DISTRICT SURVEY REPORT-2024
DISTRICT- HAMIRPUR HIMACHAL PRADESH

DISTRICT SURVEY REPORT FOR SAND MINING OR RIVER BED MINING AND OF MINOR MINERALS OTHER THAN SAND MINING OR RIVER BED MINING

Prepared and submitted by Department of Industries, Himachal Pradesh

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Finalized & approved by SEIAA, Himachal Pradesh in its 69th (A) meeting held on dated 20th August, 2024 vide Agenda Item No. 1.

Executive Summary DSR

District Survey Report (DSR) is a comprehensive document prepared to regulate riverbed and hill slope mining activities within the district. This report is essential for sustainable management of riverbed mining, ensuring that the extraction of minerals is conducted in an environmentally sound and socially responsible manner. The preparation of DSRs is mandated under the Sustainable Sand Mining Management Guidelines, 2016.

District Survey Report of riverbed mining are indispensable tools for the sustainable management of riverine mineral resources. They offer a structured approach to resource assessment, environmental protection, regulatory compliance, and stakeholder engagement. By fostering sustainable mining practices, DSRs contribute significantly to environmental conservation, socio-economic development, and the overall well-being of communities dependent on river ecosystems.

As per the EIA Notification, 2006 and its subsequent amendment vide S.O. 3611(E) dated 25th July, 2018 issued by MoEF&CC, GoI, the main objective of the preparation of District Survey Report (as per the Sustainable Sand Mining Guideline) is to ensure the identification of areas of aggradations or deposition where mining can be allowed; and identification of areas of erosion and proximity to infrastructural structures and installations where mining should be prohibited and calculation of annual rate of replenishment and allowing time for replenishment after mining in that area.

Key Aspects of District Survey Report

1. Assessment of Resources: DSR provide a detailed assessment of available mineral resources in the riverbeds within the district. This includes data on the quantity, quality, and distribution of sand and other minor minerals. By accurately estimating these resources, the report aids in preventing over-extraction and depletion of minerals.
2. Environmental Impact Analysis: The report include an analysis of the environmental impact of riverbed mining. This encompasses the effects on river morphology, hydrology, aquatic ecosystems, and biodiversity. Understanding these impacts is crucial for mitigating adverse environmental effects and preserving riverine ecosystems.
3. Regulation and Compliance: DSR serve as a regulatory framework for riverbed mining operations. They outline guidelines and standards for mining practices, ensuring compliance with national and state environmental laws. This helps in curbing illegal mining activities and promoting legal and regulated mining.
4. Sustainable Mining Practices: By recommending sustainable mining practices, DSR help in minimizing environmental degradation. These practices may include controlled mining depths, restricted extraction zones, and periodic replenishment studies to maintain the ecological balance of river systems.
5. Socio-Economic Considerations: The report also takes into account the socio-economic aspects of riverbed mining, including the impact on local communities. This includes evaluating benefits such as employment generation and revenue for local governments, as well as addressing negative consequences like displacement and loss of livelihoods.
6. Data-Driven Decision Making: DSR provide a scientific basis for decision-making regarding riverbed mining. The inclusion of geospatial data, remote sensing images, and field surveys enhances the accuracy and reliability of information. This data-driven approach supports informed policy-making and resource management.
7. Stakeholder Involvement: The preparation of DSR involves consultation with various stakeholders, including government agencies, local communities, environmentalists, and industry representatives. This inclusive process ensures that multiple perspectives are considered, leading to balanced and equitable mining practices.

Benefits of District Survey Report

1. Environmental Protection: By identifying and mitigating the environmental impacts of riverbed mining, DSR play a crucial role in protecting river ecosystems, reducing erosion, and maintaining water quality.
2. Resource Management: Effective management of mineral resources is achieved through regulated extraction, preventing over-exploitation and ensuring the longevity of resources for future use.
3. Legal Compliance: DSR help in ensuring that mining activities adhere to legal requirements, reducing the incidence of illegal mining and associated environmental damage.
4. Community Welfare: By considering the socio-economic impacts, DSR help in safeguarding the interests of local communities, ensuring that they benefit from mining activities without suffering undue harm.
5. Sustainable Development: The integration of sustainable practices in mining operations contributes to the broader goals of sustainable development, balancing economic growth with environmental stewardship.

- While issuing any fresh permission for mining activity in the district the same is permissible only when the identified stretch is reflected in the DSR with its geo coordinates, quantity and geological profiling.
- The SEIAA/ SEAC while considering the cases for grant of EC need to assess with the help of DSR the proposed mining activity is within the identified stretches of river/ streams/ khads, matching the geo coordinates of proposed site and river stretch where the mineral is available by using ***kml*** files.
- In the DSR 'No Mining Zones' are also listed which clearly give a view of stretches where no mining activity will be allowed and remain restricted.

"*No Mining Zones*" (NMZs) are critical areas identified within riverbeds where mining activities are strictly prohibited. These zones are delineated based on various environmental, ecological, and social criteria to ensure the protection of sensitive areas. The identification of NMZs is a key component of District Survey Report (DSR) for riverbed mining in India, aimed at promoting sustainable and responsible mining practices.

Criteria for Identifying No Mining Zones in DSR

1. Ecological Sensitivity: Areas with high ecological value, such as habitats for endangered species, breeding grounds for aquatic life, and regions with significant biodiversity, are designated as NMZs. Protecting these areas is crucial for maintaining ecological balance and biodiversity.
2. Hydrological Importance: Zones critical for maintaining river flow and groundwater recharge are marked as NMZs. This includes regions near riverbanks, floodplains, and areas prone to erosion. Preserving these areas helps in sustaining water quality and quantity.
3. Proximity to Infrastructure: Areas close to infrastructure such as bridges, roads, dams, and human settlements are identified as NMZs to prevent structural damage and ensure the safety of human life and property.
4. Cultural and Archaeological Significance: Regions with cultural, historical, or archaeological importance are protected as NMZs to preserve heritage sites and prevent any damage due to mining activities.
5. Community Dependence: Areas that are vital for the livelihood of local communities, such as regions used for fishing, agriculture, and other traditional activities, are designated as NMZs. This ensures the sustenance of community livelihoods and social well-being.

Basis for appraisal of EC (River Bed Mining Projects)

Sl. No.	PP Details	Location with khasra Nos.	River/ Stream location	Coordinates (Lat Long)	Area of Mining lease (ha)	Period of Mining lease (Initial)		Period of Mining lease	
						From	To	Form	To
1	2	3	4	5	6	7	8	9	10

Details of River/ Stream

S. No.	Name of the River or Stream	Total Length in the District (in Km)	Place of origin	Altitude at Origin
(1)				
(2)				

Portion of the River or Stream Recommended for Mineral Concession	Length of area recommended for mineral concession (in kilometer)	Average width of area recommended for mineral concession (in meters)	Area recommended for mineral concession (in square meter)	Mineable mineral potential (in metric tonne) (60% of total mineral potential)

Mineral Potential

Boulder (MT)	Bajari (MT)	Sand (MT)	Total Mineable Mineral Potential (MT)

S. No.	River or Stream	Portion of the river or stream recommended for mineral concession	Length of area recommended for mineral concession (in kilometer)	Average width of area recommended for mineral concession (in meters)	Area recommended for mineral concession (in square meter)	Mineable mineral potential (in metric tonne) (60% of total mineral potential)
(1)						
(2)						
Total for the District						

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1 INTRODUCTION

Minerals are valuable natural resources being finite and non-renewable. They constitute the vital raw materials for many basic industries and are a major resource for development. The history of mineral extraction in India dates back to the days of the Harappan civilization. The wide availability of the minerals in the form of abundant rich reserves made it very conducive for the growth and development of the mining sector in India. The country is endowed with huge resources of many metallic and non-metallic minerals. Mining sector is an important segment of the Indian economy. Since independence, there has been a pronounced growth in the mineral production both in terms of quantity and value. India produces as many as 87 minerals, which includes 4 fuel, 10 metallic, 47 non-metallic, 3 atomic and 23 minor minerals (including building and other materials).

Minerals are classified into two groups, namely (i) Major minerals and (ii) Minor minerals. Amongst these two groups minor mineral have been defined under section 3(e) of Mines and Minerals (Regulation and development) Act, 1957. The minor minerals are further governed by "The Himachal Pradesh Minor Minerals (concession) and Minerals (Prevention of Illegal Mining, Transportation and Storage) Rules, 2015". The Minor minerals include building stones, gravel, ordinary clay, ordinary sand, limestone used for lime burning, boulders, kankar, murum, brick earth, bentonite, road metal, slate, marble, stones used for making household utensils etc. and other minerals not defined as minor minerals in the said Act are treated as major minerals. They include coal, kyanite, sillimanite, barites, chromite, fluorite, quartz, sand used for stowing purposes in coal mines and many other minerals used for industrial purposes.

The mining activities in the state of Himachal Pradesh can basically be categorized as in large sector and in small sector. The large sector comprises of limestone projects for manufacturing cement and other lime products while the small mining sector comprises mining of minor minerals like sand, stone, bajri, slate, shale and clay etc. which are basically building material to meet up the demand for infrastructure development of the state.

In pursuance to the orders of Hon'ble Supreme Court dated 27.02.2012 in the matter of Deepak Kumar etc. vs State of Haryana and Others, prior environment clearance has now become mandatory for mining of minor minerals irrespective of the area of mining lease. In order to comply with the judgment of Hon'ble Supreme Court, the Ministry issued S.O.141 (E) dated 15.01.2016 vide which the District Level Environment Assessment Committee (DEAC) and District level Environment Imapact Assessmenyt Authority (DEIAA) were constituted. In the said Notification at point No.7 (iii) the procedure to prepare the District Survey Report (DSR) was laid down providing that a survey shall be carried out by the DEIAA with the assistance of Geology/Irrigation/Forest/PWD etc. departments. As, per the aforesaid, Notification dated 15.01.2016 the Geological Wing, assisted the DEIAA in the preparation of District Survey Report during the year 2016 and the said District Survey Report prepared for District Hamirpur was approved by the DEIAA, after following the procedure laid down in the aforesaid Notification. It is also provided in the Notification No. S.O. 141 (E) dated 15th January, 2016 that the District Survey Report (DSR) shall form the basis for application for Environment Clearence, preparation of reports and appraisal of Projects.The report shall be updated once every 5 years.

In the aforesaid notification dated 15.01.16, the Hon'ble High Court of Jharkhand at Ranchi in its orders dated the 11th April, 2018 and 19th June, 2018 in W.P. (PIL) No. 1806 of 2015, in the matter of Court on its Own Motion Versus the State of Jharkhand & Others with W.P. (PIL) No. 290 of 2013, in the matter of Hemant Kumar Shilkarwar Versus the State of Jharkhand & Others, has inter-alia directed the preparation of District Survey Report for the Sand mining or riverbed mining and for minor minerals other than Sand and bajri or delegation of the powers for preparation of format of District Survey Report of minor minerals other than sand and bajri to the State Government and/or District Environment Impact Assessment Authority and District Expert Appraisal. Thereafter, the Ministry of Environment, Forests

and Climate Change (MoEF & CC) vide notification dated 25.07.2018 provided the procedure for the preparation of the District Survey Document. Accordingly the survey report for district Hamirpur has been updated. This District Survey Report has been updated by covering the mineral bearing areas and overviews of mining activities in the district with all the relevant features pertaining to geology and mineral wealth in replenish-able and non-replenish-able areas of rivers, stream and other sources. The mineral potential has been calculated based on field investigations taking in to consideration the geology of the catchment area of the river/streams and other sources.

