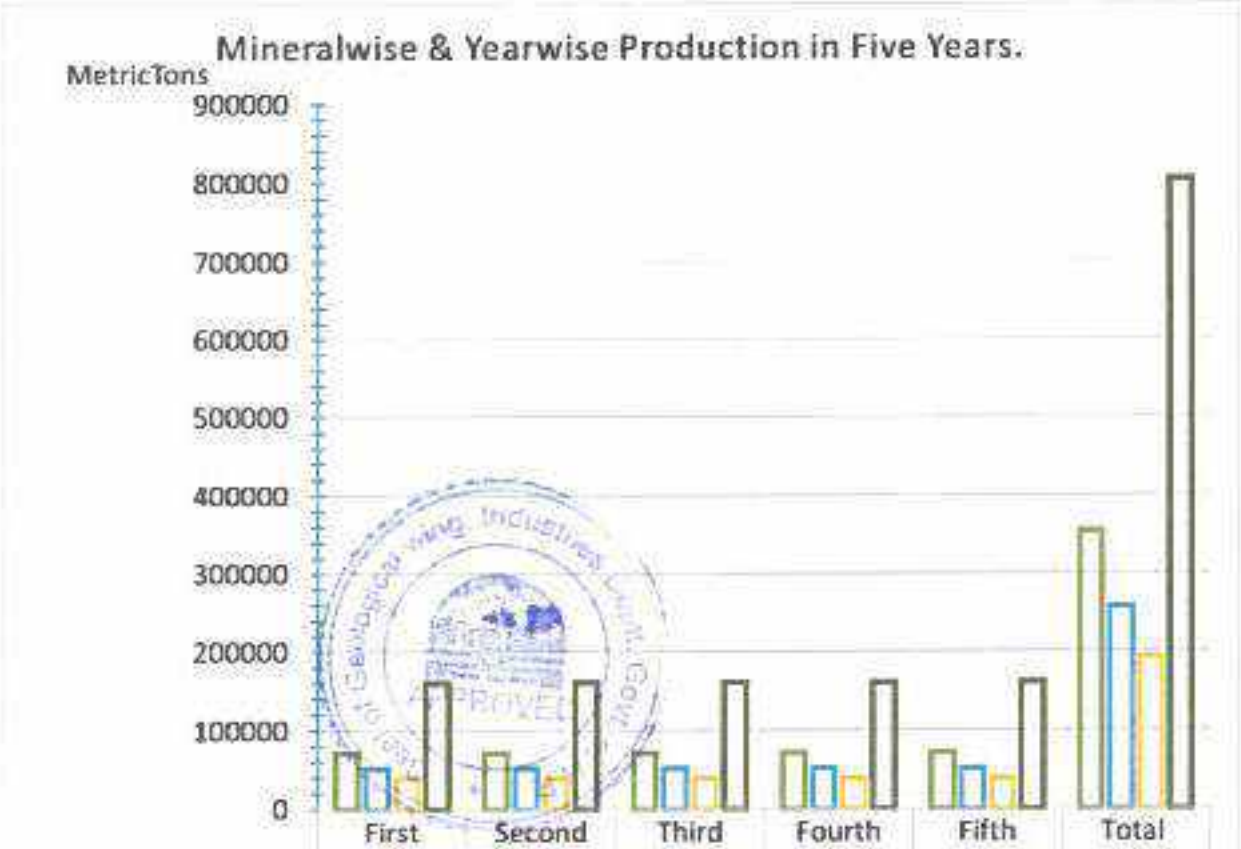
- No blasting is required.

- 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



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

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

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.

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.

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.

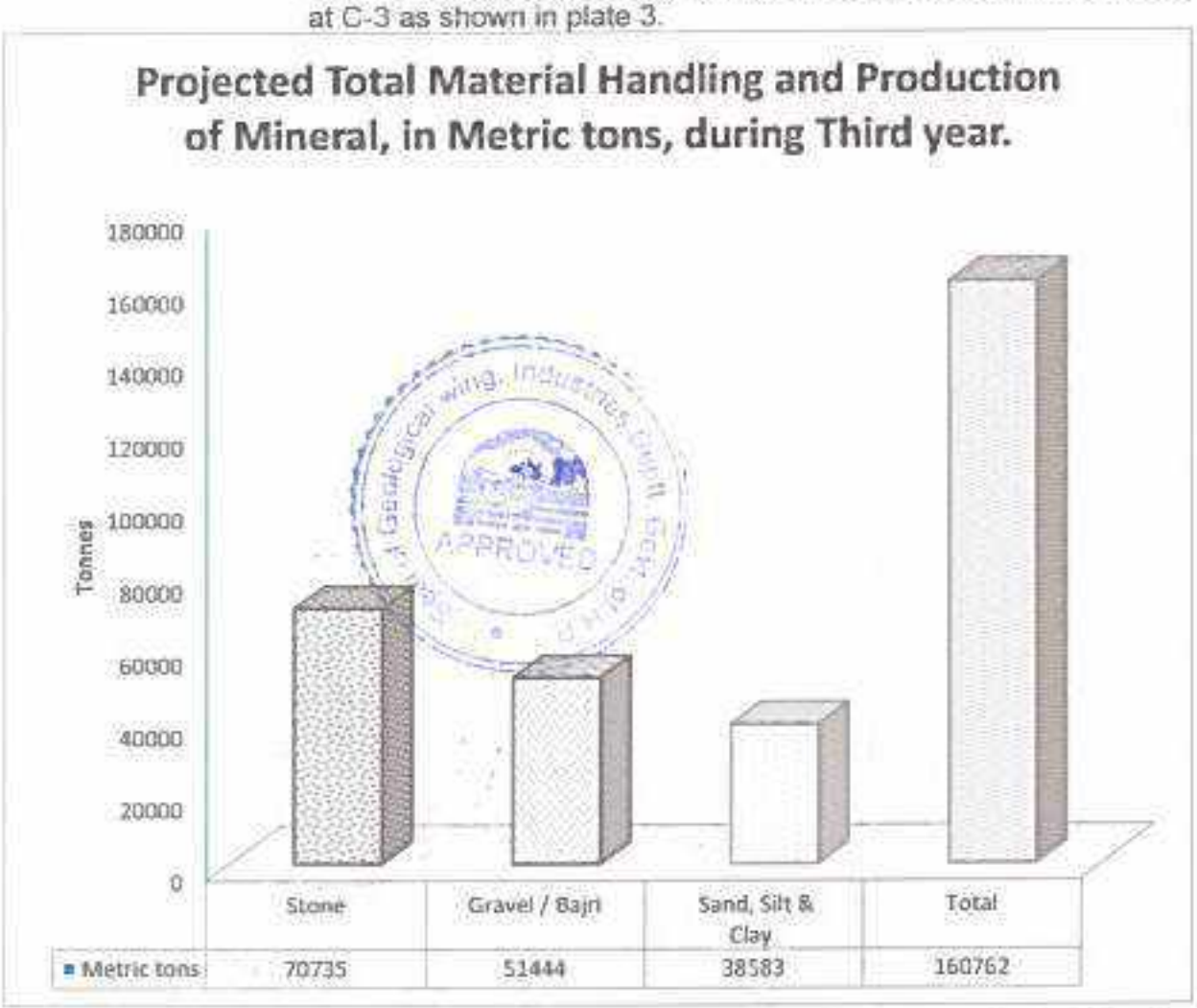


Figure 19- Proposed Production and Material Handling in the Third Year of Mining.

4.2 d Development and Production at end of fourth Year.

During 4th year of development and production programme:

- ✓ Mining of 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.

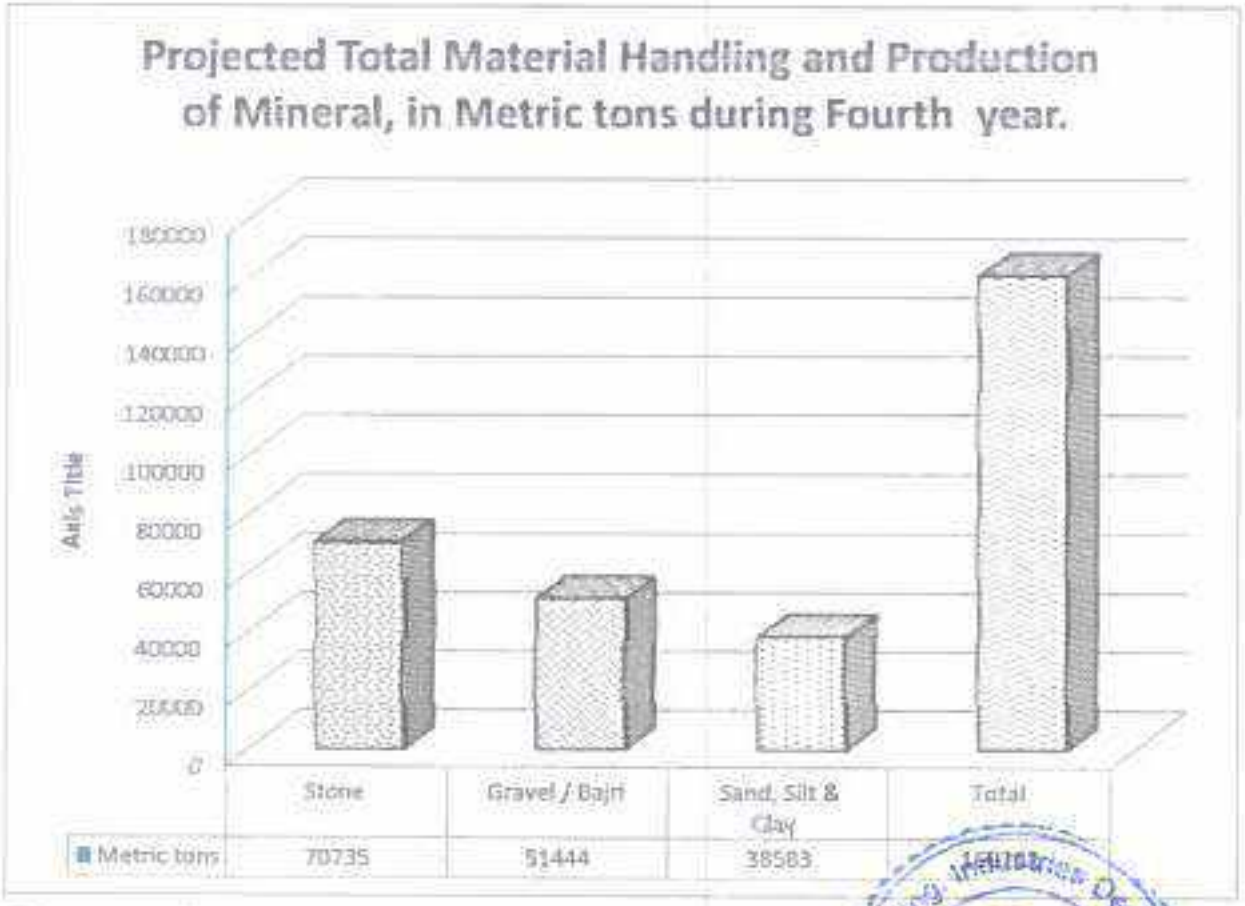


Figure 20- Proposed Production and Material Handling in the Fourth Year of Mining.

4.2 e Development and Production at end of fifth Year.

During 5th year of development and production programme:

- ✓ Mining of 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.

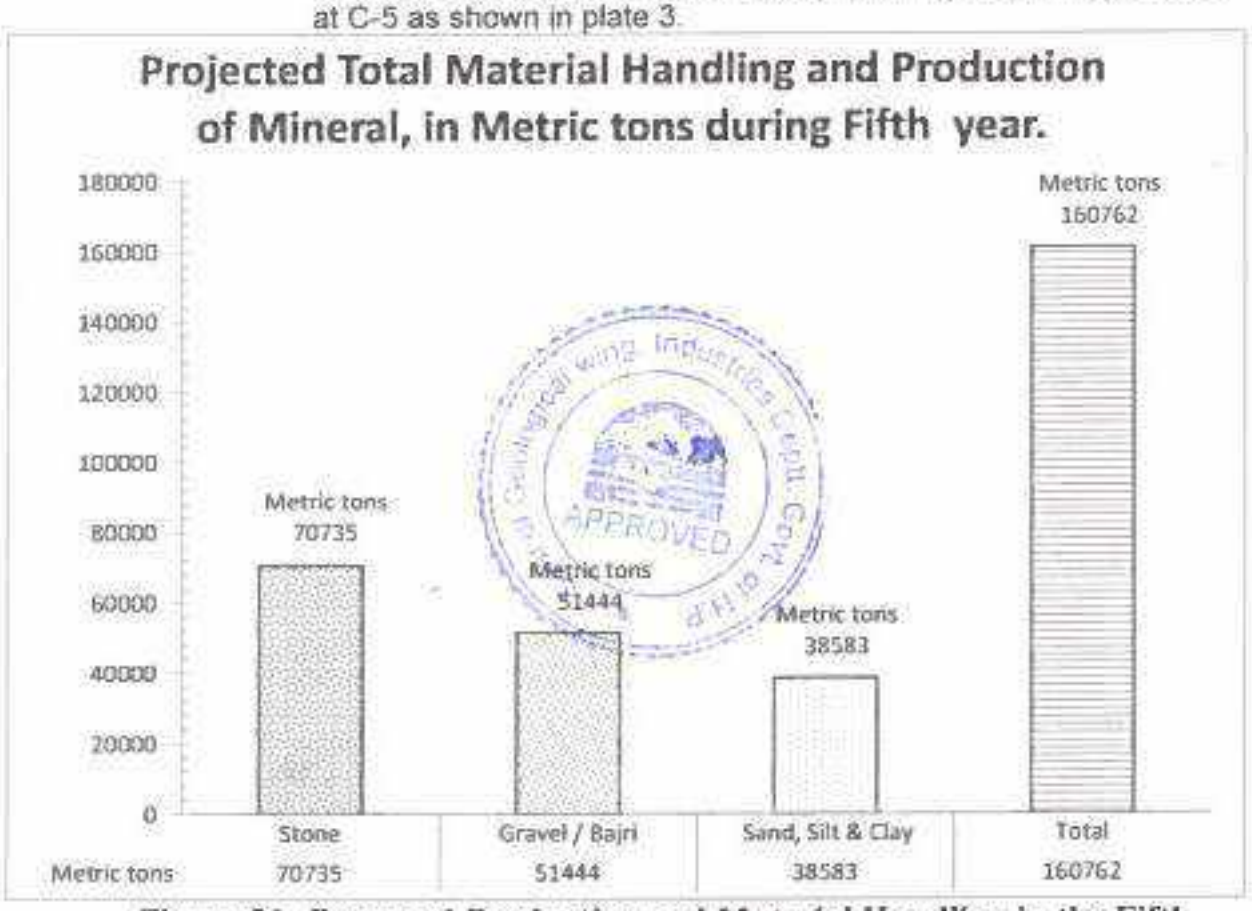


Figure 21- Proposed Production and Material Handling in the Fifth Year of Mining.