2 OVERVIEW OF MINING ACTIVITY OF DISTRICT HAMIRPUR

When it comes to construction, the essential basic materials such as sand, stone and bajri are crucial. The aggregates, play a vital role in building sturdy structures. Aggregates are granular materials used in concrete and mortar. They enhance the properties of these mixtures by providing bulk, stability, and strength. In earlier times, the houses/ buildings were constructed in the form of small dwellings with walls made up of mud plaster, stone and interlocking provided with wooden frames and there were negligible commercial as well as developmental activities resulting less demand of building material. However with the passage of time when the District was carved out in 1972, new vistas of developmental activities were started. As such the demand of minor mineral in the District started an increasing trend. The increase could be gauged from the fact that during 1984-85 the royalty receipt on minor mineral was merely 60,000/- which has now been increased to 1.45 crores. The quantity of minor mineral consumption is a thermometer to assess the quantity of developmental activities being undertaken in a particular area.

In order to meet the requirement of raw material for construction, the extraction of sand, stone and bajri is being carried out exclusively from the river beds. The demand of sand is mainly met through by river borne sand whereas the demand of bajri/grit is either met through river borne collection or through manufactured grit by stone crushers. The demand of dressed or undressed stone is met through the broken rock material from the hill slope.

In Hamirpur District there is no other mineral available except sand, stone and bajri. The local residents used to lift gravel etc. from the river beds to meet out their bonafide requirement, however after coming into being the Himachal Pradesh Minor Mineral (Concession) and Minerals (Prevention of illegal Mining, storage and transportation) Rules, 2015, the mining is allowed in accordace to the rules. Presently in this District two types of mineral concessions are being granted:-

1) Through grant of mining Lease
2) Through auction

At present 50 Nos. of mining leases have been granted under the ibid rules in different parts of the District and the detail is tabulated along with lat long as below.

Table-1 Showing list of mining leases granted/operative

Sr. No.	Name and Address	Location (in Mauza, Mohal)	Location Coordinates (Latitude and Longitude)	Area (Hectares Only)	Type (River Bed/ Hill Slope)	Period in years and (w.e.f.--- to ---)	Purpose (Open Sale/ Stone Crusher)	Approved Quantity Per Annum in MT
Barsar Sub-Division								
1.	Sh. Subhash Chand Prop: M/s Datwalia Stone Crusher	Datwal/Jajri & ghori	31°26'39.21'' N 76°36'16.01'' E	(503 kanals) 19-06-02 Hect	River Bed	15 years / 02-11-2011 to 01-11-	Stone Crusher	1,07,920

	Vill Jajri PO Railly Jajri Tehsil Barsar Distt HMR		31°26'12.73'' N 76°37'18.27'' E			2026		
2.	Sh. Ashish Sharma Partner M/S Sukker Stone Crusher Vill-Chowki, PO Baragram Tehsil-Barsar,Distt. - Hamirpur	Datwal/Dhabiri	31°27'33.53'' N 76°36'54.07'' E 31°27'28.98'' N 76°36'50.12'' E	19-21-06 Hect 507-16 kanals	River Bed	05 years / 04-10-2022 to 03-10-2027	Stone Crusher	1,03,500
3.	Ms . Sikha Kapil D/o Sh. Rakesh Chander Vill - Gharyani, PO-Lafran, Teh-Bijher Distt-Hamirpur	Datwal/ Holat	31°29'18.6'' N 76°36'32.5'' E 31°29'12.3'' N 76°36'34.7'' E	02-68-31 Hect	River Bed	10 years/ 07-12-2021 to 06-12-2031	Stone Crusher	53,865
4.	Smt.Saroti Devi Prop M/S Jai Baba stone crusher V.P.O-Dhangota Teh Barsar , District-Hamirpur	Datwal/Batlahu	31°30'44.81'' N 76°36'16.34'' E 31°30'43.83'' N 76°36'15.49'' E	4-46-92 Hect	River Bed	10 years 18-05-2022 to 17-05-2032	Stone Crusher	90,450
5.	Sh. Raj Kumar Prop: M/S Jai Bhole Shankar stone crusher V.P.O.Samtana Teh Barsar , District-Hamirpur	Datwal/ Janhain	31°33'15.08'' N 76°34'15.01'' E 31°33'58.00'' N 76°34'27.72'' E	07-02-15 Hect	River Bed	10 years 20-06-2023 to 19-06-2033	Stone Crusher	1,08,720
6.	Sh. Raj Kumar Prop: M/S Jai Bhole Shankar stone crusher V.P.O.Samtana Teh Barsar , District-Hamirpur	Datwal/ Gori	31°30'28.10'' N 76°32'37.70'' E 31°33'28.00'' N 76°32'55.00'' E	06-10-05 Hect	River Bed	10 years 20-06-2023 to 19-06-2033	Stone Crusher	90,450
7.	Smt. Kailash Thakur Prop: M/s Kailash Stone Crusher VPO-Bairi, Teh-Barsar Distt Hamirpur	Pahlu / Bairy	31°37'19.05'' N 76°31'1.47'' E 31°37'31.72'' N 76°31'22.27'' E	04-27-95 Hect	River Bed	05 years 07-03-2022 to 06-03-2027	Stone Crusher	54,000
	Nadaun Sub-Division							
1	Sh. Ashok Thakur Prop. Maheshwar stones crushing & washing unit V. Kuthera P.O	Jalari/ Kuthera	31° 38' 22" N /76° 23' 37" E	4-03-97 Hect.	River Bed	15 years / 13-3-14 to 12-3-29	Stone Crusher	30,800

	Jalari, Tehsil-Nadaun Distt.Hamirpur							
2	M/s Trident Industries Through Sh. Sanjay Thakur (GPA) Vill-Gadiyara P.O - Jalari, Tehsil-Nadaun Distt. Hamirpur.	Gadyara/ Jalari	31° 47' 30" N /76° 22' 30" E 31°39'20.36'' N 76°28'17.51'' E	03-47-58 Hect.	River Bed	5 years / 24-05-2021 to 23-05-2026	Stone Crusher	30,550
3	M/s Trident Industries Through Sh. Sanjay Thakur (GPA) Vill-Gadiyara P.O - Jalari, Tehsil-Nadaun Distt. Hamirpur.	Sunh/ Jalari	31°44' 20" N /76°26' 05" E	02-22-56 Hect.	River Bed	5 years/ 04-10-2017 to 03-10-2022	Stone Crusher	40,500
4	M/s Mahadev Stone Crusher Prop: Rakesh Jain Vill-Bela P.O &Tehsil-Nadaun Distt. Hamirpur.	Kohna/ Naungi	31°46' 23" N /76°22' 50.5" E	03-61-24 Hect	River Bed	5 years/ 10-10-2017 to 09-10-2022	Stone Crusher	37,699
5	M/s Mahadev SCU, Sh. Ashish Sharma S/o Sh. Ved Parkash Vill-Mulana, PO-Bohni, Tehsil and district-hamirpur and Sh Rakesh Kumar, Vill-Bela, Nadaun, Partners M/s Mahadev Stone crusher, Jol sapper	Naungi/Chal Chotta	31° 40' 28.78"N 76°22' 43.4" E	03-50-73 hectares	Riverbed	10 years / 21-10-2021 to 20-10-2031	Stone crusher	77,626
6	M/S Mahalakshmi stone Crusher Village-Dadoon (Hathol) PO Pansai,Tehsil-Nadaun Distt. Hamirpur	Hathol/ Dadhoon	31°41' 46.5" N / 76°21' 46.1" E	04-52-06 Hect	River Bed	5 years / 06-12-2021 to 05-12-2026	Stone Crusher	30,000
7	M/S Mahalakshmi stone Crusher Village-Dadoon (Hathol) PO Pansai,Tehsil-Nadaun Distt. Hamirpur	Hathol/ Beha	31°42' 24.44" N /76°21' 19.34"E	04-06-86 Hect	River Bed	15 years / 12-09-2022 to 11-09-2037	Stone Crusher	72,900

8	M/S Mahalakshmi stone Crusher Village-Dadoon (Hathol) PO Pansai,Tehsil-Nadaun Distt. Hamirpur	Jassai/ Jansooh	31°46' 03.8" N /76°18' 40.8" E	04-42-27 Hect	River Bed	15 years / 25-11-2023 to 24-11-2038	Stone Crusher	90,000
9	M/S Ambay Stone Crusher Prop. Gian Chand Village-Jarout, PO-Sera,Tehsil-Nadaun,Distt. Hamirpur	Kohla/ Kaloor	31°46'13.97'' N 76°18'38.11'' E	14-58-14 Hect	River Bed	15 years / 16-06-2016 to 15-06-2031	Stone Crusher	1,12,500
10	Sh Ayodhya Lal Sharma S/o Sh. Bardoo Ram vill. Dadhoon P.O.Pansai Tehsil-Nadaun, Distt. Hamirpur	Hathol/ Dadhoon	31°40'15.49'' N 76°22'54.20'' E	4-38-81 Hect.	River Bed	5 years / 01-09-16 to 31-08-2021	Open Sale	28,120
11	Sh. Prakash Chand S/o Sh. Sunder Ram VPO Chamned Teh & Distt Hamirpur	Sukardyah Buhli/ Jassai Govt. Land	31°39'16.15'' N 76°22'43.15'' E	03-76-87 Hect	River Bed	10 years/ 07-03-2019 to 06-03-2029	Stone Crusher	62,645
12	Smt Sunita Devi w/o Ranbir singh VPO- Kandwal and Smt Muskaan Thakur w/o sh Rahul Singh Pathania, Vill-Thapkour, PO Bhadroya, Tehsil- Nurpur , Kangra	Dhayaan/Bara, Govt Land	31°47'17.8" N 76°24'21.9" E	05-39-24 Hect	River Bed	10 years / 19.09.2019 to 18.09.2029	Open Sale	1,17,000
13	Sh. Shammi Soni S/o Sh. Brij Mohan Soni VPO & Teh-Nadaun Distt -Hamirpur	Bhumpal/ Mahun	31°44'48.7" N 76°24'8.7" E	07-66-42 Hect.	River Bed	15 years/ 03-12-2019 to 02-12-2034	Stone Crusher	1,05,750
14	Smt. Meera Devi W/o Sh.Som Dutt Sharma Vill-Larha, P.O-Galore, Teh-Nadaun, Distt-Hamirpur (H.P)	Jassai/ Tuhni	31°37'33.54'' N 76°24'12.69'' E	04-53-70 Hect	River Bed	5 years / 06-05-20 to 05-05-2025	Open sale	88,582
15	Sh Rajiv Singh S/o Sh Rasil Singh, Vill-	Kohala/Kaloor	31°46'44.4" N 76°18'37.4"	3-99-96 Hectares	River Bed	5 Years / 26-10-	Stone Crusher	85,500

	Bhabran, PO-Kitpal, Tehsil-Nadaun , Distt-Hamirpur		E			2020 to 25-10-2025		
16	Smt. Raksha Rani, W/o Late Sh Parkash Chand , Vill-Har masanda, Po- Sanahi, Nadaun, District-Hamirpur	Budohag/ Har-Masanda	31°42'06.71'' N 76°27'32.23'' E	04-88-94 hectares	River Bed	5 years / 13-08-2021 to 12-08-2026	open sale	73,125
17	Sh. Ashish Sharma S/o Sh. Ved Parkash Vill-Mulana, PO-Bohni, Tehsil and District-Hamirpur and Sh Rakesh Kumar, Vill-Bela, Nadaun, Partners M/s Mahadev Stone crusher, Jol sapper Teh-Nadaun Distt-HMR	Baldok/Dhamoti	31°44'18.2" N 76°25'09.6" E	02-84-89 Hectares	Riverbed	10 years / 21-10-2021 to 20-10-2031	Stone crusher	64,100
18	M/s Trident Industries Prop: Virender Jain V. P.O - Jalari, Tehsil-Nadaun Distt. HMR	Bhumpal/ Kohla	31°45'17.0" N 76°23'59.08'' E	03-30-60 Hectares	Riverbed	10 years / 05-04-2022 to 04-04-2032	Stone crusher	73,126
1	Sh. Parveen Kumar Prop M/s Mahabir stones crusher V.P.O Bhatera, Tehsil & Distt. Hamirpur.	Matitira/Bharnoti	31° 52’ 44”N/76° 38’ 50”E	04-13-18 Hect	River Bed	15 years /12-07-2011 to 11-07-2026	Stone Crusher	54,000
2	Sh. Parveen Kumar Prop M/s Mahabir stones crusher V.P.O Bhatera, Tehsil & Distt. Hamirpur.	Bhatera / Sapahal	31° 45’ 12.3”N/76° 32’ 57.2”E	42-13 Kanals	Hill Slope	10 years /04-10-2017 to 03-10-2027	Stone Crusher	40,764
3	Smt. Ashlata Devi w/o Sh. Nand Lal Vill. Majhot P.O Ropa Teh. & Distt. HMR	Saphal/ Panoh	31°45'12.3" N 76°32'57.2" E	42-08 kanal	Hill Slope	5 years / 22-06-20 to 21-06-25	Stone Crusher	35,175
4	Sh. Ashish Kumar , S/o Sh. Ved Prakash , H.No.-190	Chabutra/Tikker	31°46'00.2" N 76°30'53.6" E	02-27-68 Hect	River Bed Pvt. Land	10 years/ 26-06-20 to 25-06-30	Stone Crusher	33,050

	ward No.-8 Teh & Distt-Hamirpur							
5	Sh. Ashish Kumar , S/o Sh. Ved Prakash , H.No.-190 ward No.-8 Teh & Distt-Hamirpur	Sapahal/ Dhuk	31°44'22.05'' N 76°33'35.42'' E	02-84-09 Hect	Hill Slope	10 years/ 21-08-20 to 20-08-30	Stone Crusher	60,000
6	Sh. Rajat Thakur S/o Mohinder Singh Vill Khanauli Teh. Sujanpur Distt HMR	Jangal Rajgir/ Khanauli	31°52'25'' N 76°38'50'' E	4-61-54 Hect	River Bed	10 years/ 15-07-2011 to 16-02-2024 (extended)	Stone Crusher	40,200
7	Sh. Rajat Thakur S/o Mohinder Singh Vill Khanauli Teh. Sujanpur Distt HMR	Sachuhi/ Jangal Rajgir	31°52'37.89'' N 76°37'15.81'' E	31-08 Kanal	River Bed	10 years/ 11-2-19 to 10-02-29	Stone Crusher	11,220
8	Dhaulasidh Hydroelectric Project (SJVNL) H.No.21, W. No. 01,Heera Nagar, Teh & Distt-Hamirpur	Bhaleth/ Ropa	31°48'35.16'' N 76°29'32.03'' E	87-09 Kanal	River Bed	05 years/ 24-06-2022 to 23-06-2027	Stone Crusher	45,000
9	Dhaulasidh Hydroelectric Project (SJVNL) H.No.21, W. No. 01,Heera Nagar, Teh & Distt-Hamirpur	Bir Bagehra/ Bagehra-Bhulla	31°51'51.81'' N 76°31'59.04'' E	04-64-77 Hect	River Bed	05 years/ 21-10-2023 to 20-10-2028	Stone Crusher	90,000
10	Sh. Udesh Kumar S/o Sh. Bhuri Singh Vill-Puar P.O-Bir Bagehra, Teh- Sujanpur Distt- Hamirpur	Bir Bagehra/ Bairi	31°52'57.35'' N 76°33'48.78'' E	05-44-00 Hect	River Bed	10 years / 23-09-17 to 22-09-27	Open Sale	1,22,400
11	Sh. Bhim Singh Rangra, VPO-Jangal Beri, Tehsil Sujanpur Hamirpur	Jangal Rajgir/ jangal Khas	31°53'10'' N 76°34'11'' E	1-91-98 Hect	River Bed	05 years / 20-03-2021 to 19-03-2026	Open Sale	43,195
12	Sh. Krishan Chand S/o Shali Ram & Smt. Rajni Devi & Smt. Meena Kumari Both D/o Late Sh. Subhkaran, Vill Sachuhi, PO	Jangal Rajgir/sachuhi	31°52'51.32'' N 76°37'55.88'' E	4-84-41 Hect	River Bed	05 years/ 19-01-2018 to 18-01-2023	Open Sale	1,08,980

	Tarpol, Teh-Sujanpur Distt-Hamirpur							
1	M/s Sanjay Chouhan stones crusher-2 ,Jahu Tehsil. Bhoranj Distt. Hamirpur.	Mewa/Jahu Kalan	31° 35' 08" N /76° 42' 07" E	17-30-76 Hect.	River Bed	15 years/20-10-11 to 19-10-26	Stone Crusher	38,600
2	M/s Sanjay Chouhan stones crusher-,Jahu Tehsil. Bhoranj, Distt.-Hamirpur.	Mehlata/Manoh Bulla &Behrwin Jattan	31° 69' 40" N /76° 40' 96" E	7 Hect.	River Bed	15 years/13-06-2013 to 12-06-28	Stone Crusher	40,000
3	M/s Sanjay Chouhan stones crusher-,Jahu Tehsil. Bhoranj Distt. HMR	Mewa/Jahu Khurd	31° 72' 40" N / 76° 42' 96" E	30-80-77 Hect.	River Bed	15 years/17-09-2013 to 16-09-2028	Stone Crusher	48,720
4	M/s Sanjay Chouhan stones crusher-,Jahu Tehsil. Bhoranj Distt. HMR	Mewa/Dhamrol	31° 37' 30" N /76° 42' 10" E	1-50-46 Hect.	River Bed	15 years/13-06-2013to 12-06-2028	Stone Crusher	14,610
5	M/s Sanjay Chouhan stones crusher-,Jahu Tehsil. Bhoranj Distt. HMR	Mewa/ Dhamrol	31° 38' 28.01 " N /76° 41' 17.84" E	56-17 Kanals	River Bed	05 years/ 13-05-2022 to 12-05-2027	Open Sale	37,073
6	Sh Purshotam Chand Prop M/sHimachal stone crusher Mundkhar Teh.Bhoranj Distt. Hamirpur	Mehlata/Mundkhar	31° 36' 15" N /76° 42' 30" E	11-39-56 Hect	River Bed	15 years/19-08-15 to 18-08-30	Stone Crusher	56,490
7	Sh Amardeep S/0 Sh. Bram Chand V.P.O Bhambala Distt. Mandi (H.P)	Mewa/Badehar	31° 36' 43"N, /76° 43' 01.7" E	1-04-58	River Bed	05 years / 19-04-2021 to 18-04-2026	Stone Crusher	12,038
8	Sh Amardeep S/o Sh. Bram Chand V.P.O Bhambala Distt. Mandi (H.P)	Mewa/Jahu Khurd	31° 36' 20.8"N/76° 43' 15.9"E	1-07-69	River Bed	05 years / 19-04-2021 to 18-04-2026	Stone Crusher	12,094
9	Sh. Piar Chand Prop: M/s Laxmi stone Crusher V. Kakriar P.O. Himmer Teh-Tauni Devi, Distt. Hamirpur	Bamson / Ropari Balohian	31°40'9.29" N 76°37'27.93" E	03-63-71 Hect	River Bed	10 years / 29-09-2022 to 28-09-2032	Stone Crusher	53,100

1	Sh. Vijay Chopra Prop: M/S Jagdamba crusher Co VP.O Massiana Teh. & Distt. Hamirpur (H.P)	Jangal/Dudhana Lohiyan	31°39'59.56'' N 76°27'48.97'' E	02-86-67 Hect	River Bed	05 years / 25-03-2022 to 24-03-2027	Stone Crusher	51,525
2	Smt. Kailash Thakur Prop: M/s Kailash Stone Crusher VPO-Bairi, Teh-Barsar Distt Hamirpur	Jangal/Dudhana Lohiyan	31°39'21.22'' N 76°28'16.34'' E	04-54-89 Hect	River Bed	15 years / 05-02-2017 to 04-02-2032	Stone Crusher	54,000
3	Smt. Sneh Lata Prop. Jai Shankar Stone Crusher V.P.O Kashiri Mahadev , Tehsil-Sujanpur, District-Hamirpur	Bajuri/Darogan Pati-Darogan Bhurana	31°43'45.2" N 76°33'27.5" E	5-22-55 Hect	River Bed	05 years / 08-03-2018 to 07-03-2023	Stone Crusher	55,125
4	Sh. Jagdish Thakur Prop:M/s Matri Shakti stone Crusher V.P.O Patnoun Tehsil- Tauni Devi, Distt.-Hamirpur.	Lagwalti / Taap	31°47'10.06'' N 76°37'21.6" E	07-60-27 Hect	River Bed	10 years / 27-12-2023 to 26-12-2033	Stone Crusher	1,37,250

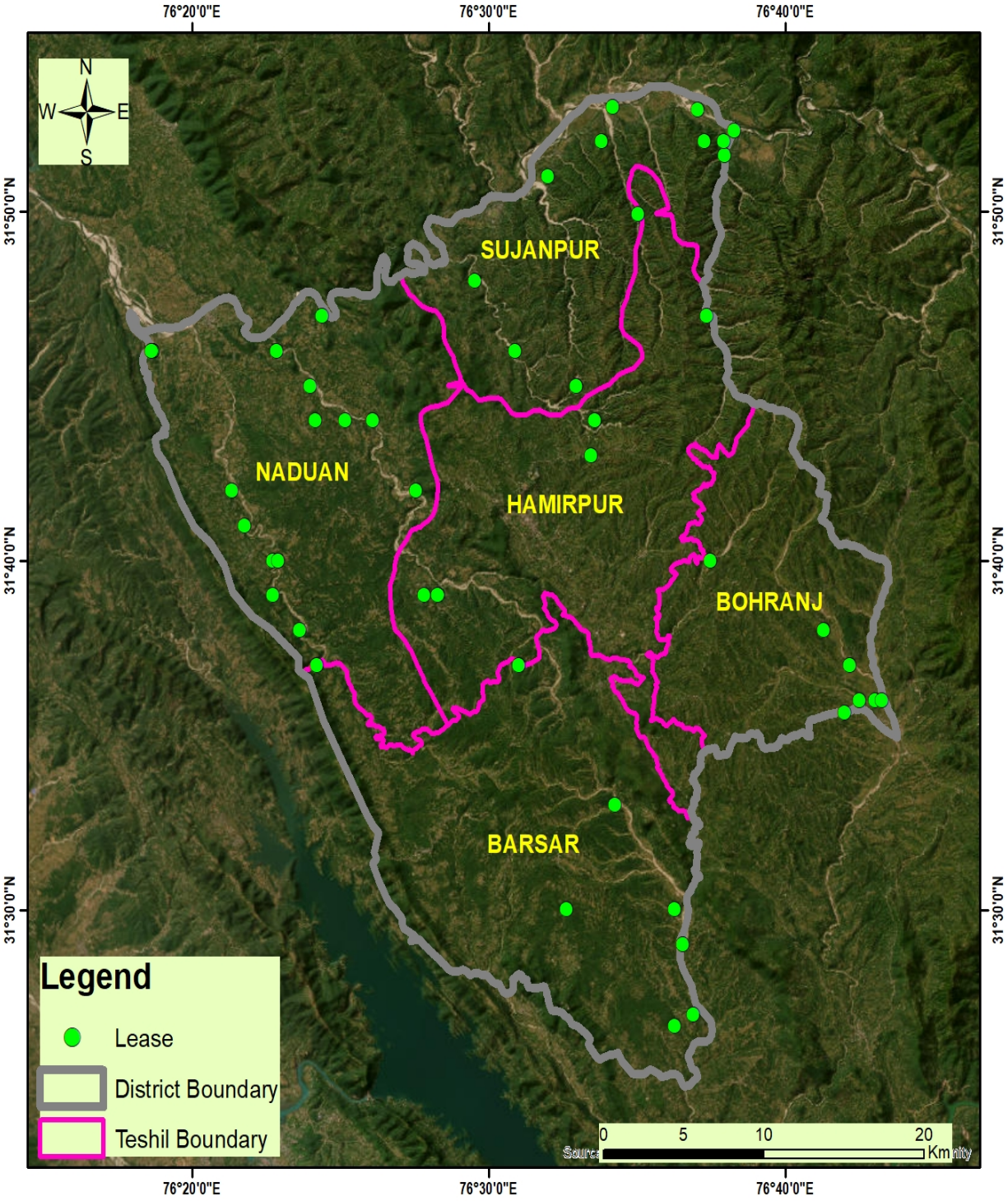
Through Auction

The auction of minor mineral quarries of District Hamirpur was conducted on 17-9-2015, 21-4-2016, 12-12-2018 & 05-03-2020 and accordingly 41 numbers of stream beds have been put to auction for extraction of Sand, Stone And Bajri.