4.3 End Use of Mineral

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

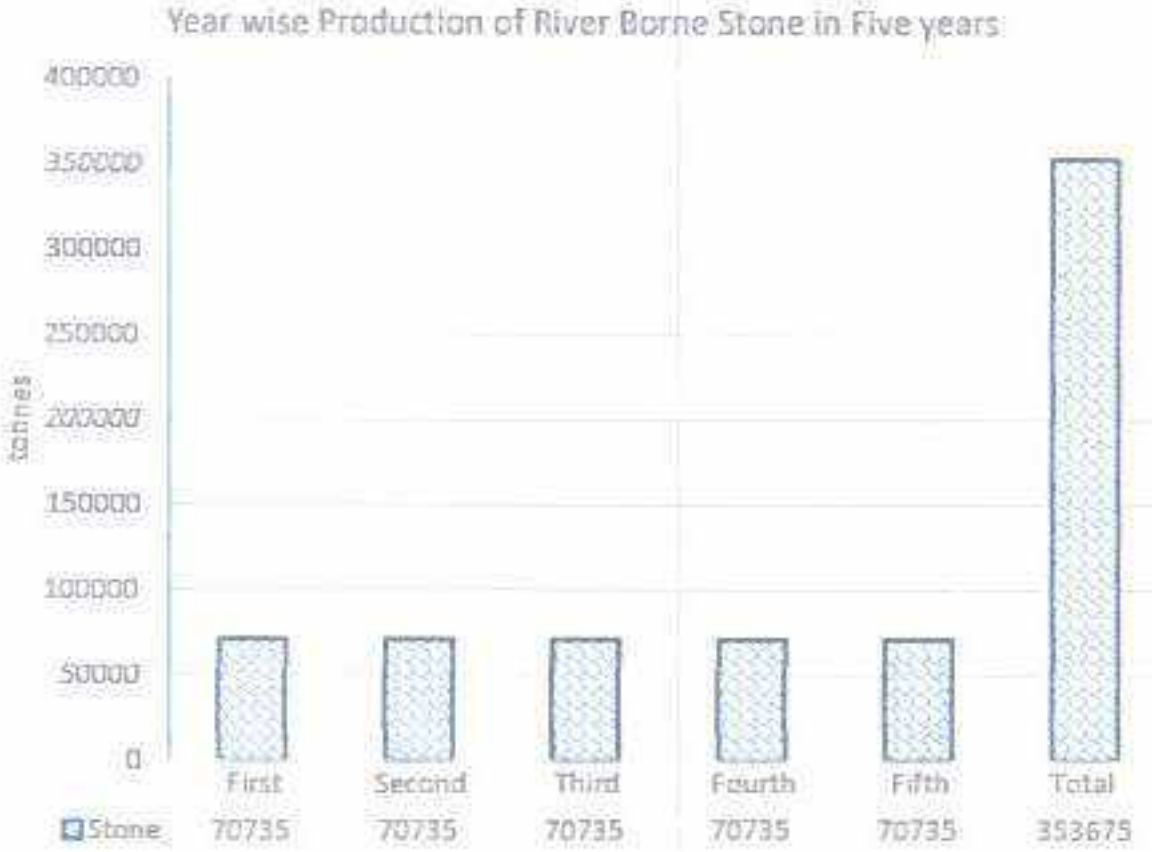


Figure 22: Year wise production of Stone.

Figure 23: Annual Production of Bajri.

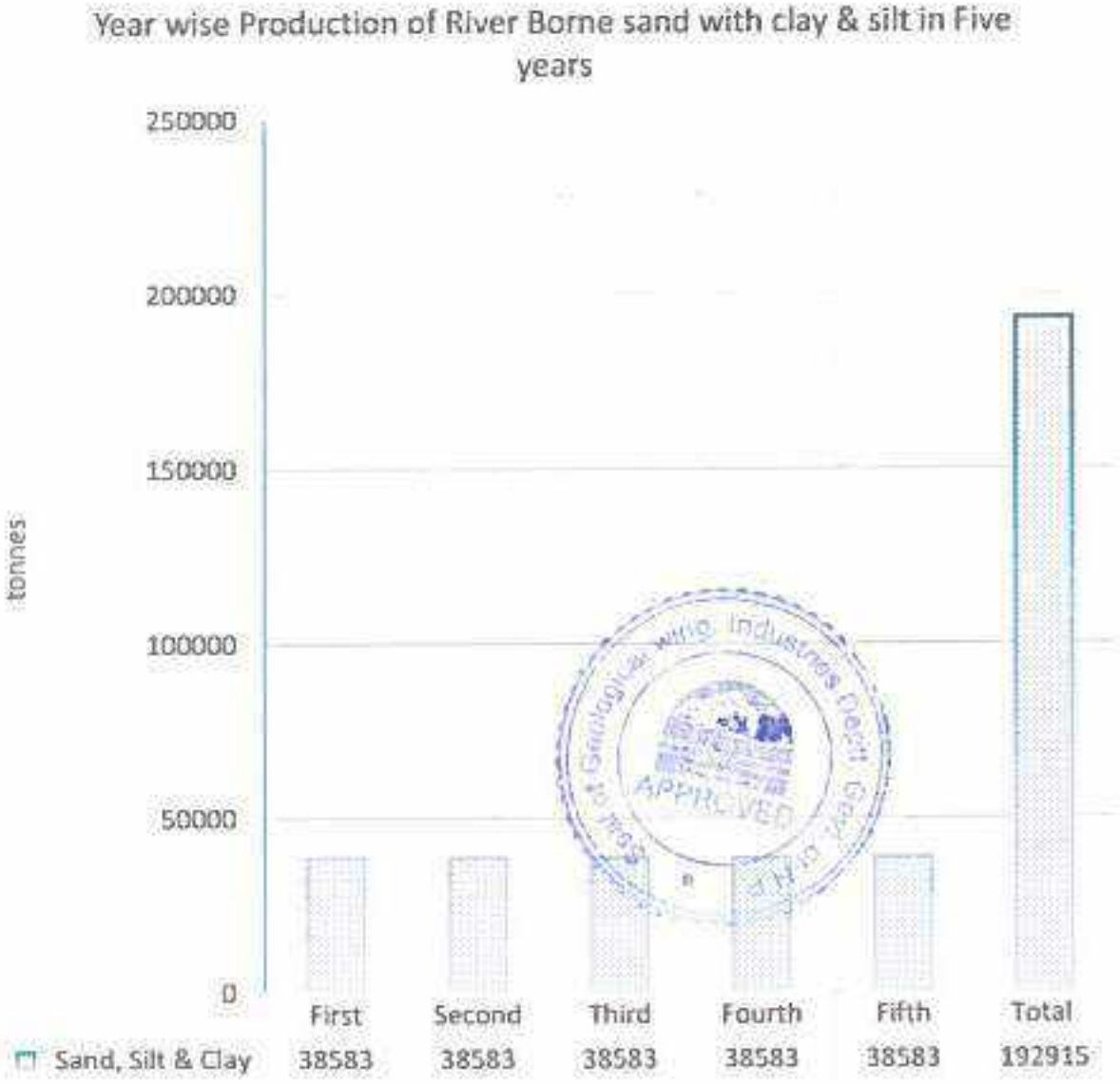


Figure 24: Annual production of sand along with silt & clay.

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.

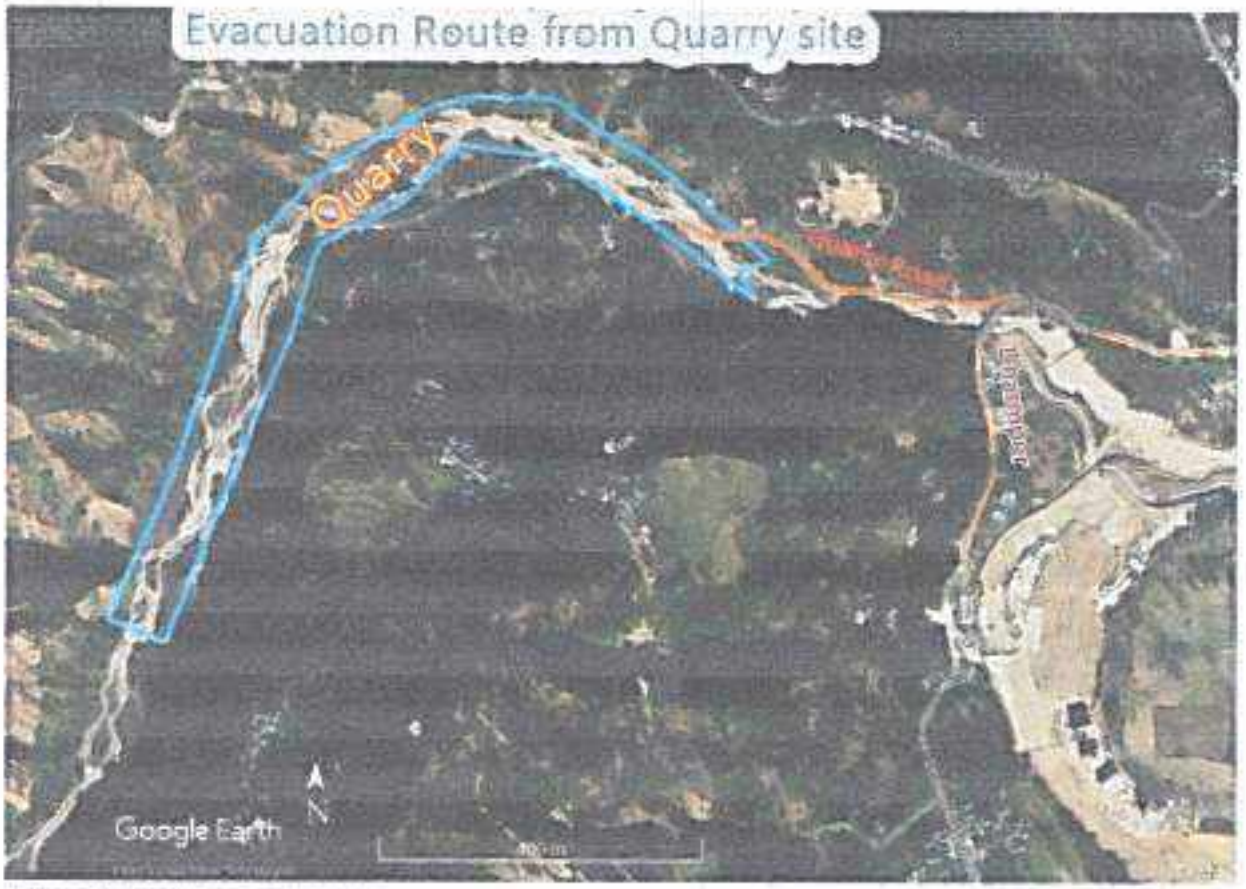


Figure 25: Evacuation route Map

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).

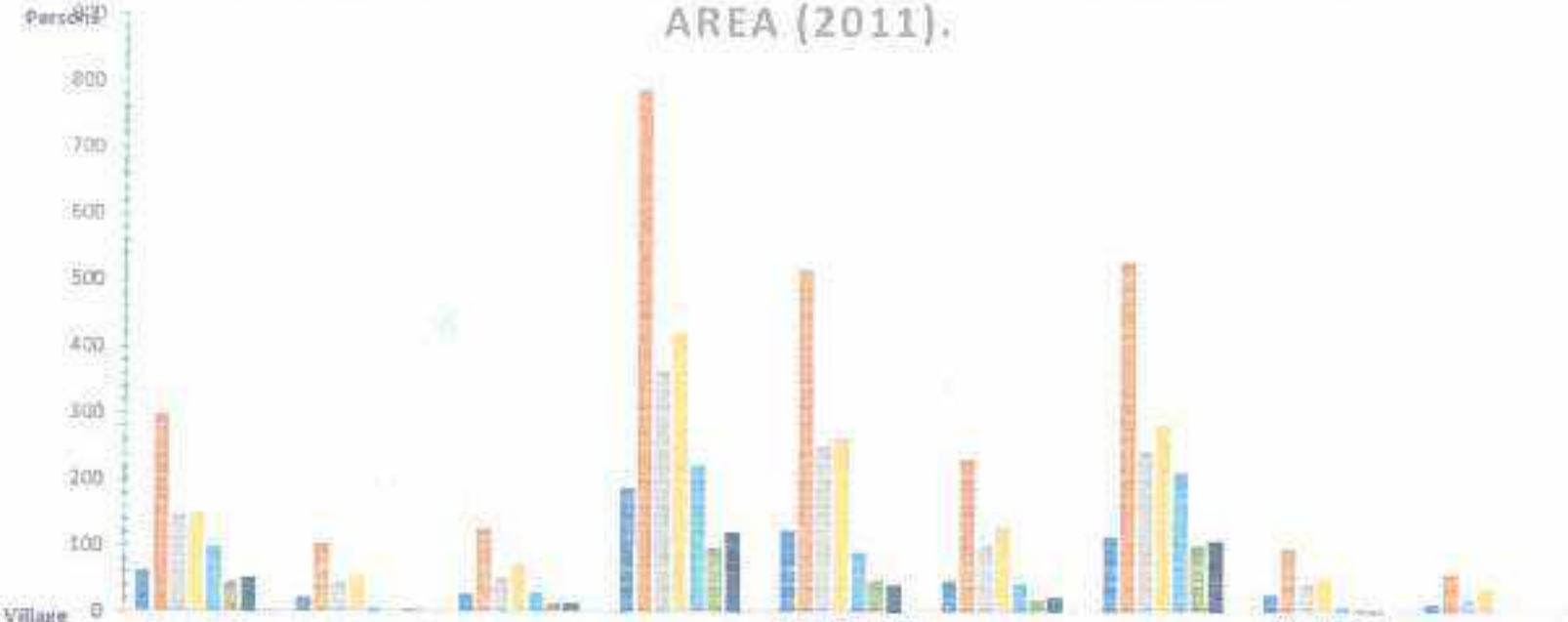
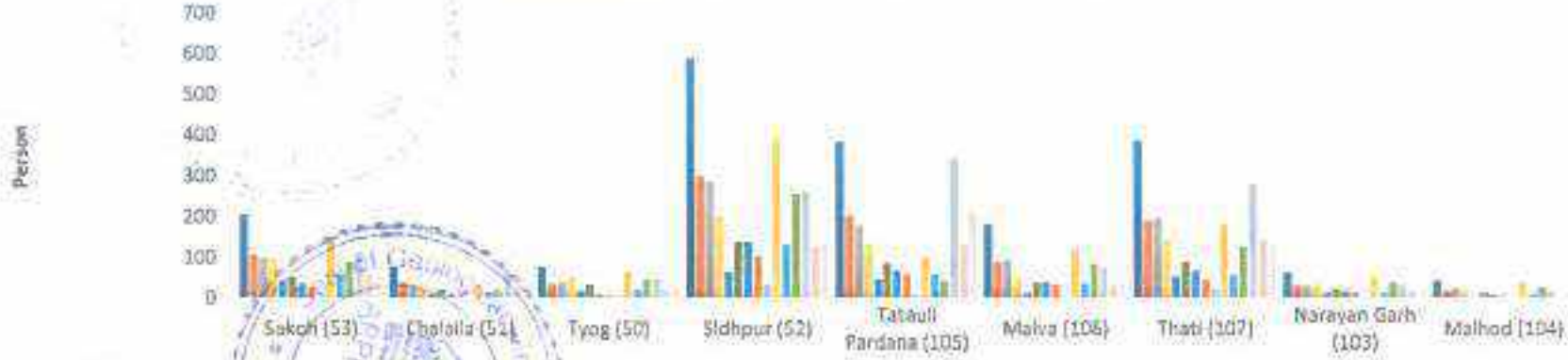