List of Tendors of minor minerals quarries in District Hamirpur held on 17-09-2015

Quarry No.	Name of the quarry	Area in Hectares	Highest Tendorer Name and address
01.	Beas Dariya IV Sujanpur	8-55-33	Sh. Ajay Pal S/o Sh. Sher Singh Vill-Kachhali, P.O & Teh-Sandhole, Distt-Mandi (H.P)
02.	Jangler Khad	5-44-00	Sh. Udesh Kumar S/o Sh. Bhuri Singh Vill-Puar P.O- Bir Bagehra, Teh-Suhajanpur Distt- Hamirpur (H.P)

Granted Leases in District Hamirpur



List of Auction of minor minerals quarries in District Hamirpur held on 21-04-2016

Quarry No.	Name of the quarry	Area in Hectares	Highest Bidder Name and address
01.	Beas Dariya Nadaun	5-39-24	Smt.Sunita Devi W/o Sh.Ranbir Singh,V.P.O-Kandwal,Teh- Nurpur, Distt- Kangra (H.P) & Smt.Muskan Thakur W/o Kanwar Rahul Singh,Vill- Thapkor, P.O- Bhadroya, Teh- Nurpur, Distt- Kangra (H.P)
02.	Maan Khad Part-I	12-62-72	Sh. Som Dutt Sharma S/o Sh. Purshotam Dass Sharma, Vill-Larha, P.O-Galore, Teh- Nadaun, Distt-Hamirpur (H.P)
03.	Maan Khad Part-III	8-48-12	Sh. Prakash Chand, S/o Sh.Sunder Ram, V.P.O-Chamned,Teh & Distt- Hamirpur (H.P)
04.	Kunah Khad Part-I	21-16-08	Sh. Anmol Kumar, S/o Sh. Jai Chand, Flat No.-08, Ward No.-7, Housing Board Colony Hamirpur (H.P)
05.	Kunah Khad Part-II	5-59-06	Sh. Som Dutt Sharma S/o Sh. Purshotam Dass Sharma, Vill-Larha, P.O-Galore, Teh- Nadaun, Distt-Hamirpur (H.P)
06.	Kunah Khad Part-III	7-26-31	Sh. Raj Kumar, S/o Sh.Kalidass, Vill- Lalin, P.O-Changar, Teh & Distt- Hamirpur (H.P)
07.	Kunah Khad Part-IV	14-94-32	Sh. Raj Kumar, S/o Sh. Punnu Ram, Vill-Sorad, P.O- Jol Sapper, Teh- Nadaun, Distt- Hamirpur (H.P)
08.	Kunah Khad Part-V	6-64-95	Sh. Raj Kumar, S/o Sh. Punnu Ram, Vill-Sorad, P.O- Jol Sapper, Teh- Nadaun, Distt- Hamirpur (H.P)
09.	Beas River Sujanpur-III	22-93-07	Sh. Rahul Pathania S/o Sh. Ranjit Singh, Vill-Thapkor, P.O- Bhadroya, Teh- Nurpur, Distt-Kangra (H.P) & Smt.Seema Devi, W/o Sh.Dharamveer Singh, V.P.O-Kandwal,Teh- Nurpur, Distt- Kangra (H.P)
10.	Beas River Sujanpur-IV	16-24-89	Sh. Ravi Kumar, S/o Sh. Daulat Ram, Vill-Puar, P.O- Bir Bagehra, Teh- Sujanpur, Distt- Hamirpur (H.P)
11.	Sukker Khad	9-15-94	Sh. Balwant Rai, S/o Sh. Kanshi Ram, V.P.O-Saloni, Teh- Barsar, Distt- Hamirpur (H.P)
12.	Bakker Khad	4-03-85	Sh. Bikesh Kumar Chambial, S/o Sh. Desh Raj Chambial, Vill-Bajahar, P.O- Tarpohal, Teh-Sujanpur, Distt-Hamirpur (H.P)

Tender-cum-Auction of minor minerals quarries in District Hamirpur held on 12-12-2018

Quarry No.	Name of the quarry	Area in Hect	Highest Bidder Name
01.	Sirhali Khad-III	02-90-08	Sh.Sanjay Chauhan

			S/o Sh. Hukkam Chand VPO- Jahu, Teh-Bhoranj Distt. Hamirpur
02.	Sirhali Khad-IV	06-84-02	Sh. Subhash Chand S/o Sh. Mukadam Singh V.Kulwal P.o Loharli Teh.. Barsar Distt. Hamirpur.
03.	Sukker Khad-IV	07-02-15	Sh. Raj Kumar S/o Sh. Joginder Singh V.P.O.Samtana Teh Barsar , Districrt-Hamirpur
04.	Sukker Khad-V	20-40-11	Sh.Sanjay Chauhan S/o Sh. Hukkam Chand VPO- Jahu, Teh-Bhoranj Distt. Hamirpur
05.	Sukker Khad-III	06-54-40	Sh.Kamal Dev Pathania Vill- Gori PO- Kulehra Teh-Barsar Distt Hamirpur
06.	Sukker Khad-I	06-10-05	Sh. Raj Kumar S/o Sh. Joginder Singh V.P.O.Samtana Teh Barsar , Districrt-Hamirpur
07.	Sukker Khad-II	05-28-05	Sh.Kamal Dev Pathania Vill- Gori PO- Kulehra Teh-Barsar Distt Hamirpur
08.	Bakker Khad -II	07-77-12	Sh. Piar Chand Chauhan Vill- Kakriar P.O. Himmer Tehsil- Tauni Devi, Distt. Hamirpur (H.P)
09.	Bakker Khad –III	06-10-00	Smt. Usha Devi W/o Sh. Piar Chand Chauhan Vill- Kakriar P.O. Himmer Tehsil- Tauni Devi, Distt. Hamirpur (H.P)
10.	Bakker Khad -IV	08-56-70	Sh.Jagdish Thakur S/o Sh. Hem Raj H. No.-18 W. No.-10 Gandhi Nagar Teh & Distt- Hamirpur
11.	Bakker Khad -V	07-79-54	Smt. Usha Devi W/o Sh. Piar Chand Chauhan Vill- Kakriar P.O. Himmer Tehsil- Tauni Devi, Distt. Hamirpur (H.P)
12.	Sukker Khad Daihran	09-82-67	Sh.Sanjay Chauhan S/o Sh. Hukkam Chand VPO- Jahu, Teh-Bhoranj Distt. Hamirpur
13.	Sukker Khad Pharnol	09-51-40	Sh. Shashi Kumar S/o sh. Paras Ram Vill - Badhan PO- Jhiralri Teh-Basar Distt- Hamirpur
14.	Kunah Khad (Dera Parol)	03-63-71	Sh.Piar Chand Chauhan Vill- Kakriar P.O. Himmer Tehsil- Tauni Devi, Distt. Hamirpur (H.P)

Auction of minor minerals quarries in District Hamirpur held on 05-03-2020

Qarry. No.	Name of the quarry	Area in Hect.	Highest Bidder Name and address
01.	Pung Khad-I	55-10 (Kanals)	Sh. Jagdish Thakur S/o Sh. Hem Raj H. No.-18 W. No.-10 Gandhi Nagar Teh & Distt- Hamirpur & Sh. AbhayVeer Singh S/o Sh. Inder Singh Chauhan Vill- Chhaan PO- Barara Tehsil- Tauni Devi, Distt. Hamirpur (H.P)
02.	Pung Khad-II	53-06 kanals	Smt. Ashlata Devi w/o Sh. Nand Lal Vill. Manjhot P.O Ropa Teh. & Distt. HMR.
03.	Pung Khad-III	68-07 Kanals	Sh. Jagdish Thakur S/o Sh. Hem Raj H. No.-18 W. No.-10 Gandhi Nagar The & Distt- Hamirpur & Sh. AbhayVeer Singh S/o Sh. Inder Singh Chauhan Vill- Chhaan PO- Barara Tehsil- Tauni Devi, Distt. Hamirpur (H.P)
04.	Maan Khad (Galol-I)	03-36-41	Sh. Anurag Chauhan S/o Sh. Piar Chand Chauhan

05.	Maan Khad (Galol-III)	05-93-17	Sh. Anurag Chauhan S/o Sh. Piar Chand ChauhanVill- Kakriar P.O. Himmer Tehsil-Tauni Devi, Distt. Hamirpur (H.P)
06.	Maan Khad (Galol-IV)	10-03-17	Sh.Jagdish Thakur S/o Sh. Hem Raj H. No.-18 W. No.-10 Gandhi Nagar Teh & Distt- Hamirpur & Sh. AbhayVeer Singh S/o Sh. Inder Singh Chauhan Vill- Chhaan PO- Barara Tehsil-Tauni Devi, Distt. Hamirpur (H.P)
07.	Kunah Khad (Chadhoo)	02-84-89	Sh.Rakesh Jain Vill-Bela P.O & Tehsil-Nadaun Distt. Hamirpur & Sh. Ashish Sharma S/o Sh. Ved Parkash Vill. Mulana, P.O. Bohni Tehsil & Distt. Hamirpur
08.	Kunah Khad (Bhumpal)	03-30-60	Sh.Virender JainS/o Sh. Sudershan Jain Vill- Seri PO & Teh- Nadaun Distt-Hamirpur
09.	Sukker Khad (Jangli)	03-37-99	Sh. Madan Lal S/o Sh. Ram Chand VPO-Ganalwin Teh - Ghuwarwin Distt- Bilaspur
10.	Sukker Khad (Lafran)	08-58-45	Smt.Saroti Devi W/o Sh. Gian Chand VPO-Dhangota Teh -Barsar Distt Hamirpur
11.	Sukker Khad (Chowki)	06-88-82	Sh.Sanjay Chauhan S/o Sh. Hukkam Chand VPO- Jahu, Teh-Bhoranj Distt. Hamirpur
12.	Garli Khad (Garli khas)	04-90-09	Sh. Subhash Chand S/o Sh. Mukadam Singh V.Kulwal P.o Loharli Teh.. Barsar Distt. Hamirpur.
13.	Garli Khad	07-43-59	Sh. Subhash Chand S/o Sh. Mukadam Singh V.Kulwal P.o Loharli Teh.. Barsar Distt. Hamirpur.

Stone crushers, also known as rock crushers, are mechanical devices designed to crush rocks into smaller fragments or gravel. They play a crucial role in various industries, from mining to construction and every district of Himachal Pradesh have such industries so that raw mineral could be processed for use in construction activities in the state.

In District Hamirpur 28 number of such Stone Crushers have been installed and registered with the Mining Departmrent. However, these 28 No. of Stone Crushers require various codal formalities as per law for legal operation as and when needed.

3 DETAIL OF ROYALTY AND PRODUCTION OF MINOR MINERAL

In Hamirpur District only minor mineral such as sand/ M- sand, stone and bajri is available and the royalty is received only from these minerals based on consumption factors. The royalty received during the last five in the district Hamirpur is as follows:-

Table-4- Showing year wise royality recieved and production of minerals

Sr No.	Year	Royalty in Crore	Production of mineral
01.	2018-2019	21169740	352829
02.	2019-2020	24197460	403291
03.	2020-2021	35581680	593028
04.	2021-2022	36018960	600316
05.	2022-2023	67934000	849175

Figure-1 Showing Graph of yearwise Royality

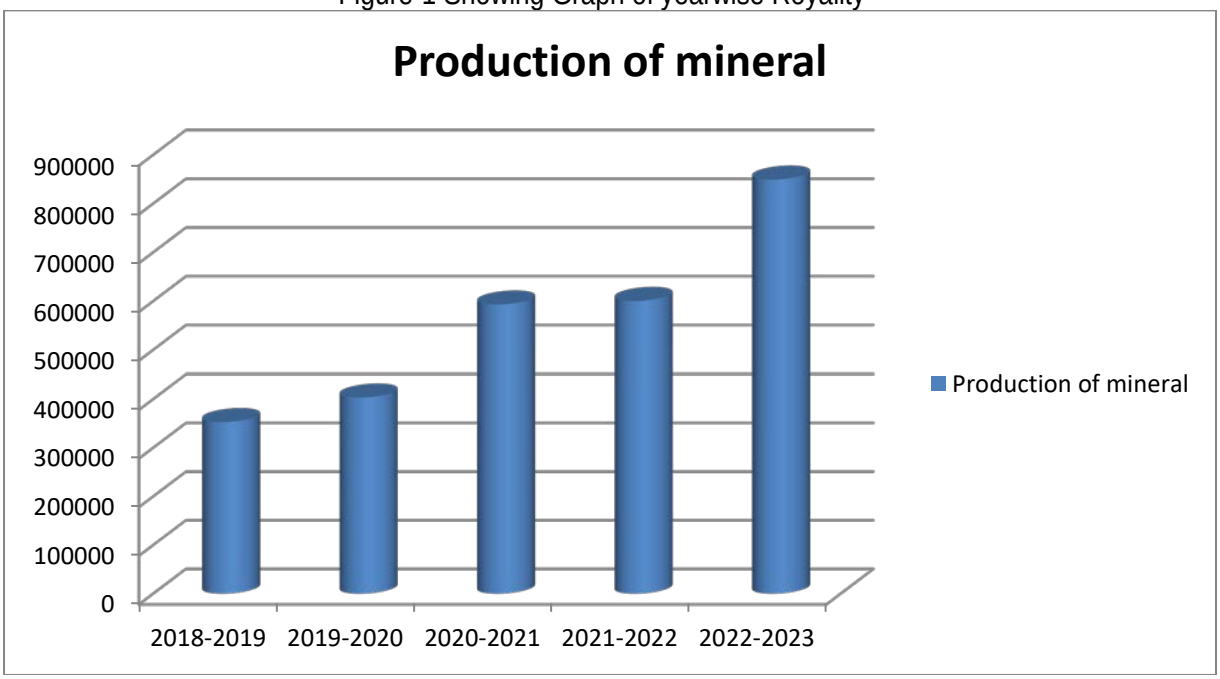


Figure-2 Showing detail of yearwise production of mineral

4 PROCESS OF EROSION, TRANSPORTATION AND DEPOSITION IN THE RIVER BED:

Mineral erosion, transport, and accumulation by rivers are essential processes that shape landscapes and influence the distribution of minerals in Earth's ecosystems. These processes involve complex interactions between geological, hydrological, and environmental factors. Understanding them requires an interdisciplinary approach combining geology, hydrology, sedimentology, and geomorphology.

Erosion, the wearing away of rocks and sediments by physical and chemical processes, is a primary mechanism by which minerals are mobilized within river systems. The rate of erosion (E) can be quantified using equations such as the stream power law:

$$E=kS^{m}A^{n}$$

where k is the erodibility coefficient, S is the slope of the river channel, A is the drainage area, and m and n are exponents that vary depending on factors such as sediment characteristics and hydraulic conditions. This equation illustrates how erosion rates depend on factors like channel slope and drainage area. Once minerals are eroded from their source rocks, they are transported downstream by river currents. The transport of sediment is governed by principles of fluid dynamics and sediment transport mechanics. One widely used equation to describe sediment transport is the Einstein-Brown equation:

$$q=C_f \cdot v_s \cdot D \cdot (s-s_c)^{3/2}$$

where q is the sediment transport rate, Cf is the sediment concentration, vs is the settling velocity of sediment particles, D is the river flow depth, s is the sediment specific weight, and sc is the specific weight of water. This equation highlights the influence of factors such as sediment concentration, settling velocity, and flow depth on sediment transport.

As sediment-laden rivers meander across landscapes, they deposit minerals in various locations, leading to the accumulation of sedimentary deposits. The process of sediment deposition is influenced by factors such as flow velocity, channel morphology, and sediment supply. A fundamental equation used to describe sediment deposition is the Hjulström curve:

$$vc=k \cdot D^{d}$$

where vc is the critical velocity required for sediment transport, k is a constant, D is the particle diameter, and d is an exponent that reflects the relationship between particle size and critical velocity. This equation illustrates how sediment deposition rates vary with factors such as particle size and flow velocity.

In addition to physical processes, chemical weathering also plays a significant role in mineral erosion and transport by rivers. Chemical reactions between water and minerals can alter their composition and solubility, affecting their transport and fate within river systems. Equations such as the Gibbs free energy equation and the rate law for chemical reactions are used to quantify the kinetics and thermodynamics of chemical weathering processes.

In conclusion, mineral erosion, transport, and accumulation by rivers are complex phenomena that are governed by a combination of physical, chemical, and environmental factors.

There is not a single river that doesn't carry fragmental material and deposit it. Even at the early stages, in the development of a river, when erosion and transport definitely prevail over accumulation, the material carried by the river is deposited in some of the sections. During youthful stage of the river, these deposits are unstable and when the volume of water and stream velocity increases (during flood), they may start moving again downstream. The load carried by a stream includes the rock waste supplied to it by rain wash, surface creep, slumping etc. by tributaries , external agents such as glaciers, wind, together with, acquired by its own erosion work. The term load doesn't specifically mean the maximum amount of debris, that a stream could carry in a given set of conditions, that amount is referred to as the transporting power or capacity of a river. The term load is technically defined as the total weight of solid detritus transported in unit time. The transporting capacity of a stream rises very rapidly as the discharge and the velocity increases. Experiments show that with debris of mixed shapes and sizes, the maximum load that can be carried is proportional to something between the third and fourth power of the velocity. But the fragments of a given shape, the largest size that can be moved (not the actual mass of mixed debris) is proportional to the sixth power of the velocity, provided of course that the depth of water is also adequate for the purpose. As the velocity of a river is checked, the bed load is first to come to rest with continued slackening of the flow, the larger ingredients of the suspended load are dropped, followed successibly by finer and finer particles. When the stream begins to flow more vigoursly, the finer materials are the first to move again. A river begins to sort out its load or burden as soon as it receives it. The proportion of fine to coarse amongst the deposited materials tend on average to increase downstream, but there may be interruptions of this tendency because of addition of coarse debris from tributataries or from landslides and steepening of the banks.

a. General Geomorphological Characteristics of Rivers/Streams

Transport of Sediment by Streams and Rivers

The material transported by a stream can travel as:

1. Bed load
2. Suspended load
3. Dissolved load (salts, chemicals)

Stream capacity

- Maximum quantity of solid material that a stream can carry
- Related to velocity (discharge)
- Higher after a rain (more sediment in water

Stream competence (or competency)

- Measure of the maximum size of particles the stream can transport
- Predict erosive capabilities

Types of rivers or streams

1. Meandering

   These streams are very sinuous, and tend to migrate back and forth across the floodplain (or meander), over time. The word "meander" comes from the name of a sinuous river in Turkey, named the Menderes.
2. Braided

These streams have lots of lenticular-shaped in-channel bars. The stream channel bifurcates around these bars, and follows a pattern resembling braided hair.

Fluvial Geomorphology

Erosion is the set of all processes by which soil and rock are loosened and moved downhill or downslope. The most important process of erosion is due to running water. Erosion by running water acts in two basic forms: *overland flow* and *channel flow.*

I. Splash Erosion

Most running water starts off as rain. Rain drops have diameters of between 0.5 to 7 mm and hit the ground at between 1 - 9 m/sec. The force of the impact loosens material and throws it into the air. This is called splash erosion. In violent thunderstorms over 200 tonnes/hectare can be disturbed. On a sloping surface, soil is shifted downhill as grains are moved slightly greater distances downhill than uphill. More importantly, however, it leads to a decrease in the permeability of the surface due to openings being sealed by particles. There is therefore less infiltration and an increase in overland flow.

II. Overland Flow

Runoff starts as a broad sheet. The sheet exerts a drag force over the ground surface and some weathered products may be removed. This is sheet erosion. Generally, after traveling a short distance, small channels or rills are formed, which coalesce into gullies, concentrating the erosive action.

The amount of erosion of a slope depends on

- the length and steepness of the slope
- the rainfall intensity
- the permeability and structure of the surface
- the amount of vegetation cover.

III. Channel Flow

Stream erosion is "the progressive removal of mineral matter from the surfaces of a stream channel which itself may consist of bedrock or regolith. Erosion will only occur when the stream has an excess of energy. In mountainous streams, the rough channel walls may amount to 96% of the potential energy of the stream. Some energy is also spent in transporting load previously acquired. The quantity of water passing through the channel is termed the discharge (m^2/sec) and is eqaul to the channel cross-sectional area (m^2) times the average stream velocity (m/sec).
The amount of sediment carried by the stream is called the stream load (kg/m^3)

Sub-processes of Erosion

a. Hydraulic Action

- The force of the running water alone. This is very important in weak alluvial deposits, especially in times of flood, when fast flowing; turbulent water undermines the channel banks.

b. Abrasion,

- the scouring caused by the impact of rock particles that are being transported. Abrasion features include plunge pools, potholes and chutes. Abrasion is proportional to velocity2, so a three-fold increase in velocity leads to nine times as much abrasion. The mutual erosion of two particles is known as attrition

c. Solution (Corrosion)

- chemical reactions between ions in solution and exposed minerals. It is particularly important in limestone areas or on beds of rock salt and gypsum, but all common minerals are soluble to some extent.

IV. Erosion Velocities

The easiest grains to erode are in the fine to medium sand size range (see figure 1). Particles greater than this size have a proportionally greater volume to surface area ratio, so are harder to erode. For clays, ionic bonding leads to increased cohesion between clay particles, making them harder to erode. Clays are also platy minerals and form smooth surfaces. Laminar flow over the smooth surface decreases the ability of the stream to erode the particles. Clays also infill between larger grains and so are protected by the larger grains. Sands, therefore, may be moved during "normal" river flow, but it is only when floods increase the stream's velocity that the larger and smaller particles can be moved. Once the particles are being transported, there is an orderly deposition of particles with the largest being deposited first and clays being held almost indefinitely. Hence the sediment becomes sorted downstream.

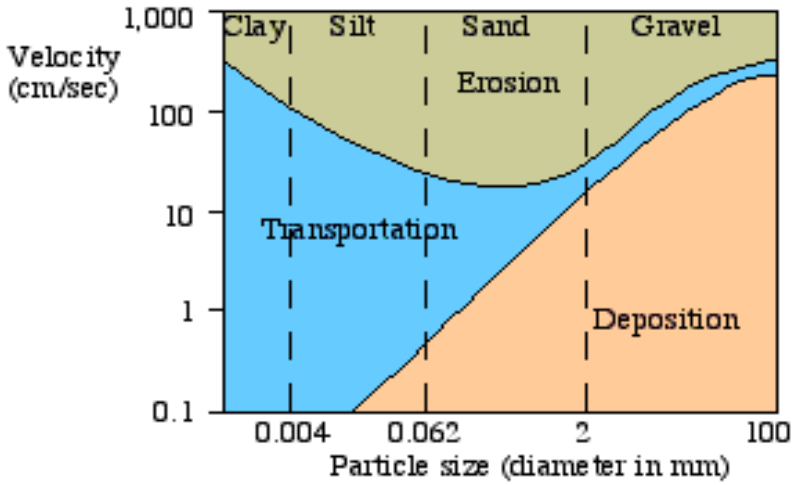


Figure 3. Hjulstrom diagram showing the stream velocity required to erode, transport and deposit particles of various sizes.