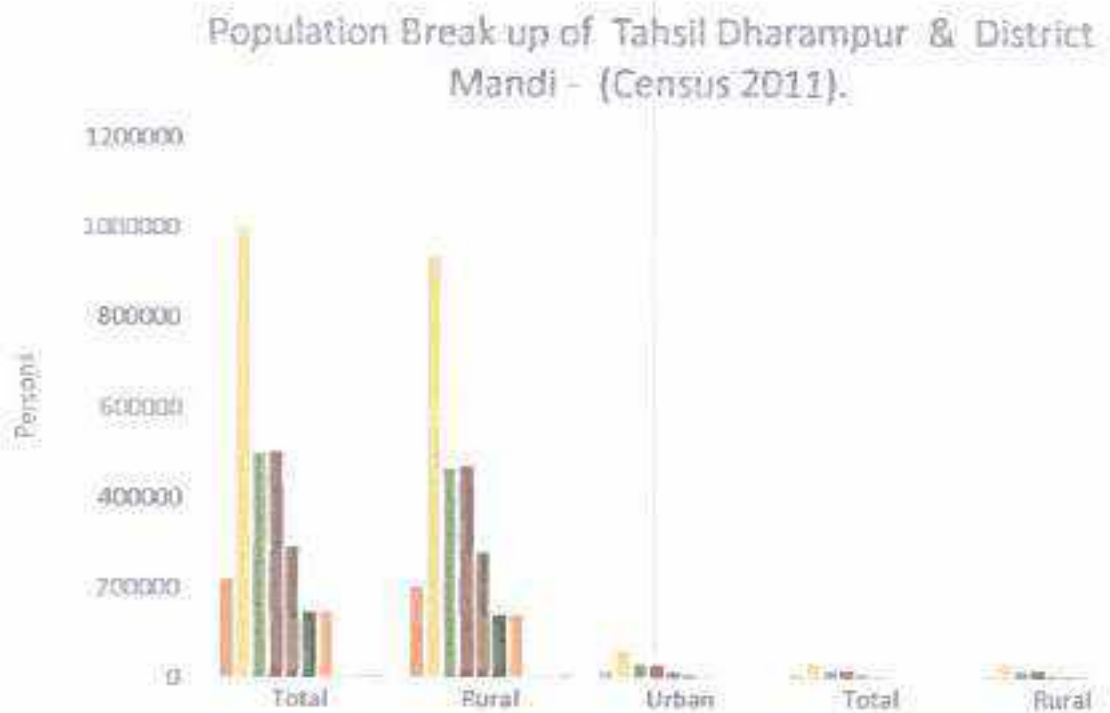
Figure 26: Population of the villages of the zone of influence.

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



	Sakoh (53)	Chalaila (52)	Tyog (50)	Sidhpur (52)	Tataull Pardana (105)	Malva (106)	Thati (107)	Narayan Garh (103)	Malhod (104)
Total Literate	204	75	76	588	384	181	387	63	43
Male Literate	106	40	36	301	204	87	191	32	18
Female Literate	98	35	40	287	180	94	196	31	25
Total Illiterate	94	30	51	202	134	53	144	37	18
Male Illiterate	42	9	18	64	48	15	55	14	5
Female Illiterate	52	21	33	138	86	38	89	23	13
Total Workers	36	11	11	139	69	39	68	17	7
Male Workers	27	11	10	104	59	34	46	15	7
Female Workers	9	0	1	35	10	5	22	2	0
Marginal Workers	150	32	66	389	102	121	183	51	37
Marginal Workers M	61	13	20	133	60	36	57	14	11
Marginal Workers Fe	89	19	46	257	42	85	126	37	26
Non-Workers	112	62	50	262	347	74	280	32	17
Non-Workers M	60	25	24	129	133	32	143	17	5
Non-Workers Fe	52	37	26	133	214	42	137	15	12

Figure 27: 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 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 area is found 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 (44.719%)* and *underemployed 40.919%)* people in the area despite moderately high level of literacy. (72.40% literates, figure 30) of literacy.

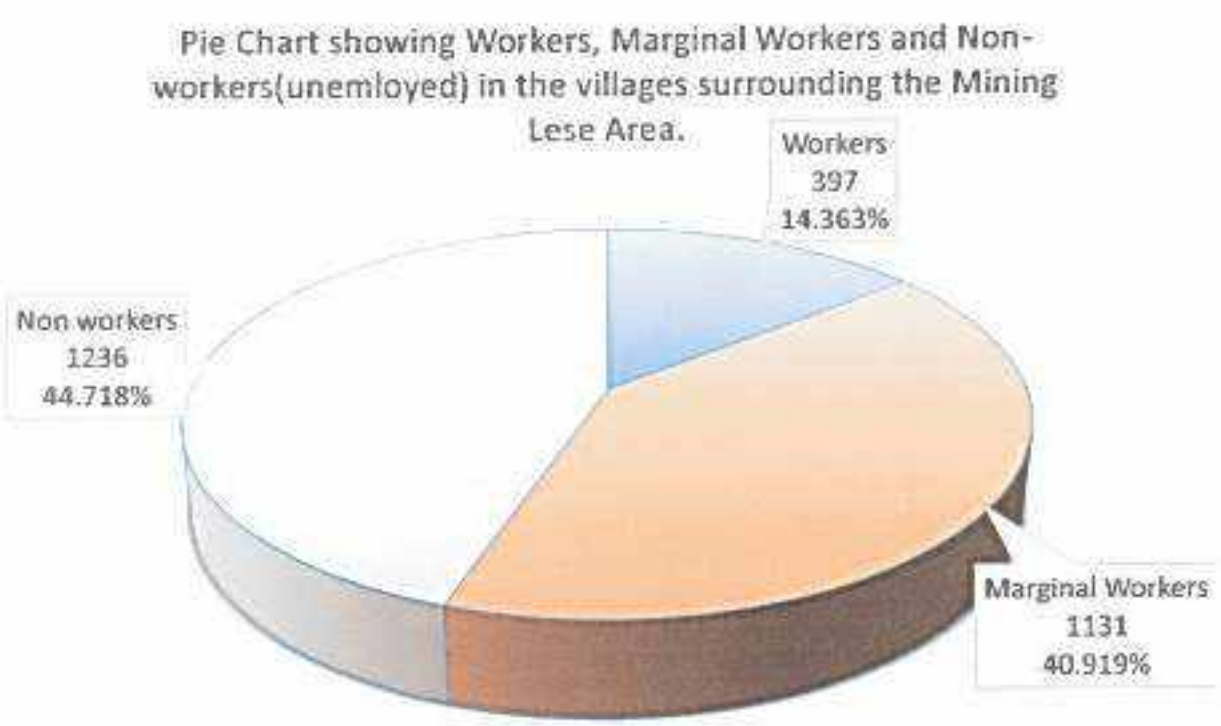


Figure 29: Employment percentage in adjoining villages.

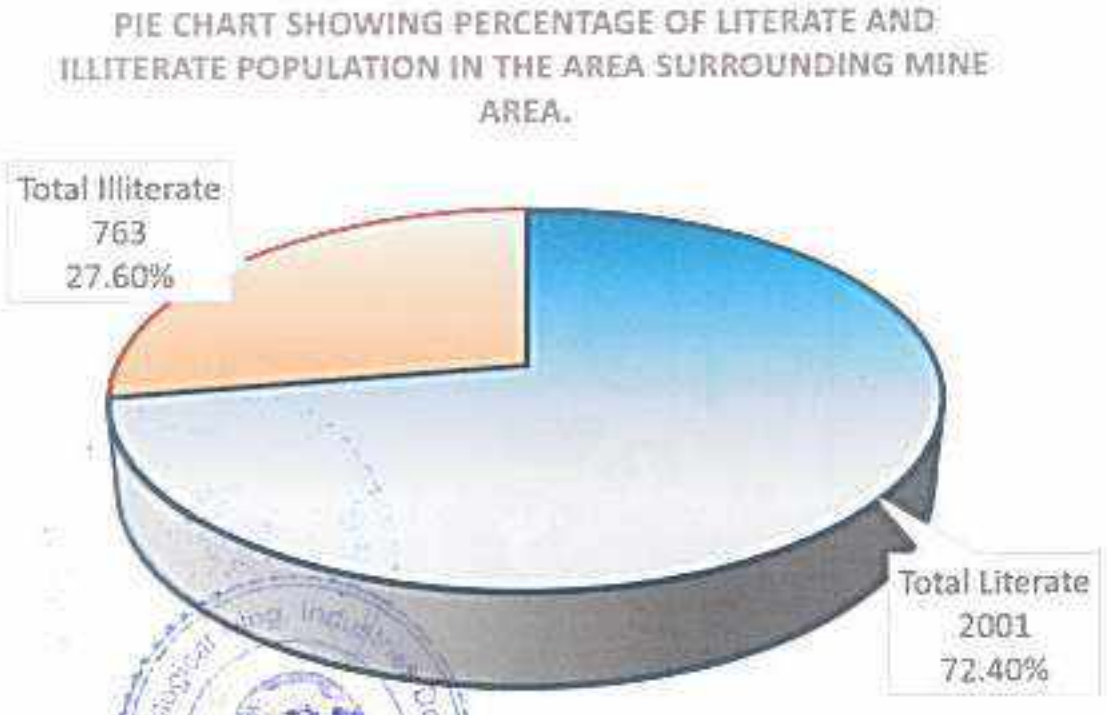


Figure 30: showing Percentage of literate and illiterate POPULATION in the Surrounding mine area