Transportation –

The particles carried by streams is known as the stream load. Particles may be carried by

- Floatation- Of very minor significance.
- Solution- Ions of dissolved minerals that may travel downstream indefinitely. The most common are Na, Ca, K, Mg, Cl, SO_4 and HCO_3. One estimate of U.S. rivers was that they carry 300 million tonnes of dissolved load each year, and 250 million tonnes of solid load.
- Suspension- The temporary support of particles when turbulence is greater than the settling velocity of the particle. Clay and silt are normally transported in suspension, but sand may be carried this way in floods.
- Saltation- Intermittent "jumping" of grains that are lifted by turbulence, but are too heavy to remain in suspension.

- Traction- The sliding or rolling of particles along the stream floor. Particles moved in this way comprise the bed load. Bed load normally constitutes around 10% of the solid load, but may be up to 50% during floods, when the major work of the stream is done.

Transportation is aided by the buoyancy of water, eg. quartz grains are Å 2000 times the density of air, but only two and a half times that of water. Unequal velocities at the top and bottom of boulders also assists transportation, as does steep gradients.

The total load of particles of all sizes that a stream can carry is known as its capacity. It is proportional to discharge, which is proportional to velocity. A faster flowing stream therefore has a higher capacity. If a stream's capacity is less than its load, the stream cannot carry its load, so deposition occurs. If capacity exceeds load, the stream has excess energy (gravitational, potential energy), so it can erode more sediments. Streams switch back and forth from depositional to erosional agents, depending on load vs. capacity. A stream can erode along one stretch and deposit along another, since gradient and channel shape/size vary along the stream's course. Streams can erode during periods of higher velocity or discharge (floods) and deposit during periods of lower velocity or discharge. Anything that alters the sediment load delivered to the channel or that alters the stream's capacity to carry that load will cause the stream's gradient or channel geometry to change in response.

The largest particle that a stream can transport is known as its competence. Assuming that there is sufficient depth to cover the particles, then competence is proportional to the square of velocity.

Deposition

Deposition will occur when a loss of energy results in a decrease in velocity. This may be due to such things as declining gradient, a decrease in water volume, an increase in cross-sectional area (particularly pools, lakes, and oceans), or by local obstructions. An excessive load produced by increased erosion in the drainage basin or tributary valleys, or from glaciofluvial outwash will also inevitably lead to deposition. The accumulations of stream deposits are called alluvium

Note: There is a constant interaction between erosion, transportation and deposition. During a flood, the bed of a stream at a particular point may be eroded, but as the flood subsides the bed is filled again. Similarly, in different parts of the stream, velocity differs and hence one part of the stream may be eroding its bank, while on the opposite bank deposition is taking place.

5 GENERAL PROFILE OF DISTRICT HAMIRPUR

General

Hamirpur is located in the southwestern part of the Himachal Pradesh and is situated between 76^0 17' 50'' –$76^0$43 '42"east longitude and $31^0$24'48''-$31^0$53'35'' north latitude. It is the smallest district of the Himachal Pradesh having a total area of 1118 square kms (2.01 % of the State). The District has the highest population density in the State i.e. 369 persons per square Kms of the State. The District has the highest literacy rate and highest density of motorable road per sq km.

The district is bounded in the north by river Beas which separate it from the district Kangra. In the east, the Bakkar and Seer Khad separate it from Mandi district. In the south it is bounded by Bilaspur district and on the west by Una district.

Salient Features of the district

Geographical Area	=1118 SqKm
By Village Papers	=110134 hects i.e.1101.34 sqkm
Number of Sub-Divisions	= 05

1 Hamirpur
2 Nadaun
3 Barsar
4 Bhoranj
5 Sujanpur

Number of Tehsils = 8

1 Nadaun
2 Hamirpur
3 Bhoranj
4 Barsar
5 Sujanpur
6 Tauni Devi
7 Bijher
8 Galore

Number of Sub-Tehsils=2

1 Bhota
2 Kangoo

Number of C.D. Block-6

1 Bhota
2 Hamirpur
3 Nadaun
4 Tira Sujanpur
5 Bijher
6 Tauni Devi

Number of Municipal Committeess/Corporation	=1 Hamirpur
Number of Nagar Panchayat	=3
Number of Gram Panchayat	=215
Number of villages	=1650
Total Population	= 412009 (2001census)
Density per Sq Km	=369
Number of Households -Rural	=64208
Urban	=69176

6 LAND UTILIZATION PATTERN

Land Utilization Pattern of the District (in hects)	
Area Under Forest	20058
Barren and Unculturable land	18699
Land put to non agriculture uses	16195
Permanent Pasture and other grazing land	969
Land under misc.-tree/crops and groves	2777
Culturable waste	7444
Other Fallow land	1550
Cultivated area	42442
Total Area	110134

Table-5 The general land utilizationpattern of the District is as given below

6.1 AGRICULTURE

The landholding in the district are small and scattered. The farmers grow more than two crops in a year so as to get maximum production from the land. The crop rotation followed in the district are:

I. Maize- Toria-Wheat
II. Maize-Potato-Potato
III. Maize- Toria-Wheat-Baisakhi Moong
IV Paddy Wheat
V Maize-Wheat

Wheat and Maize are major crops of the district. These are followed by gram, Paddy and other pulses. Besides these, Barley, Ragi, Mustered, Seasmum and Sugarcane are also grown in the district. Peas, Carrot, Cabbage, Lady finger, Tomato, Brinjal, Capsicum, Cauliflower, Cucumber, Pumpkin etc. vegetables are also grown.

About 95% of the total cultivable area in the district is rain fed. Hence production of the district mainly depends upon rain.

Table Showing Crop Pattern Surrounding Mining Area

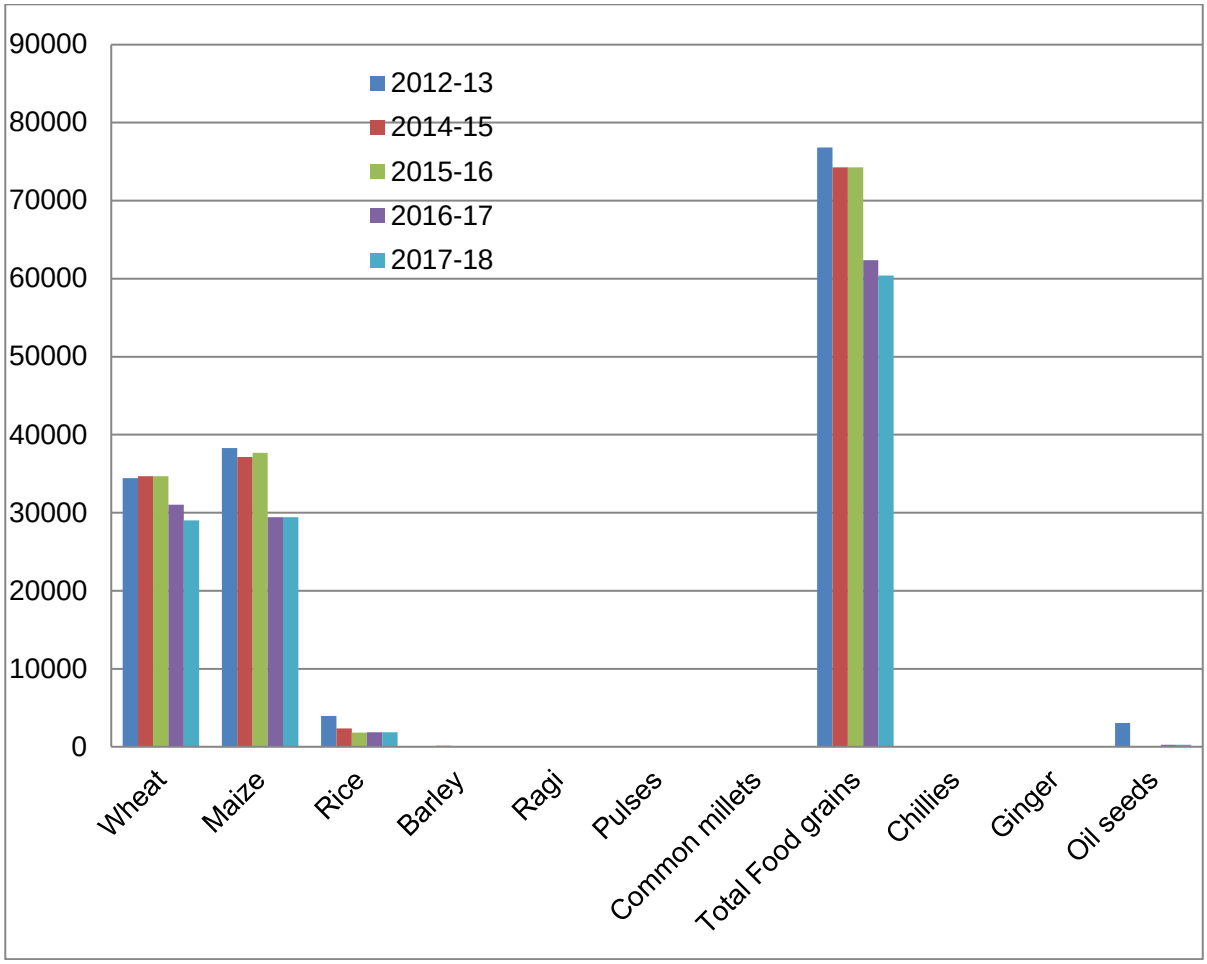
June	July	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May
Maize				Wheat				Maize			
Maize			Toria			Wheat			Maize		
Maize			Potato			Wheat			Maize		
Maize			Potato			Potato			Maize		
Bhindi				Cauliflower				French Bean / Tomato / brinjal / Capsicum Cucurbits			
Sesame						Sarson/Raya/G.Sarson					
Ginger/Colacasia/Turmeric				Potato		Wheat			Ginger		
Paddy						Wheat					
Paddy						Barseem					
Paddy						Potato					
Kulthi Mah					B. Sarson/Raya/G. Sarson/Taramira(Eruca Sativa)						

Mash	Wheat
Maize+ Mash	Wheat
Arhar	

Table Showing Area under various Agriculture Crops in Hamirpur

Table showing Area under Different Crops in Hectares at Hamirpur District											
Year	Wheat	Maize	Rice	Barley	Ragi	Pulses	Common millets	Total Food grains	Chillies	Ginger	Oil seeds
2012-13	34452	38294	3957	82	...	16	6	76807	11	4	3068
2014-15	34668	37129	2339	131	...	7	...	74274	1	72	64
2015-16	34690	37674	1820	99	...	7	...	74290	9	8	66
2016-17	31038	29422	1871	38	...	24	...	62393	10	9	248
2017-18	29038	29422	1871	38	...	25	...	60393	10	9	248