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

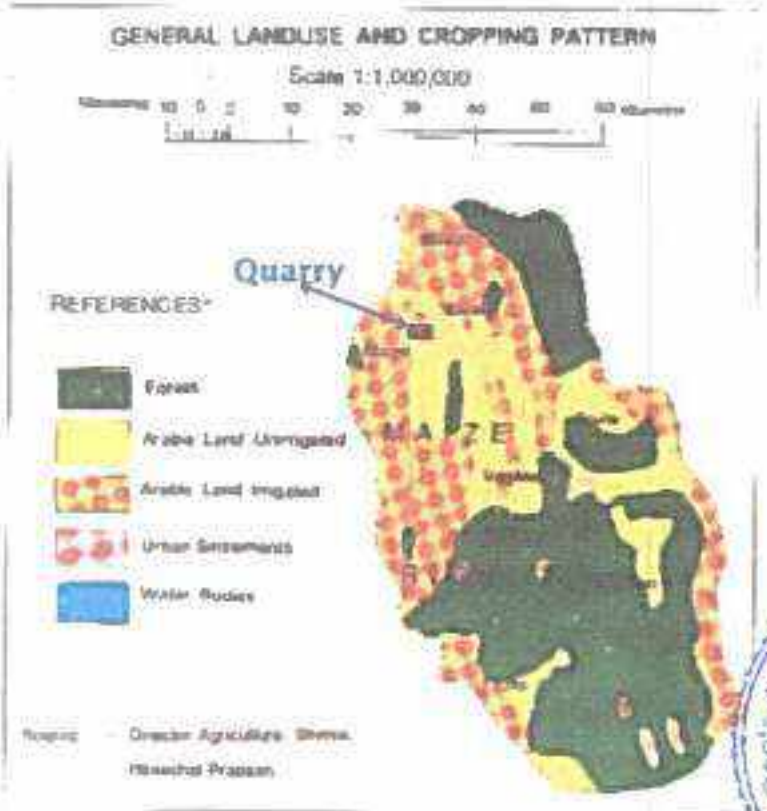
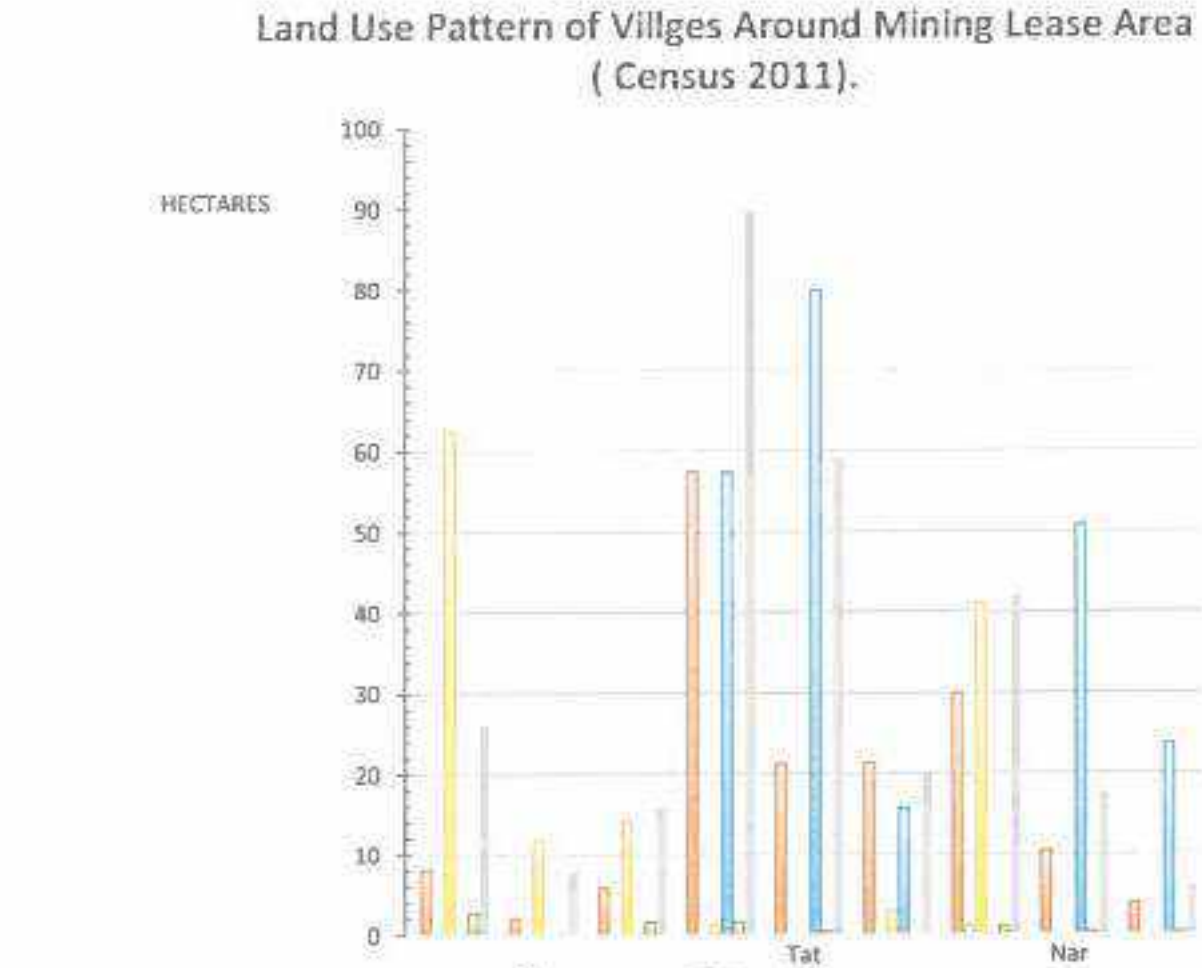


Figure 31: Showing General Land Use Pattern of the District Mandi.

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



VILLAGES	Sakoh (53)	Chalaila (51)	Tyog (50)	Sidhpur (52)	Tatauli Pardana (105)	Malva (106)	Thati (107)	Narayan Garh (103)	Malhod (104)
Forest Area (in Hectares)	0	0	0	0	0	0	0	0	0
Area under Non-Agricultural Uses	8.09	2.06	5.78	57.55	21.27	21.42	30	10.36	3.99
Barren & Un-cultivable Land Area	0	0	0	0	0	0	1	0	0
Permanent Pastures and Other Grazing Land Area	62.34	11.92	14.21	1.15	0	2.97	41	0	0
Land Under Miscellaneous Tree Crops etc. Area	0	0	0	57.38	79.91	15.68	0	50.82	23.76
Culturable Waste Land Area	2.73	0.05	1.59	1.59	0.48	0	1	0.39	0.32
Total Unirrigated Land Area	26.1	7.65	15.66	89.62	59.19	19.91	42	17.62	6.03

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

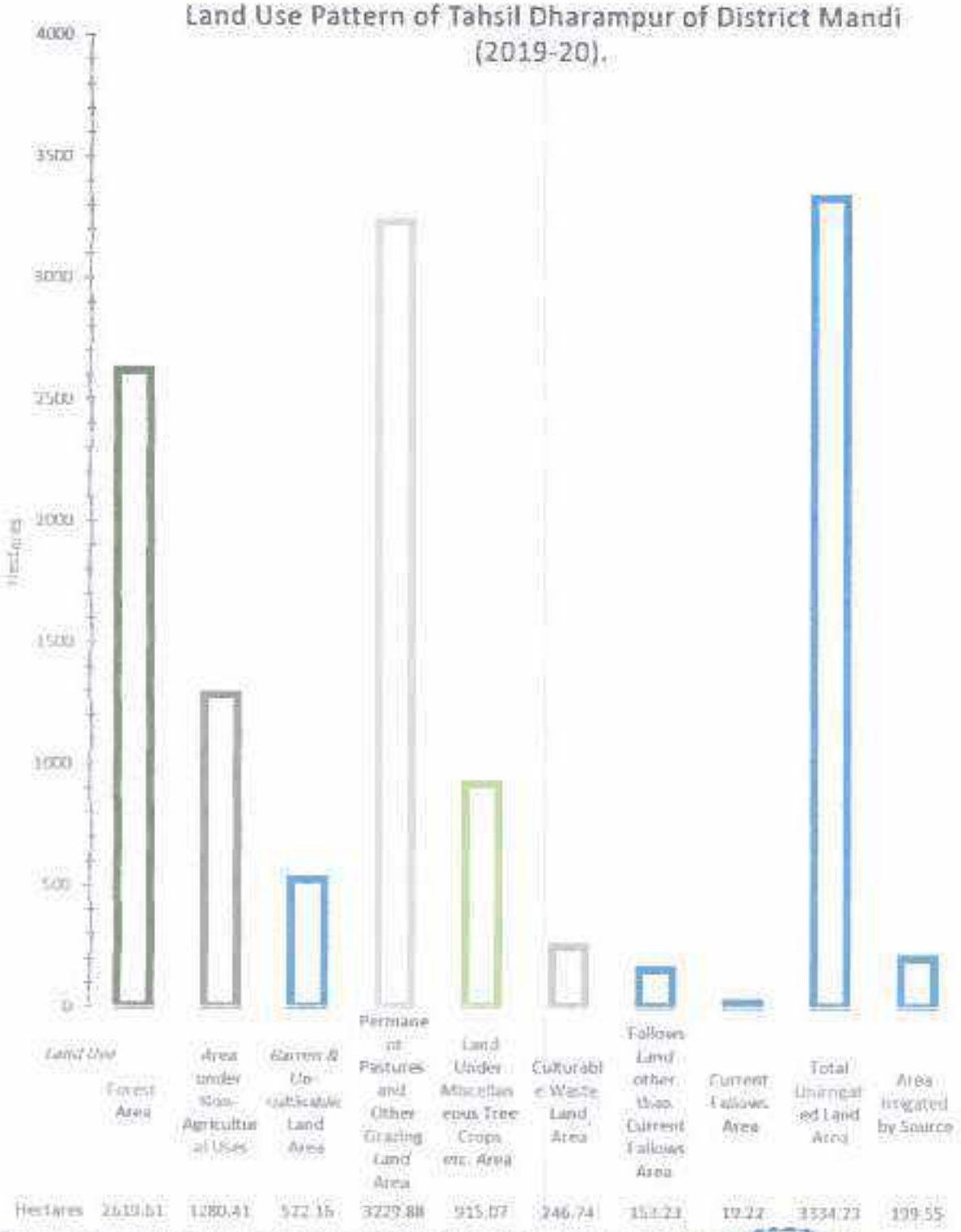


Figure 33: Land Use Pattern of Tahsil Dharmpur of District Mandi.

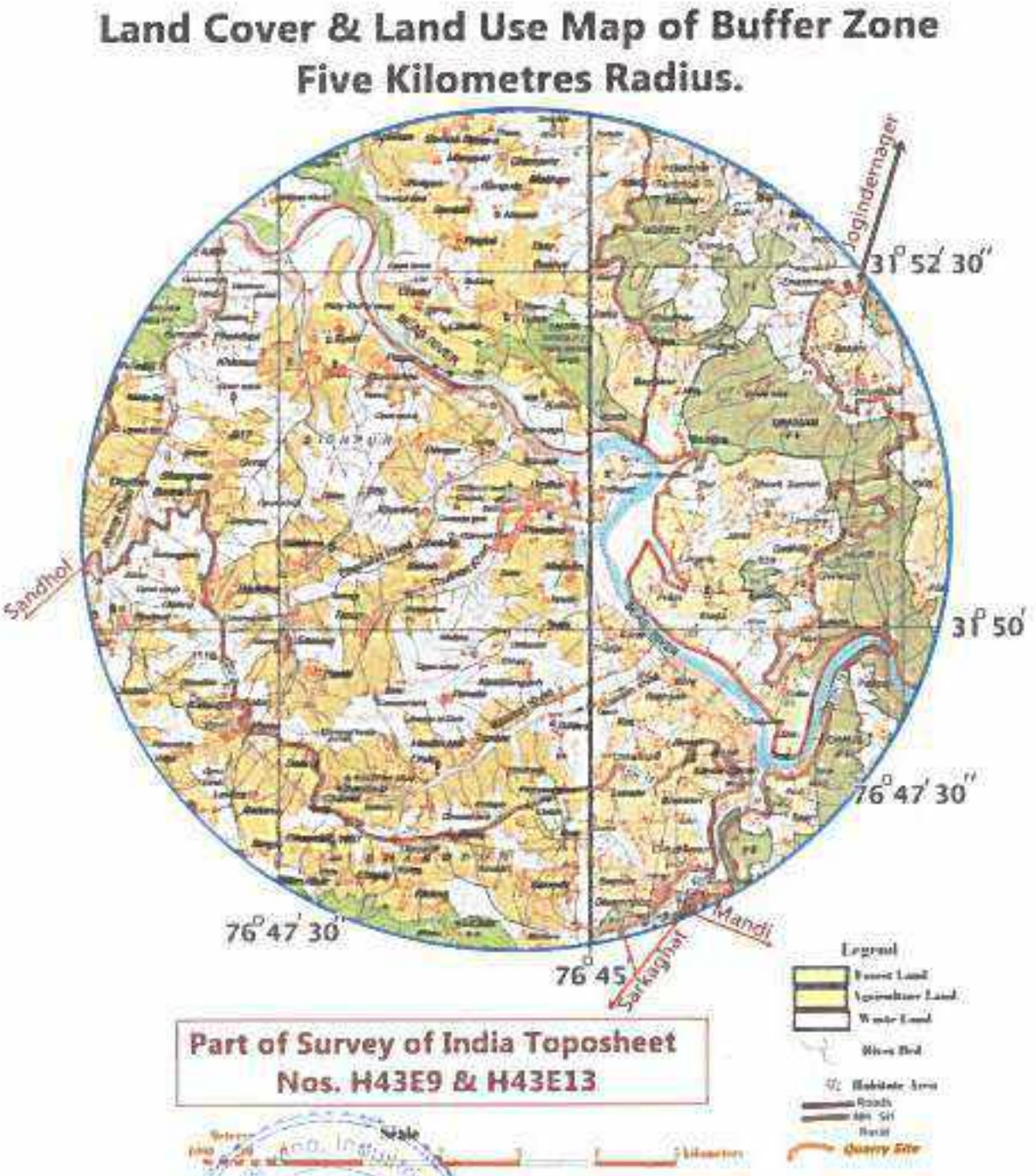


Figure 34: Showing the Five kms Radius Buffer zone.

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 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: -35.

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

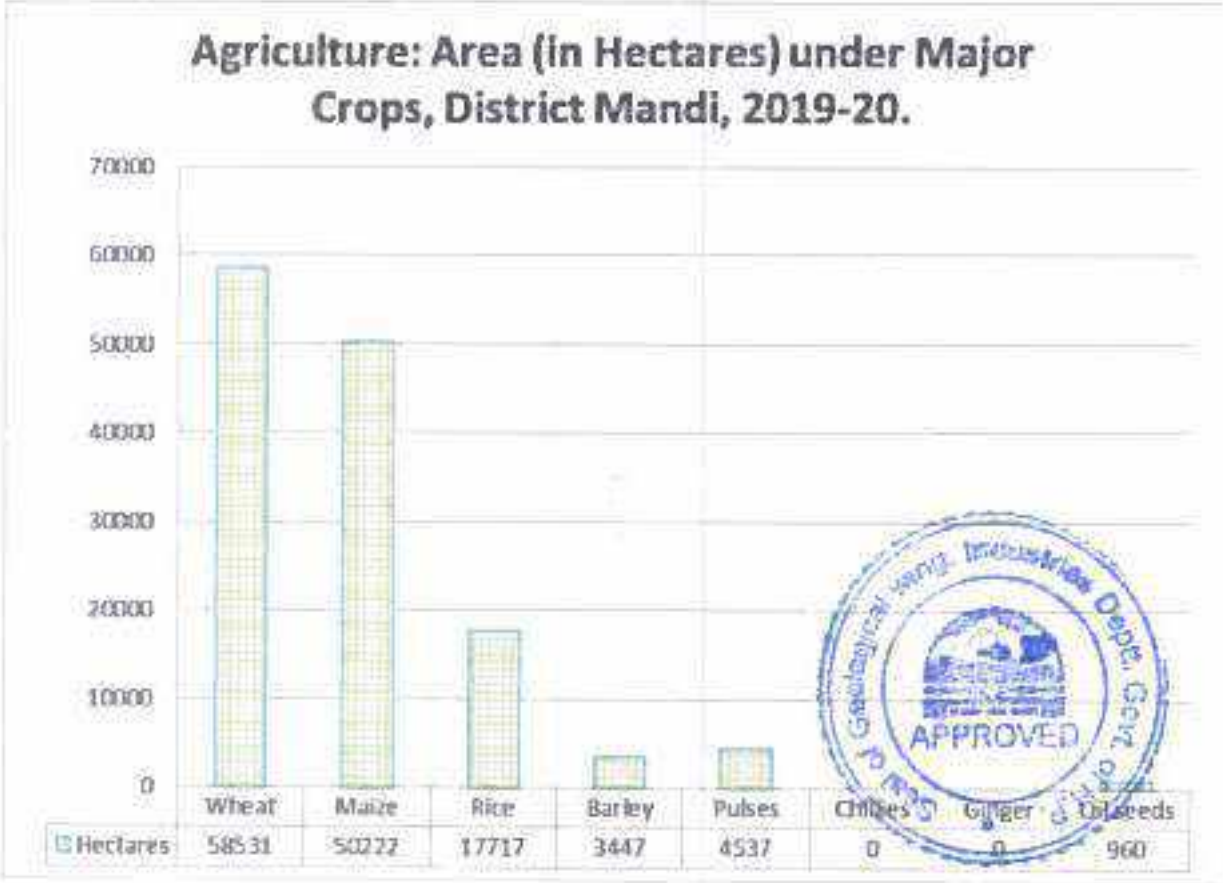


Figure 35:: Showing area under different crops in Mandi District.