Source: Directorate of Land Records, HP

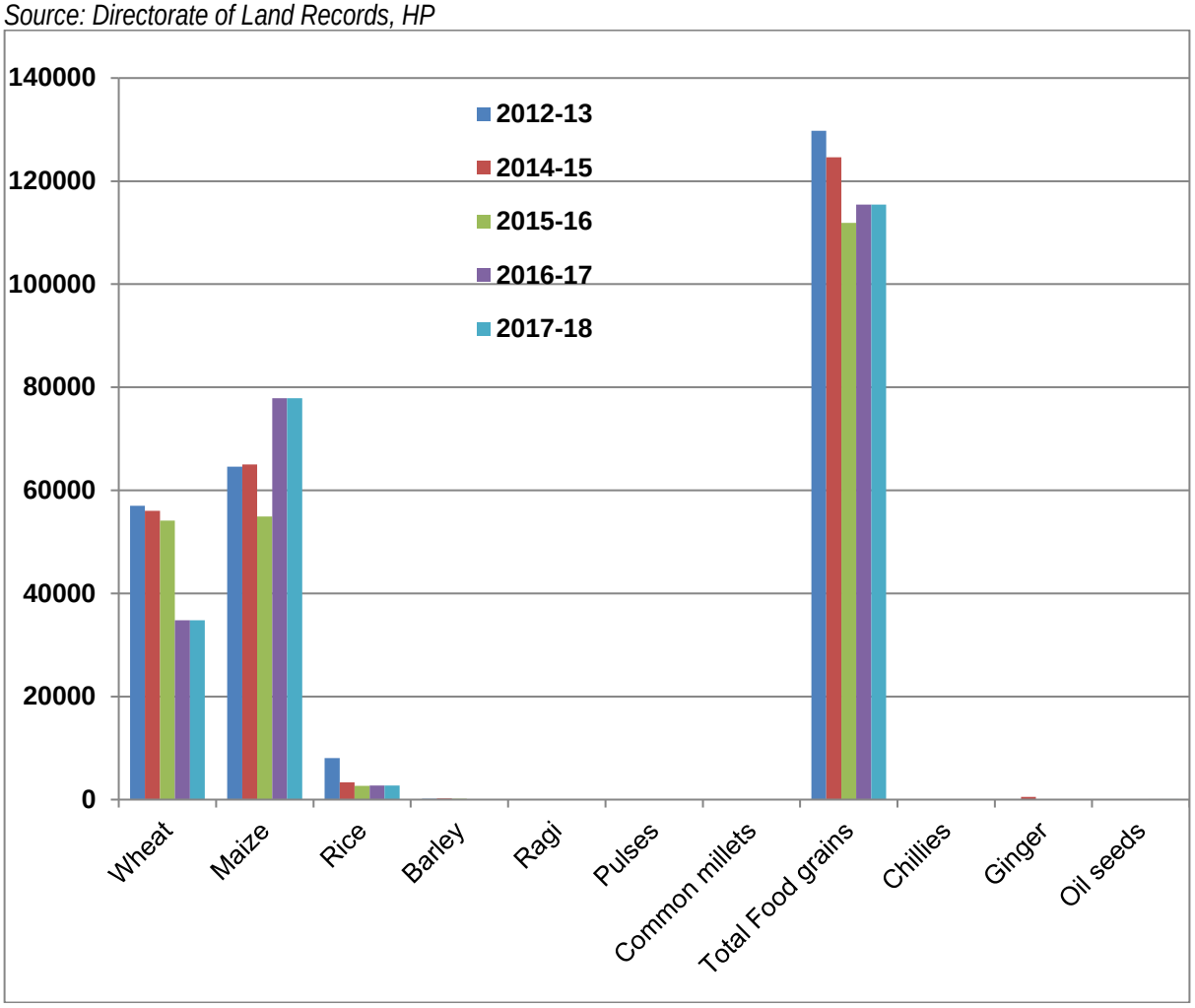


Graph Showing Area under various Agriculture Crops in District Hamirpur

Table Showing Production of Agriculture Crop in Hamirpur

Table showing Production of Different Crops in MT at Hamirpur District											
Year	Wheat	Maize	Rice	Barley	Ragi	Pulses	Common millets	Total Food grains	Chillies	Ginger	Oil seeds
2012-13	57000	64570	8064	141	...	8	3	129786	3	28	44
2014-15	56013	65034	3370	228	...	4	...	124648	1	504	33
2015-16	54102	54939	2656	167	...	13	...	111877	2	56	63
2016-17	34789	77868	2741	63	...	10	...	115471	5	62	81
2017-18	34789	77868	2741	63	...	11	...	115471	5	62	81

Source: Directorate of Land Records, HP

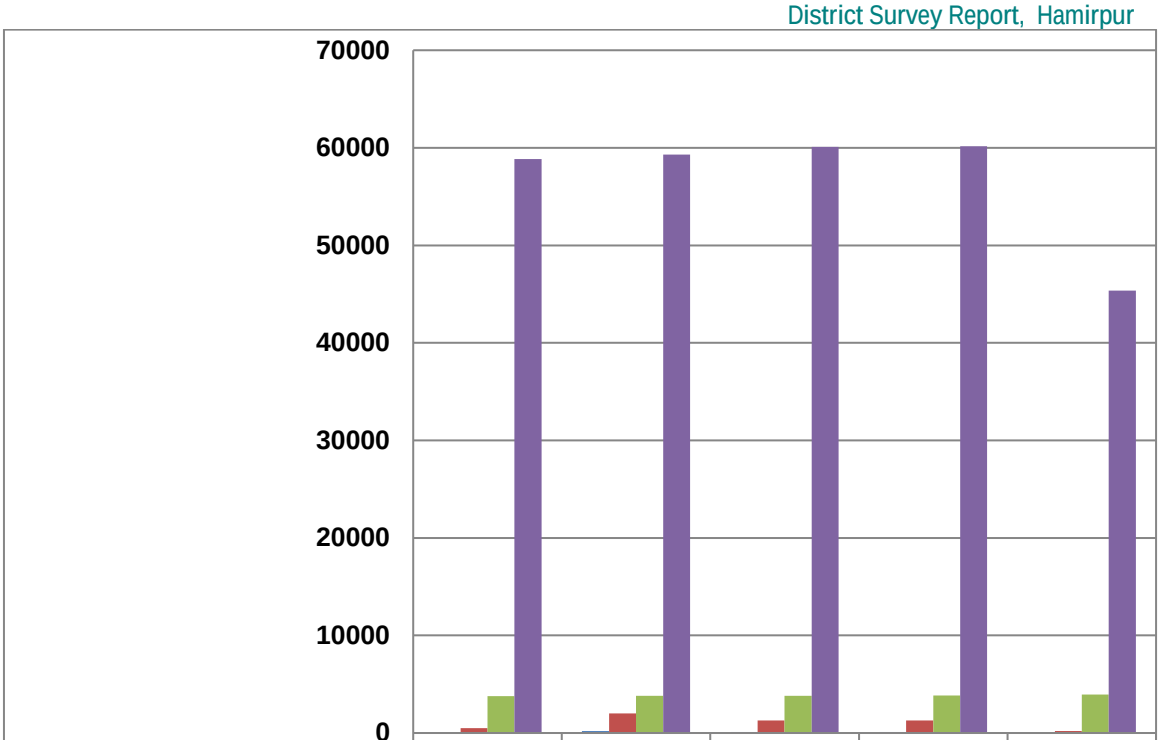


Graph Showing Production of Agriculture Crop in District Hamirpur

Table Showing Area &Production of Vegetables in District Hamirpur

Area & Production of Vegetables (Distt Hamirpur)				
Year	Potato		Other Vegetables	
	Area (In Hectares)	Production (In Tonnes)	Area (In Hectares)	Production (In Tonnes)
2014-15	40	500	3794	58839
2015-16	200	2000	3814	59319
2016-17	100	1300	3823	60100
2017-18	100	1300	3846	60155
2018-19	15	195	3950	45355

Source: Directorate of Land Records, HP



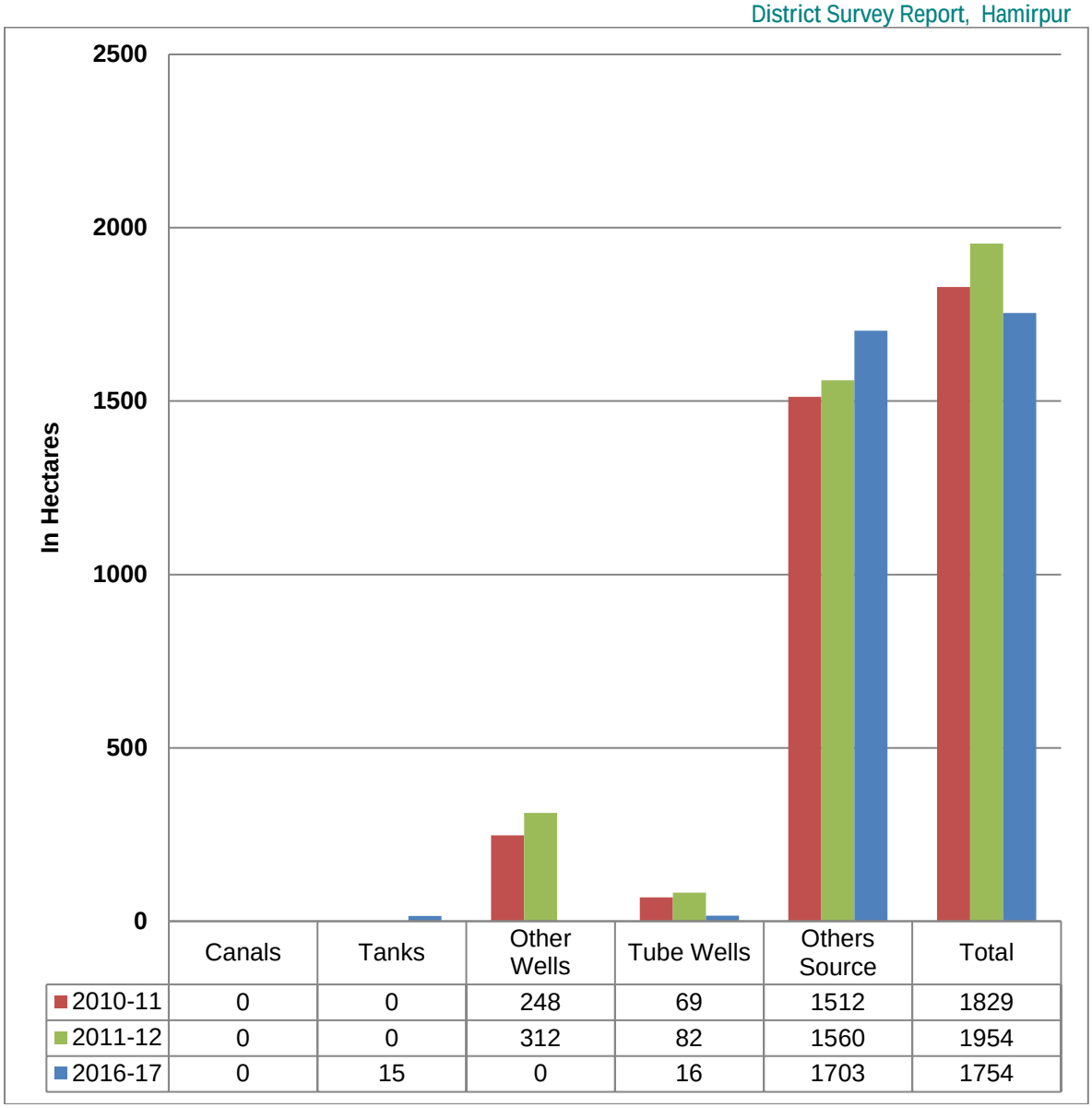
	2014-15	2015-16	2016-17	2017-18	2018-19
Potato Area (In Hectares)	40	200	100	100	15
Potato Production (In Tonnes)	500	2000	1300	1300	195
Other Vegetables Area (In Hectares)	3794	3814	3823	3846	3950
Other Vegetables Production (In Tonnes)	58839	59319	60100	60155	45355

Graph Showing Area & Production of Vegetables in District Hamirpur

Table Showing Net Irrigated area of the district

Table showing Net Irrigated Area of Hamirpur by source (in Hectares)						
Year	Canals	Tanks	Other Wells	Tube Wells	Others Source	Total
2010-11	...	...	248	69	1512	1829
2011-12	...	...	312	82	1560	1954
2016-17	...	15	...	16	1703	1754