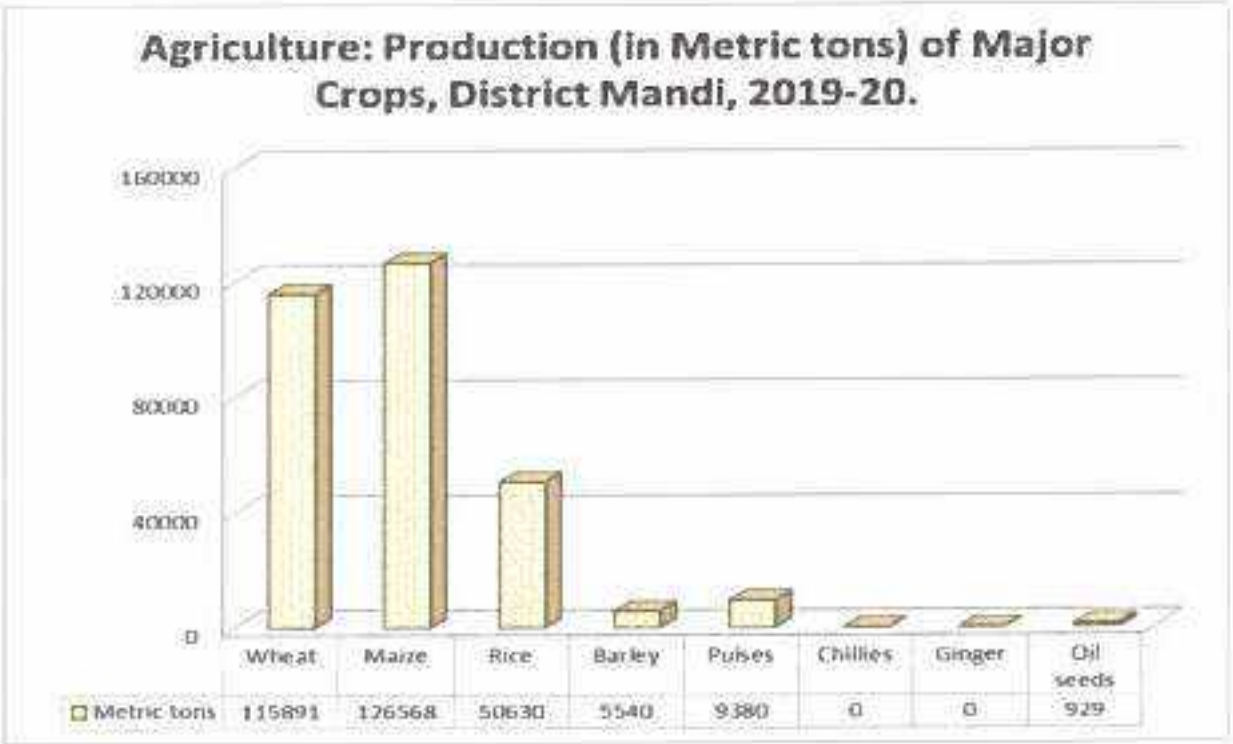


Figure 36 Showing production of each crop in District Mandi.

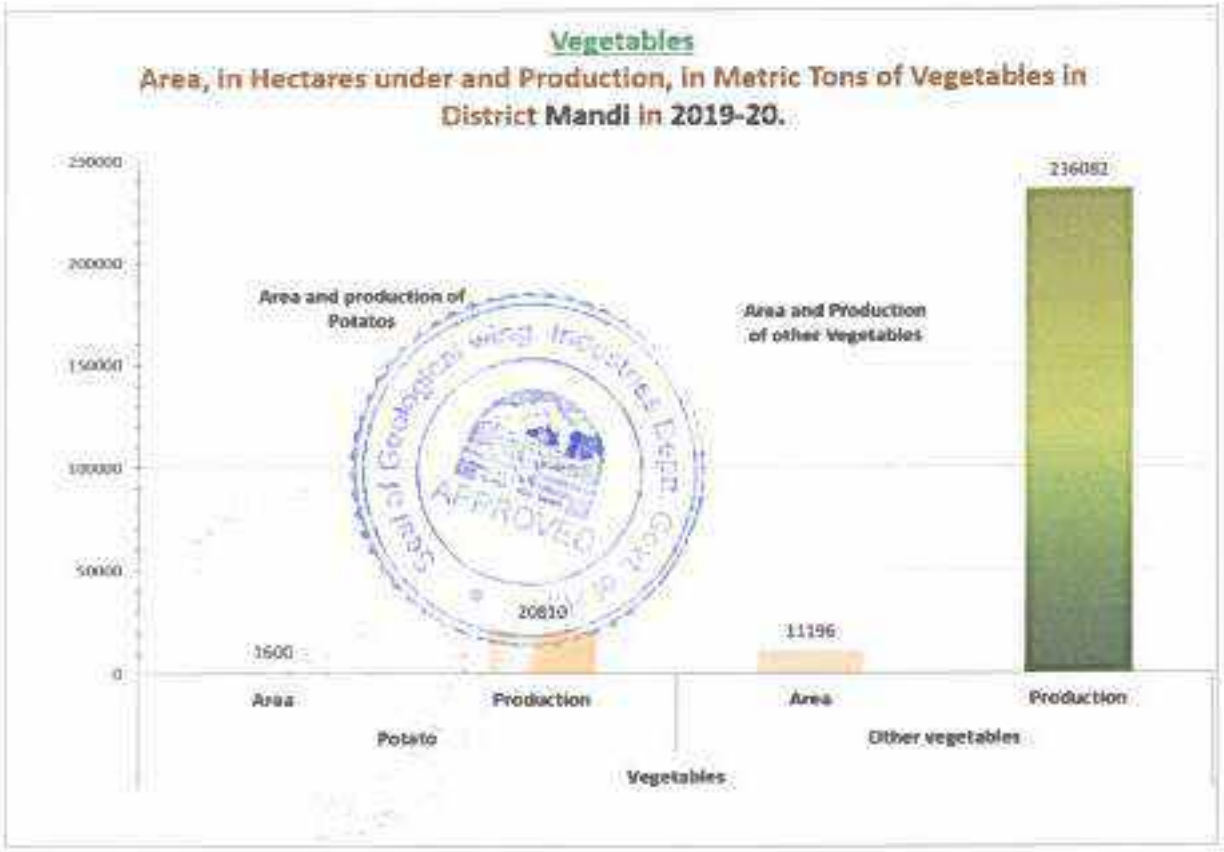


Figure 37: Showing area under vegetable, in Hectare and Production, in Metric tons, of District Mandi.

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 5.

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	2
Olive	298	
Kiwi	29	

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 Husbandary: Population of Livestock, District Mandi, 2019-20.

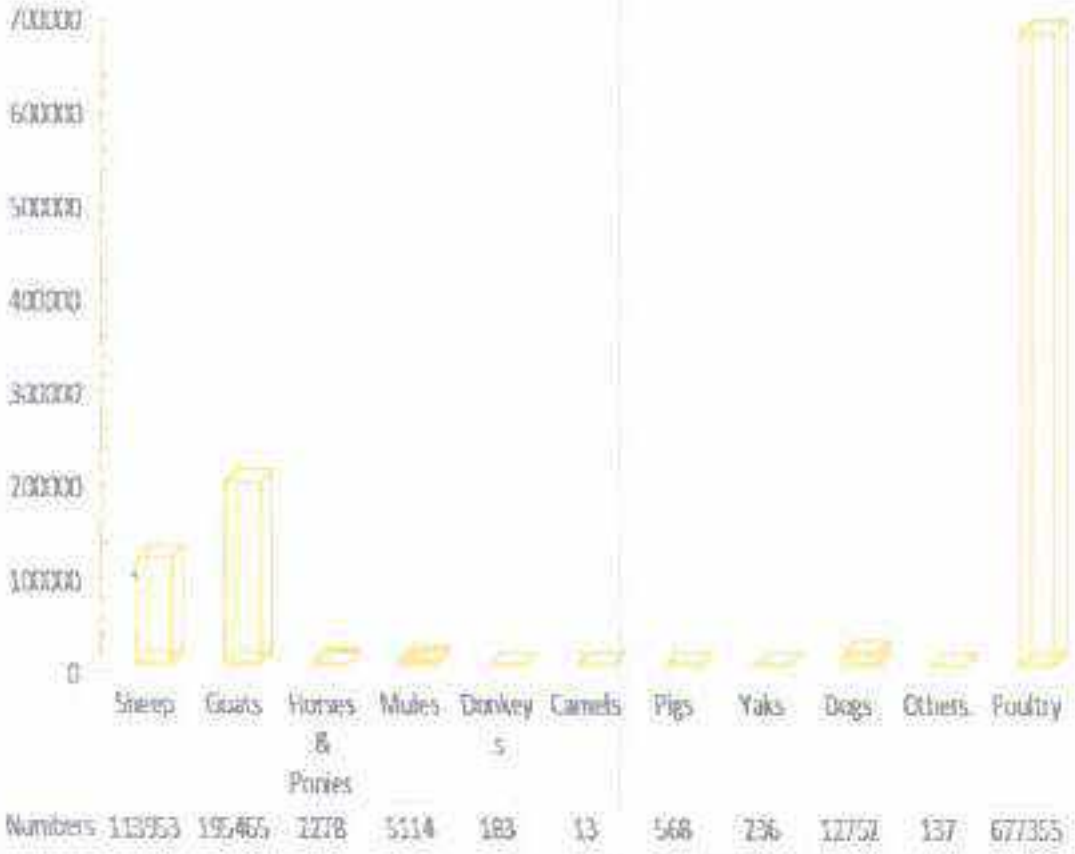


Figure 38:Livestock population of District Mandi

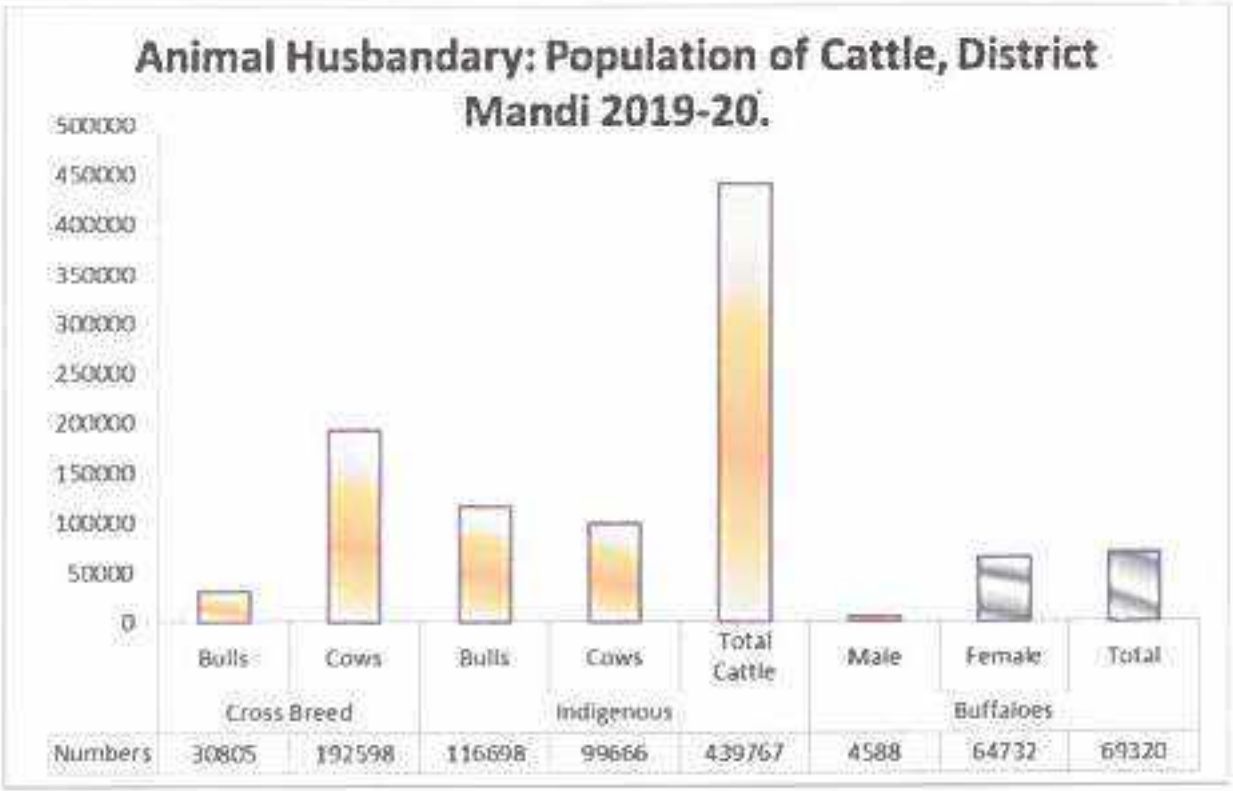


Figure 39: Showing Population of Cattle Buffaloes in District Mandi.

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 trought 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 trought fishing.

No perennial stream passes through the area under consideration.

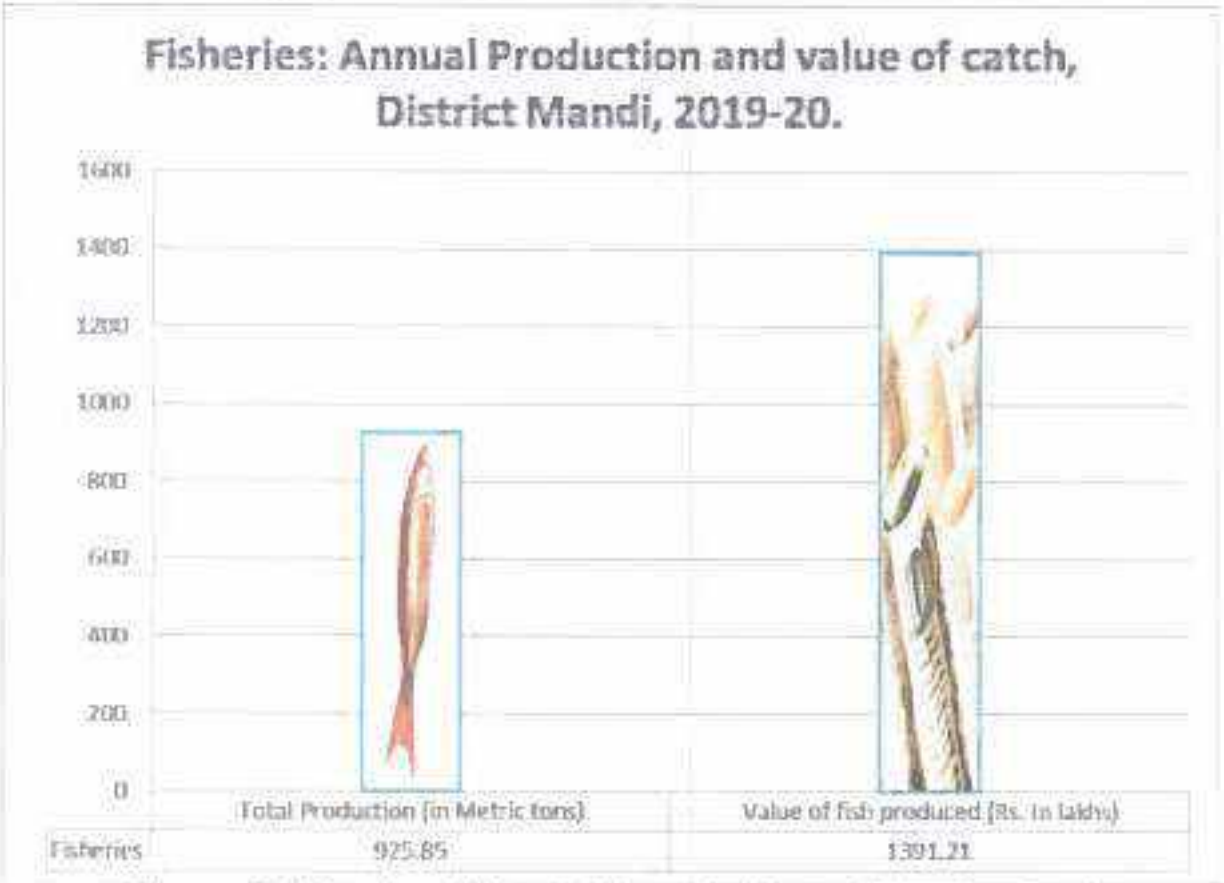


Figure 40: Showing Fish catch / production and its sale value in *2016-17.*

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 (Bombex malabaricum).
Mango (Magniferaindica)
Tun (Cedrela toona)
Several species of acacia and albizia

Salambra (Odina wodier)
Terminalia
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**
Milvus migrants	Vulture	Cheel, Gidh, Eell
Eudynamys scolopacea	Koel	Koel
Columbia livia	Pigeon	Kabuttar
Coracias bengalensis	Blue jay	Nilkantha

Columns livia	Hawk	Baj
Francolius francolinus	Black partridge	Kala Tittar
Francolius pondicerians	Grey partridge	Safed Tittar
Pavo crisslatus	Peacock	Mor
Coturnix coturnix	Common quail	Bater
Alectoris graeca	Chakor	Chakor
Crawus splendens	Crow	Kanwa
Prattacula Kameri	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 rufonucholis	Tits	
Picus canus	Black napped Woodpecker	Woodpecker
Drycocopus javensis	Woodpecker	
Muscicopa subrubra	Himalayan Fly Catcher	
Acridotheres tristis	Common Myna	Ghatari
Terpsiphone paradisi	Paradise flycatcher	Choti- Pinja
Passer domesticus	House sparrow	
Carduelis spinoides	Himalayan Green Finch	Chata

Table 7

Mammals in Mandi

Zoological Name	English Name	Common Name
Felis bengalensis	Leapard Cat	Mirag, Bagla
Felis Chaus	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 nigricollis	Hare	Khargosh, Sherru, farru
Moschus moschiferus	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 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 and information available indicates following seasons in the district:

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

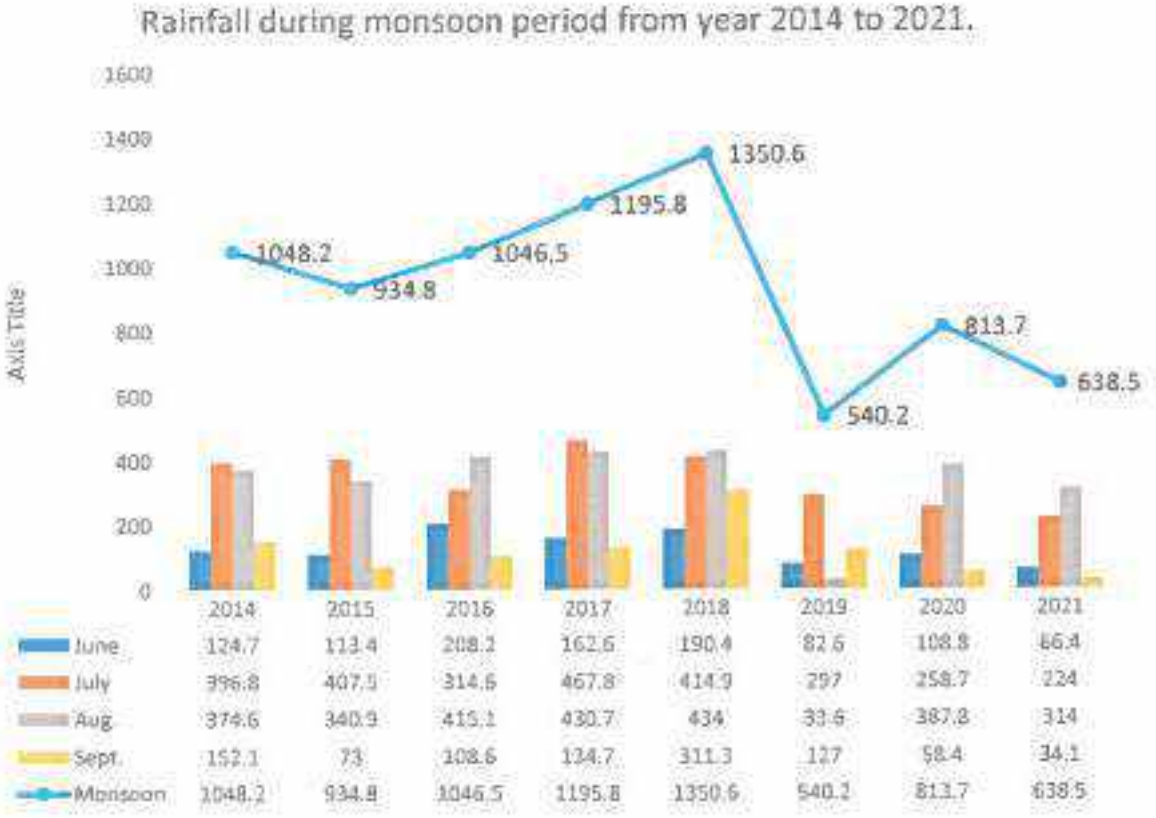


Figure 41:Yearly monsoon Rainfall from year 2014 to 2021.

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.
- 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 515 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 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	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 river bed 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:

Supervisor	1
Drivers and JCB operators	6
Unskilled workers	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

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.

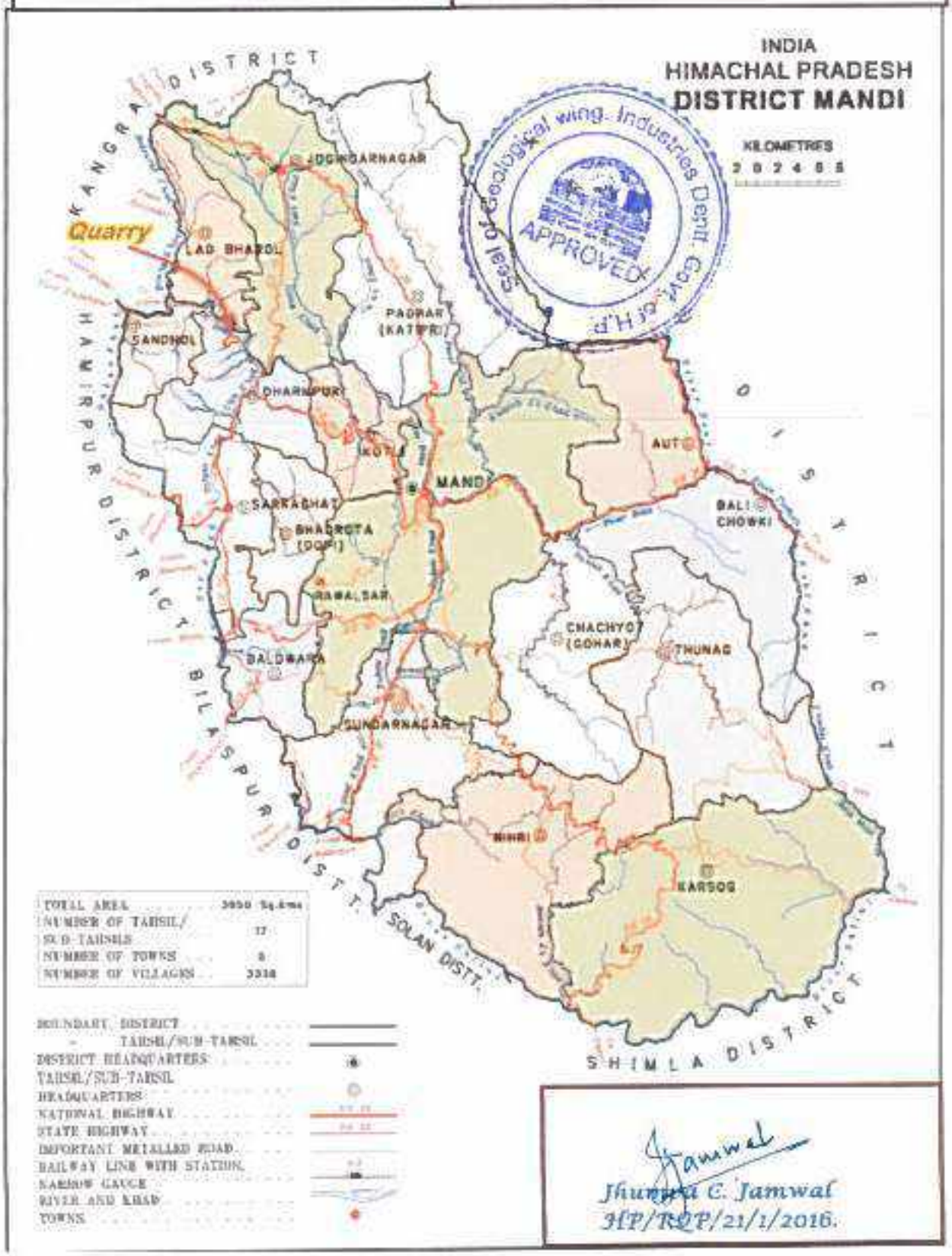
Date
Place: Shimla

Seal of Geological Wing, Industries Dept. 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

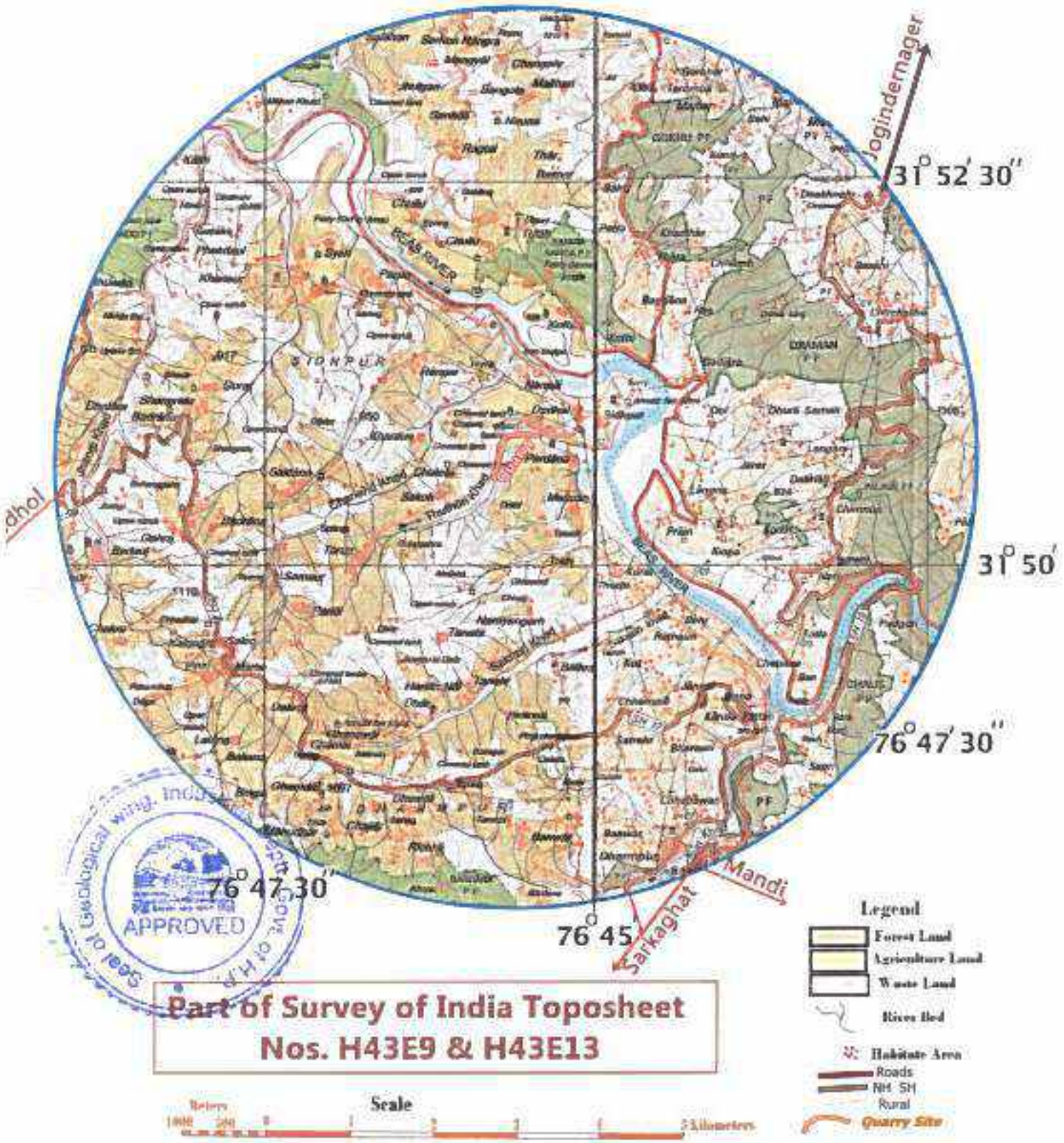
Lessee
General Manager
Triveni Mahadev & Thana Plaun HEP's,
Himachal Pradesh Power Corp.Ltd.,
Tehsil Kotli, Distt Mandi,
HP-175003



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

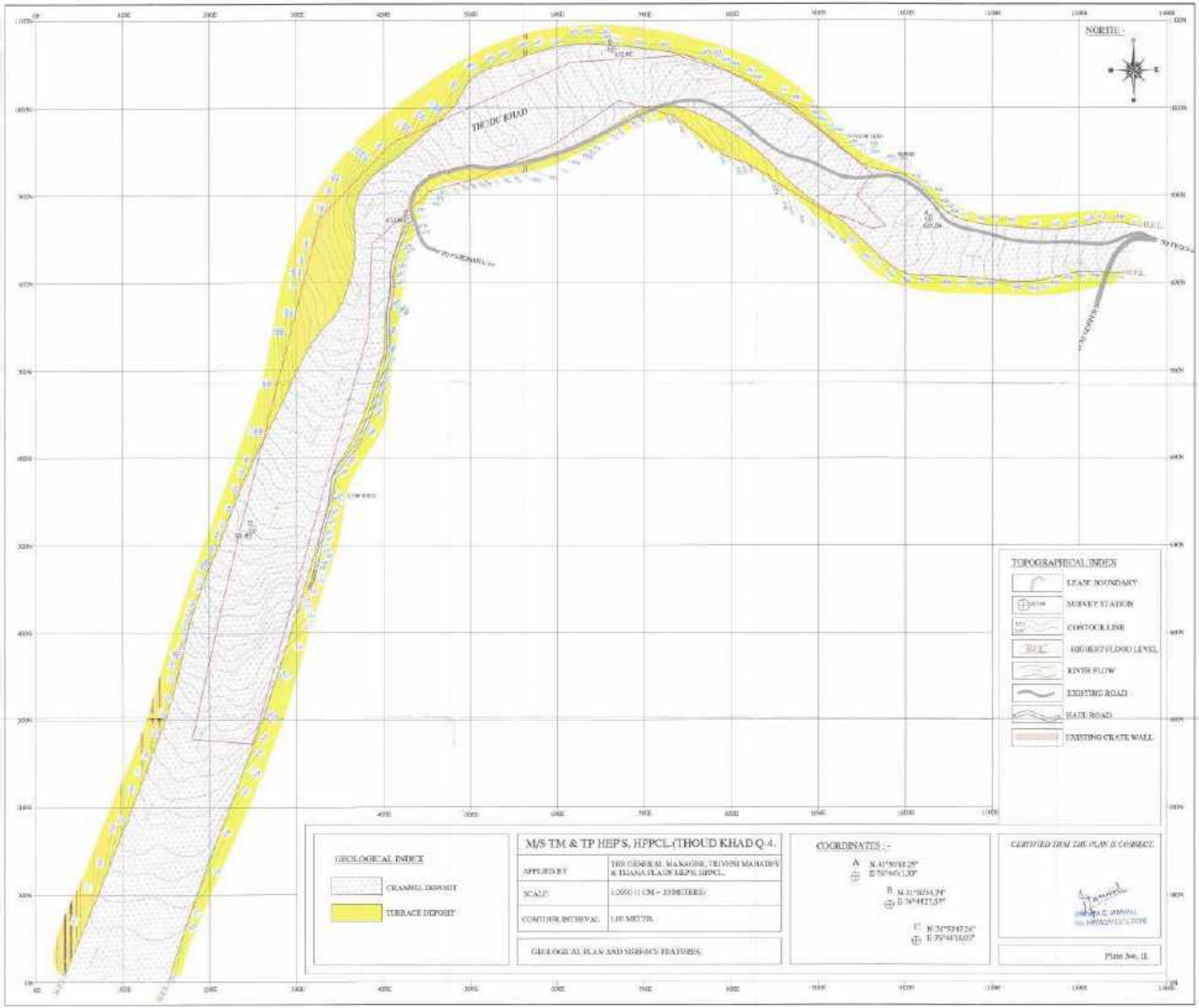
Plate 4

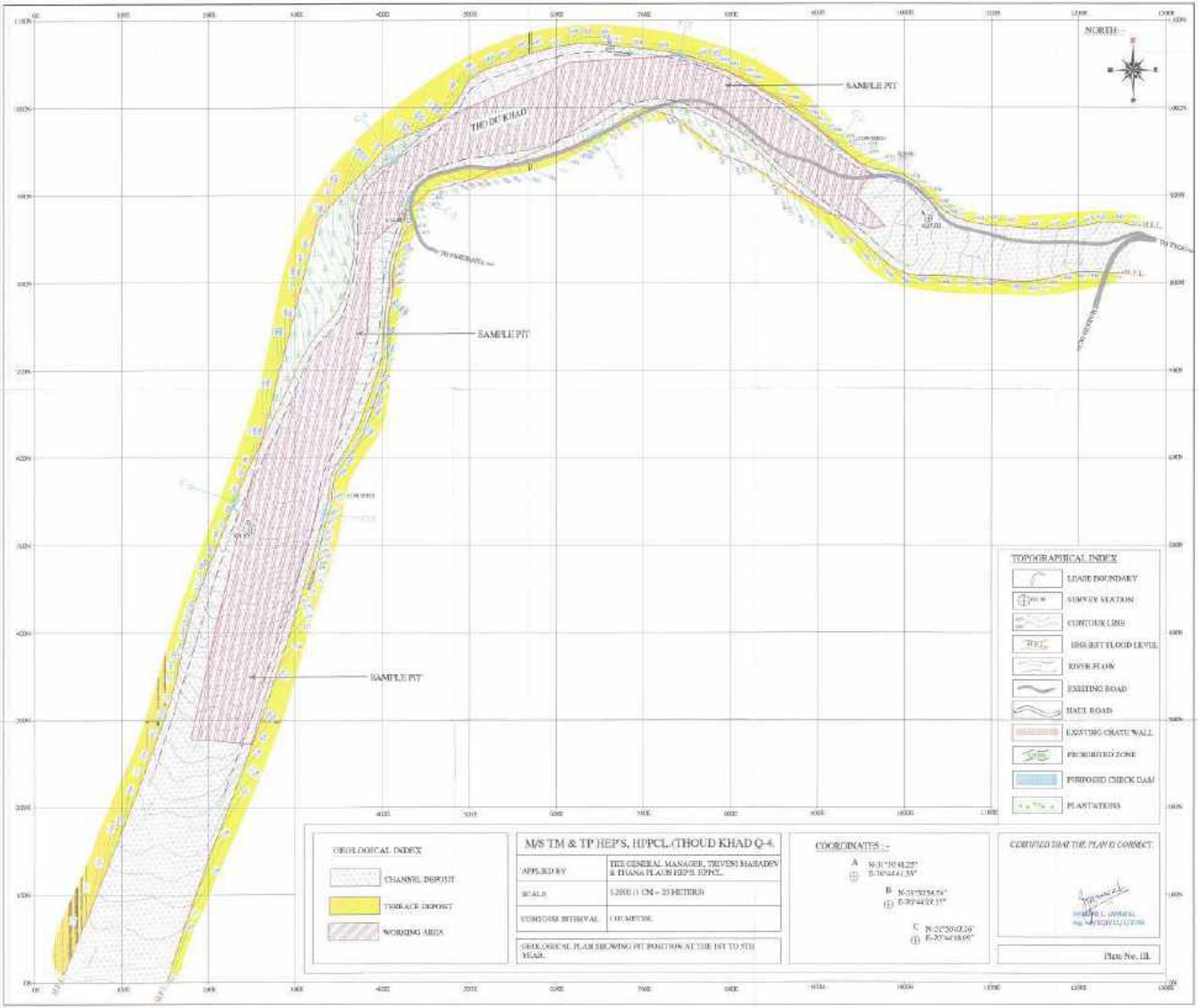
Land Cover & Land Use Map of Buffer Zone Five Kilometres Radius.



Part of Survey of India Toposheet Nos. H43E9 & H43E13

lessee	
The General Manager Triveni Mahadev & Thana Plaun HEP's, Himachal Pradesh Power Corp.Ltd., Tehsil Kotli, Distt. Mandi.	Jhunjna C. Jamwal HP/RQP/21/1/2016.


NORTH
THOUC KHAD
TO PARBHANI
TO THOUC
TO GONDIA
TOPOGRAPHICAL INDEX
LEASE BOUNDARY
SURVEY STATION
CONTOUR LINE
HIGHEST FLOOD LEVEL
RIVER FLOW
EXISTING ROAD
HAUL ROAD
EXISTING CRATE WALL
GEOLOGICAL INDEX
CHANNEL DEPOSIT
TERRACE DEPOSIT
M/S TM & TP HEPS, HPPCL (THOUD KHAD Q-4.
APPLIED BY
THE GENERAL MANAGER, TRIVENI MAHADEV & TEJANA PLAIN HEPS, HPPCL.
SCALE
1:2000 (1 CM = 20 METERS)
CONTOUR INTERVAL
1.00 METER
GEOLOGICAL PLAN AND SURFACE FEATURES.
COORDINATES :-
A N 31°50'48.25"
E 76°44'41.30"
B N 31°50'54.78"
E 76°44'21.57"
C N 31°50'47.26"
E 76°44'16.07"
CERTIFIED THAT THE PLAN IS CORRECT.
Plate No. II.


NORTH
SAMPLE PIT
SAMPLE PIT
SAMPLE PIT
THOUD KHAD
TO THOUD KHAD
TOPOGRAPHICAL INDEX
LEASE BOUNDARY
SURVEY STATION
CONTOUR LINE
HIGHEST FLOOD LEVEL
RIVER FLOW
EXISTING ROAD
HAUL ROAD
EXISTING GRATE WALL
PROHIBITED ZONE
PURPOSED CHECK DAM
PLANTATIONS
GEOLOGICAL INDEX
CHANNEL DEPOSIT
TERRACE DEPOSIT
WORKING AREA
M/S TM & TP HEP'S, HPCL /THOUD KHAD Q-4.
APPLIED BY
THE GENERAL MANAGER, TRIVENI MAHADEV & THANA PLAIN HEP'S, HPCL.
SCALE
1:2000 (1 CM = 20 METERS)
CONTOUR INTERVAL
1.0 METER.
GEOLOGICAL PLAN SHOWING PIT POSITION AT THE 1ST TO 5TH YEAR.
COORDINATES :-
A N-31°39'48.25"
E-76°44'41.38"
B N-31°39'54.79"
E-76°44'22.37"
C N-31°39'49.26"
E-76°44'38.05"
CERTIFIED THAT THE PLAN IS CORRECT.
Plan No. III.

ANNEXURE- III

GM
AGM
DM(Env)
12/06/23

279
12-6-23

OFFICE OF THE DISTRICT COLLECTOR, MANDI DISTRICT, MANDI, H.P.

Dated:-

Non Availability Certificate

In view of recommendation of Sub-Divisional Officer (Civil) Jogindernagar, District Mandi H.P the non availability certificate of non forest land for the purpose of construction of Dumping Sites (Thana Plaun HEP (191 MW), HPPCL) in Tehsil Jogindernagar, District Mandi H.P. in respect of following land is hereby issued:-

Sr.No	Name of Muhal	Khasra Number	Area in Bighas/Hectare	Status of land
1	**Neri Kotla/226**	3129/3103/I	11-07-0 Bighas (0.9183 ha.)	Jungle Mehfuja Mehduda
	-do-	3131/3091/1	27-05-17 Bighas (2.2081 ha.)	-do-
	-do-	3133/3097/1	79-17-15 (6.4634 ha.)	-do-
	-do-	3134/3097/1	0-8-1 (0.0326 ha.)	Jungle Mehfuja Gair Mehduda
	-do-	3132/3091/1	05-16-19 (0.4731 ha.)	Charagah Drakhtan
	-do-	3179/3145/1	03-02-14 (0.2536 ha.)	-do-
		Total Area	**127-18-06 Bighas (10.3491 hectare)**	

It is certified that there is no non forest land available in above muhal Neri Kotla/226 for the said purpose.

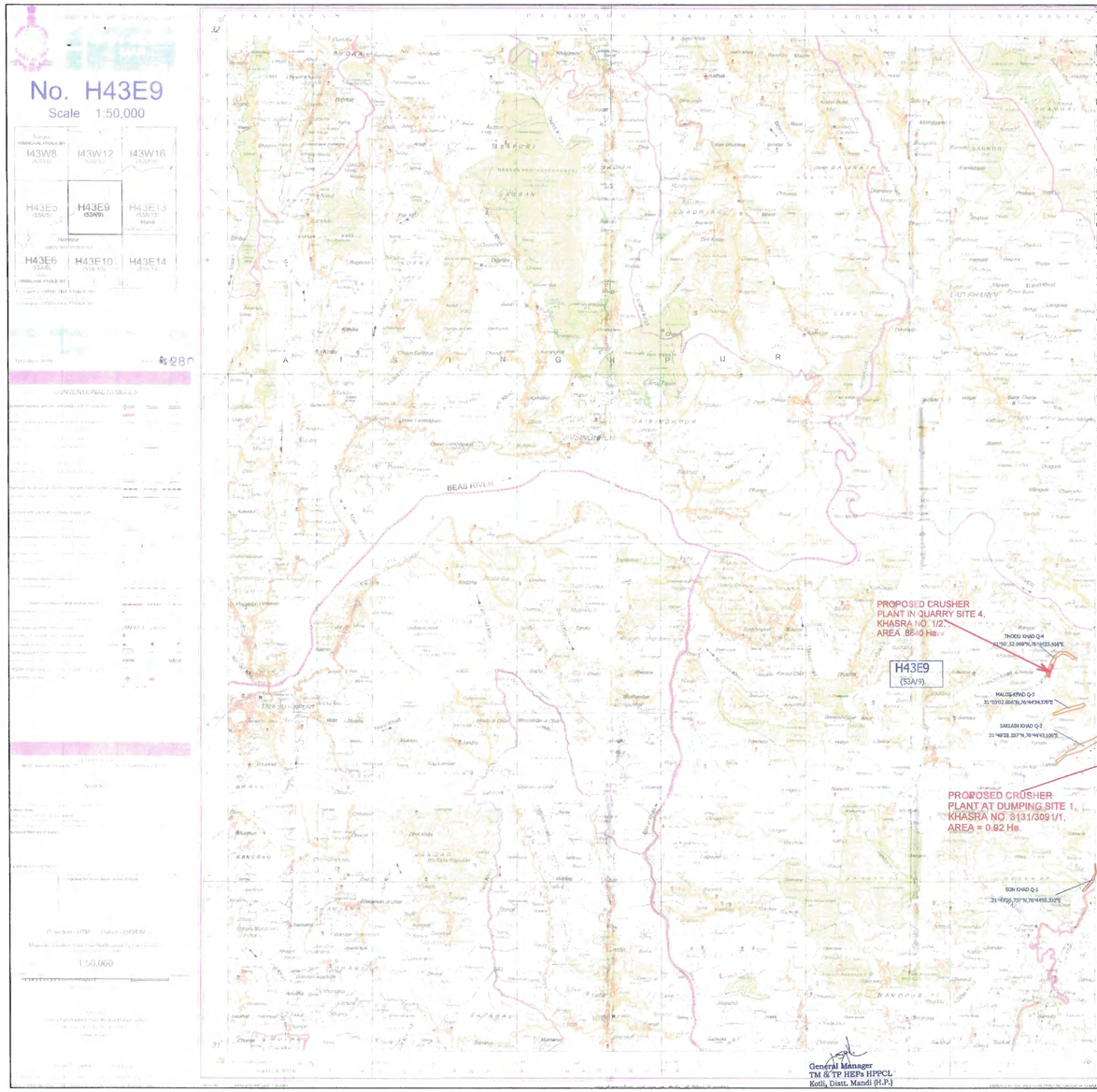
District Collector,
Mandi District, Mandi H.P.

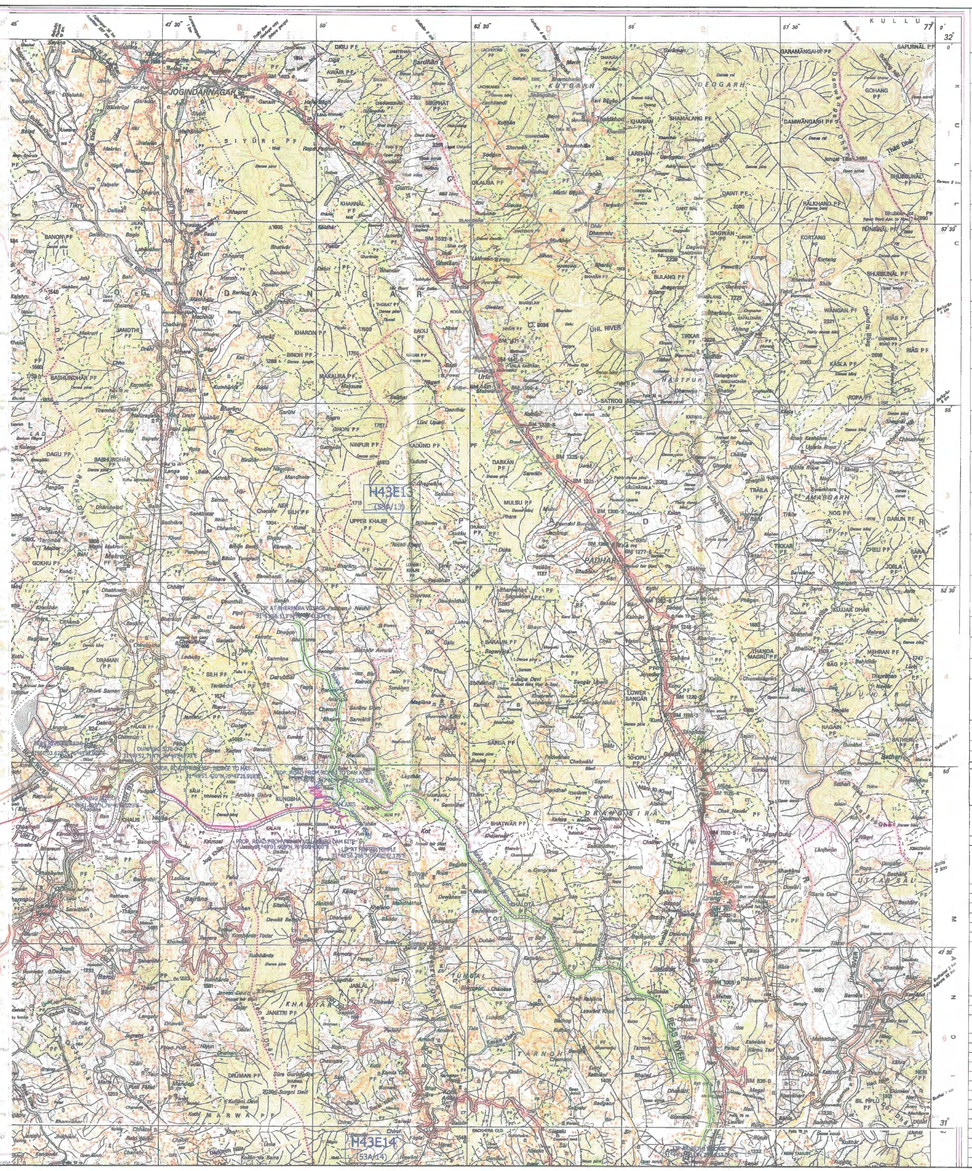
Endst. No. 1766-01 Dated:- 02-6-2023

Copy forwarded to:

1) The Sub-Divisional Officer (Civil) Jogindernagar, District Mandi H.P. for information and necessary action.
2) The General Manager, Triveni Mahadev & Thana Plain HEPs, Kotli, District Mandi H.P. for information and necessary action.

District Collector,
Mandi District, Mandi H.P.





GEO-REFERANCE/DIGITAL/DGPS MAP ON SOI SHEET OF FOREST LAND 406.79 HECT. PROPOSED FOR DIVERSION UNDER FCA, 1980 FOR THE CONSTRUCTION OF THANA PLAUN HEP (191 MW) IN DISTT. MANDI(HP)

PROJECT:-
THANA PLAUN HEP (191 MW)

NAME OF USER AGENCY:-
GENERAL MANAGER,
TM & TP HEPs
HPPCL,SUJANPUR TIHRA,
DISTT. HAMIRPUR, H.P. - 176110
(A STATE GOVT. UNDERTAKING)

NAME OF FOREST DIVISION:-
JOGINDERNAGAR & MANDI (HP)

FOREST LAND REQUIRED:- 406.79 HECTARE

REF. SHEET NO. OF SOI :-
1. H43E9 (53A/9)
2. H43E13 (53A/13)
3. H43E14 (53A/14)

SCALE 1 IN 50000 (1cm = 500m)

DGPS Co-ordinates of Components

S No.	Description	Latitude	Longitude
1	Quarry Sites-I Son Khad	31°47'19.600"	76°44'43.600"
		31°47'18.571"	76°44'45.290"
		31°47'41.300"	76°45'02.090"
		31°47'41.300"	76°45'01.300"
2	Quarry Sites-II Saklain Khad	31°49'14.272"	76°44'21.690"
		31°49'16.796"	76°44'20.639"
		31°48'41.943"	76°45'14.284"
		31°48'37.055"	76°45'18.003"
3	Quarry Sites-III Malot Khad	31°49'57.201"	76°44'17.681"
		31°48'58.970"	76°44'16.991"
		31°50'07.761"	76°44'49.138"
		31°50'05.693"	76°44'51.026"
4	Quarry Sites-V Thodu Khad	31°50'33.386"	76°44'12.309"
		31°50'34.555"	76°44'09.601"
		31°50'48.422"	76°44'41.372"
		31°50'46.686"	76°44'39.662"
5	Quarry Sites-V Prain Khad	31°50'11.066"	76°45'19.268"
		31°50'11.608"	76°45'20.748"
		31°49'57.915"	76°45'35.807"
6	Dumping Yard-I	31°49'56.687"	76°45'32.495"
		31°49'40.044"	76°46'36.742"
		31°49'37.500"	76°46'44.000"
		31°49'39.800"	76°46'46.000"
7	Dumping Yard-II	31°49'46.300"	76°46'41.500"
		31°49'50.229"	76°46'47.994"
		31°49'47.552"	76°46'52.183"
		31°49'53.051"	76°47'02.013"
		31°49'56.286"	76°47'01.131"
8	Prop. Road from K.P. Bridge to MAT	31°49'51.420"	76°47'25.918"
9	Prop. Road from Roprru to Dam Axis	31°49'24.434"	76°50'05.447"
		31°49'40.747"	76°50'02.128"
10	Prop. Road from Mahan Village to Dam Site	31°49'27.567"	76°50'17.628"
		31°49'01.900"	76°50'34.300"
11	Dam Body & Components	31°49'22.246"	76°50'19.175"
		31°49'24.179"	76°49'58.680"
		31°49'30.460"	76°50'18.786"
		31°49'21.384"	76°50'10.933"
12	Beas River Submergence	31°49'21.875"	76°50'21.803"
		31°51'56.513"	76°49'43.874"
13	Arnodi Khad Submergence	31°48'56.286"	76°50'47.175"
14	Luni Khad Submergence	31°50'04.594"	76°50'56.867"

1. APPROACH ROADS/JOB FACILITY
2. QUARRY SITES
3. DUMPING SITES
4. SUBMERGENCE
5. DAM BODY & COMP.

COMPONENT WISE DETAIL OF FOREST AREA PROPOSED FOR DIVERSION FOR THE CONSTRUCTION OF THANA PLAUN HEP (191 MW) IN DISTT. MANDI (HP)

S. No.	Name of Components	Forest Area Proposed for diversion (Sq. mtr.)	Total Forest Land in Hect.
1	**Submergence / Reservoir**		
	i) River Beas	2282000	228.2
	ii) Rana Khad	630000	63
	iii) Arnodi Khad	216000	21.6
	iv) Luni Khad	11200	1.12
	Total of 1	**3139200**	**313.92**
2	Dam Body & Components Complete i/c of Diversion Dam, Diversion Tunnel, Intake Structure, WaterConductor System, Pressure Shaft, Adits, Power House Cavern Transformer Cavern, Poth Head Yard etc.	166400	16.64
3	i) Approach Roads	187500	18.75
	ii) Job Facility Area under to intake site, near to Power House & Dam Site	11900	1.19
	Total of 3	**199400**	**19.94**
4	**Dumping Sites**		
	i) Dumping Yard-I	38500	3.85
	ii) Dumping Yard-II	65000	6.5
	Total of 4	**103500**	**10.35**
5	**Quarry Sites**		
	i) Quarry Sites-I Son Khad	41000	4.1
	ii) Quarry Sites-II Saklain Khad	205010	20.5
	iii) Quarry Sites-III Malot Khad	77200	7.72
	iv) Quarry Sites-IV Thodu Khad	94990	9.5
	v) Quarry Sites-V Prain Khad	41200	4.12
	Total of 5	**459400**	**45.94**
	Gross Total (1 + 2 + 3 + 4 + 5)	**4067900**	**406.79**

ANNEXURE- IV

ANNEXURE- V

GM
AGM
SH-I / DM(Env)

HIMACHAL PRADESH
PUBLIC WORKS DEPARTMENT

NO. PW-MD-II/WA/ N.O.C /2023- 8944-46 Dated:- 7/8/2023

To,

The General Manager Triveni Mahadev
& Thana Plaun HEPs, Kotli, Distt. Mandi-175003.
Tel. No. 01905-281081, Email: - gmtmtpbnhppcl@gmail.com.

Subject: - N.O.C of Thana Plaun 191 MW Hydro Power Project on River Beas in Mandi. District of Himachal Pradesh by M/s Himachal Pradesh Power Corporation Ltd.

Reference: - **Your No HPPCL/GM TM & TP HEP/TP-E & F/K-1/2023-625-31 dt 08.06.2023.**

As per proposal of Thana Plaun 191 MW Hydro Power Project it is intimated that this department may have no objection for the implementation of this scheme, if during the execution of this project whatever assets fall under the submergence of the reservoir basin are to be rehabilitated i.e. existing bridge situated on Sandhapattan Bharol Kun- Ka-Tar Kotli road at RD 70/600, due to the construction of the said project the reservoir level will rise to 724.00 mtrs resulting in the submergence of the bridge situated at level 665.00 mtrs as well as road length approximate 1.50 km between RD 70/600 to 72/0.

Executive Engineer,
Mandi Division No. II,
HP.PWD. Mandi H.P.

Copy to the Superintending Engineer, 1st Circle, HPPWD Mandi for kind information please.

Copy to the Assistant Engineer Mandi Sub Division III HP.PWD. Mandi for information and further necessary action w.r.t. his letter No. 299 dated 20.06.2023. He is requested to ensure the implementation of above condition/ instructions meticulously any laxity in the matter will be your responsibility & in case of any violation an immediate action may be taken immediately under intimation to this office.

Executive Engineer,
Mandi Division No. II,
HP.PWD. Mandi H.P.