Source: Directorate of Land Records, HP



	Canals	Tanks	Other Wells	Tube Wells	Others Source	Total
2010-11	0	0	248	69	1512	1829
2011-12	0	0	312	82	1560	1954
2016-17	0	15	0	16	1703	1754

Graph Showing Net Irrigated area of the district

6.2 HORTICULTURE:

Following important fruits are grown in the district:

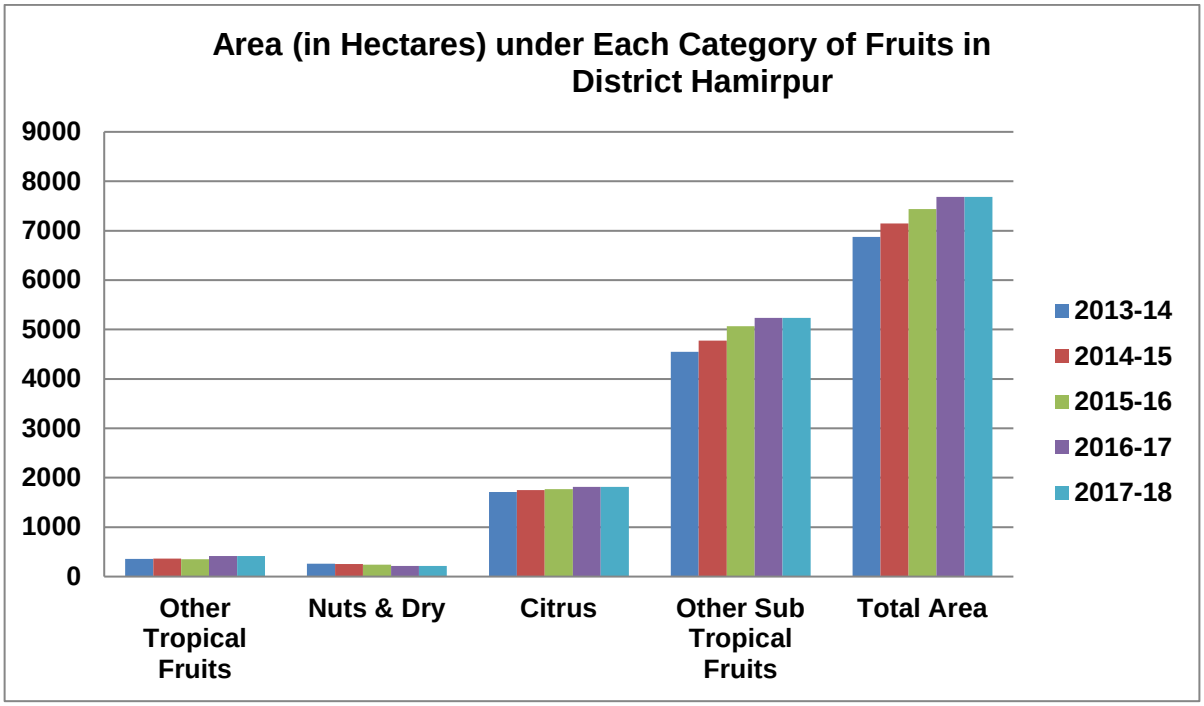
I Plum
II. Peach
III. Apricot
IV. Pear
V Nuts and dry fruits
VI Citrus fruits
VII. Sub-Tropical fruits like Mango, Guava, Lichi, Papaya etc.

Table Showing Area under Each Category of Fruits in District Hamirpur

Table showing Area (In Hectares) under Each Category of Fruits in District Hamirpur

Year	Other Tropical Fruits	Nuts & Dry	Citrus	Other Sub Tropical Fruits	Total Area
2013-14	357	262	1710	4547	6876
2014-15	366	254	1750	4777	7147
2015-16	352	244	1771	5070	7437
2016-17	415	215	1816	5235	7681
2017-18	415	215	1816	5235	7681

Source: Directorate of Horticulture, HP

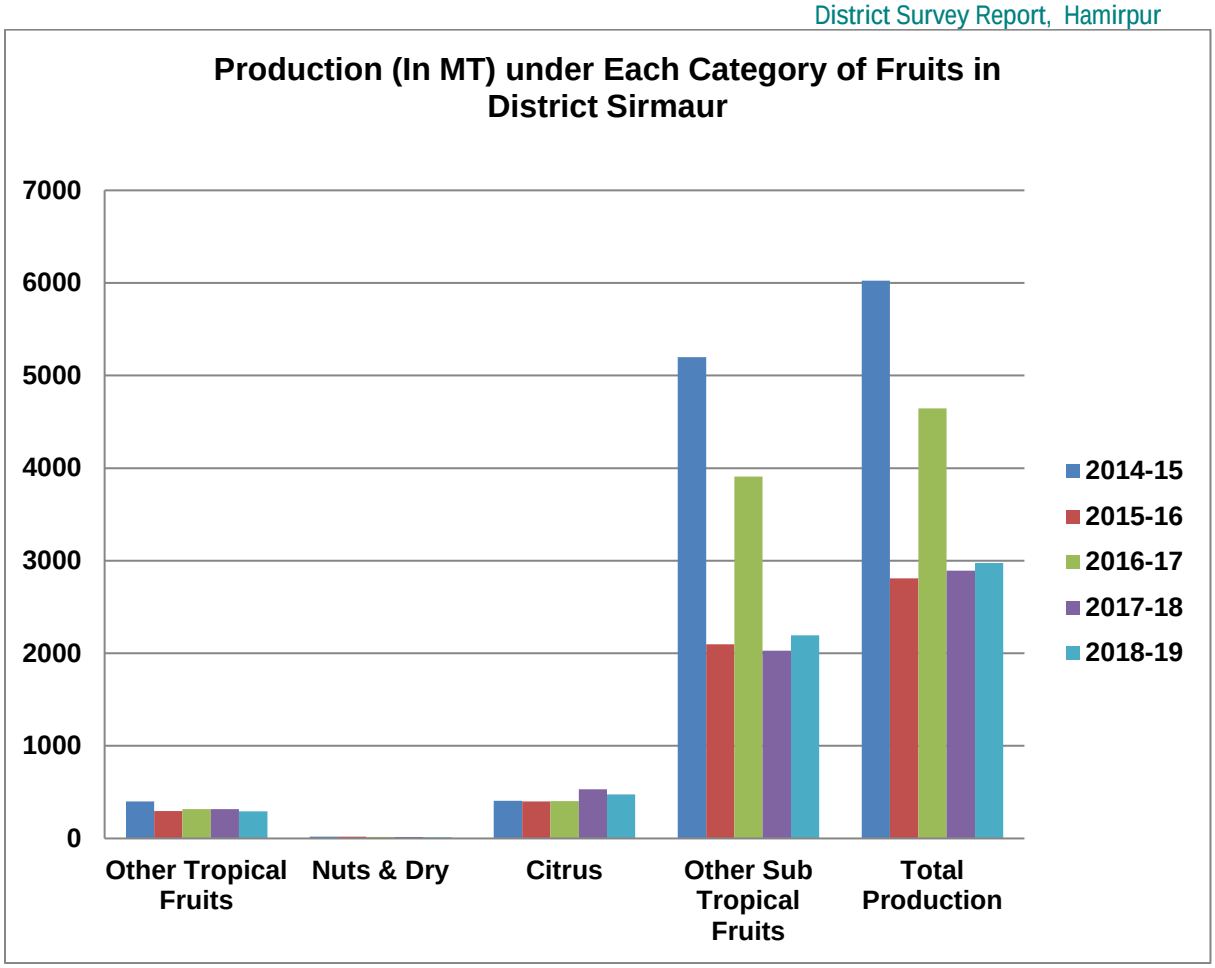


Graph Showing Area under Each Category of Fruits in Hamirpur district

Table Showing Production under Each Category of Fruits in District Hamirpur

Table showing Production (In MT) under Each Category of Fruits in District Hamirpur					
Year	Other Tropical Fruits	Nuts & Dry	Citrus	Other Sub Tropical Fruits	Total Production
2014-15	398	20	408	5199	6025
2015-16	295	18	400	2097	2810
2016-17	316	16	404	3908	4644
2017-18	316	16	531	2029	2892
2018-19	294	12	477	2193	2976

Source: Directorate of Horticulture, HP



Graph Showing Production under Each Category of Fruits in Hamirpur district

6.3 ANIMAL HUSBANDRY:

Following livestock in the district:

I. Cow
II. Ox
III. Buffalo
IV. Sheep
V Goat
VI. Ponies

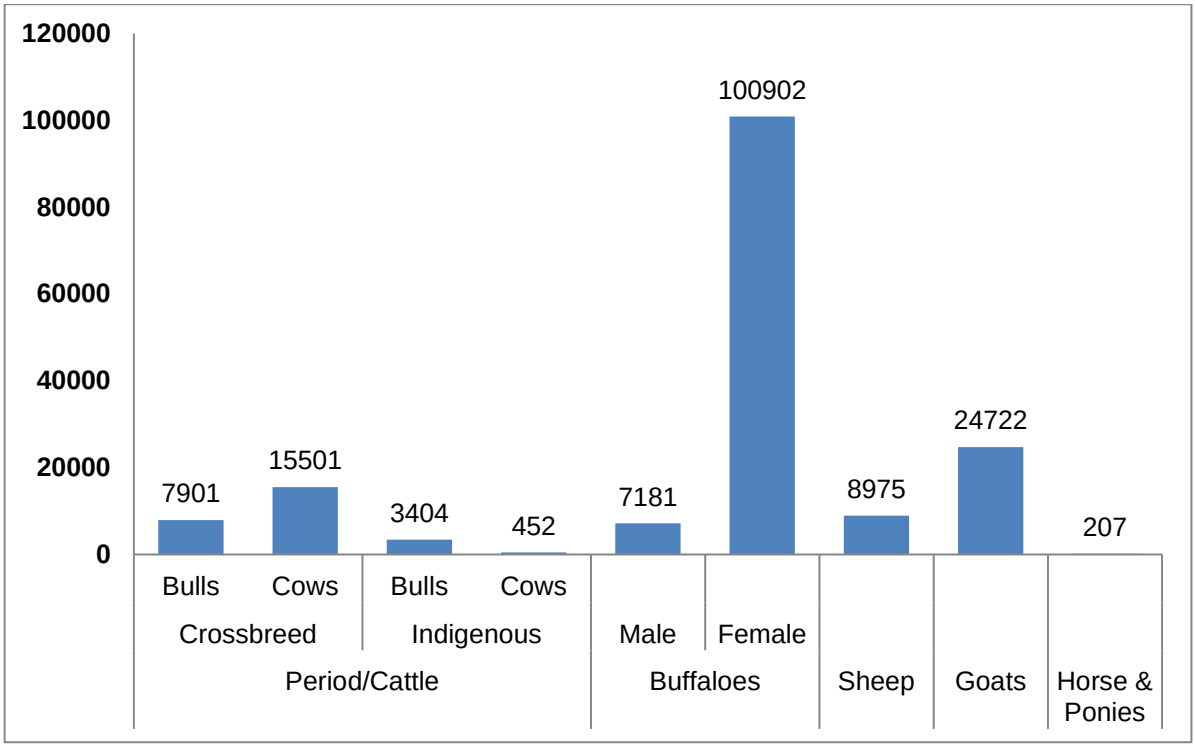
Following are important poultry bids:

I. Fowl
II. Ducks (Rare)

Table Showing Livestock Census of the District Hamirpur 2012

Animal Husbandry Population in District Hamirpur										
Year	Status	Period/Cattle				Buffaloes		Sheep	Goats	Horse & Ponies
		Crossbreed		Indigenous		Male	Female			
		Bulls	Cows	Bulls	Cows					
2012	At Hamirpur	7901	15501	3404	452	7181	100902	8975	24722	207

Source: Directorate of Animal Husbandry, HP

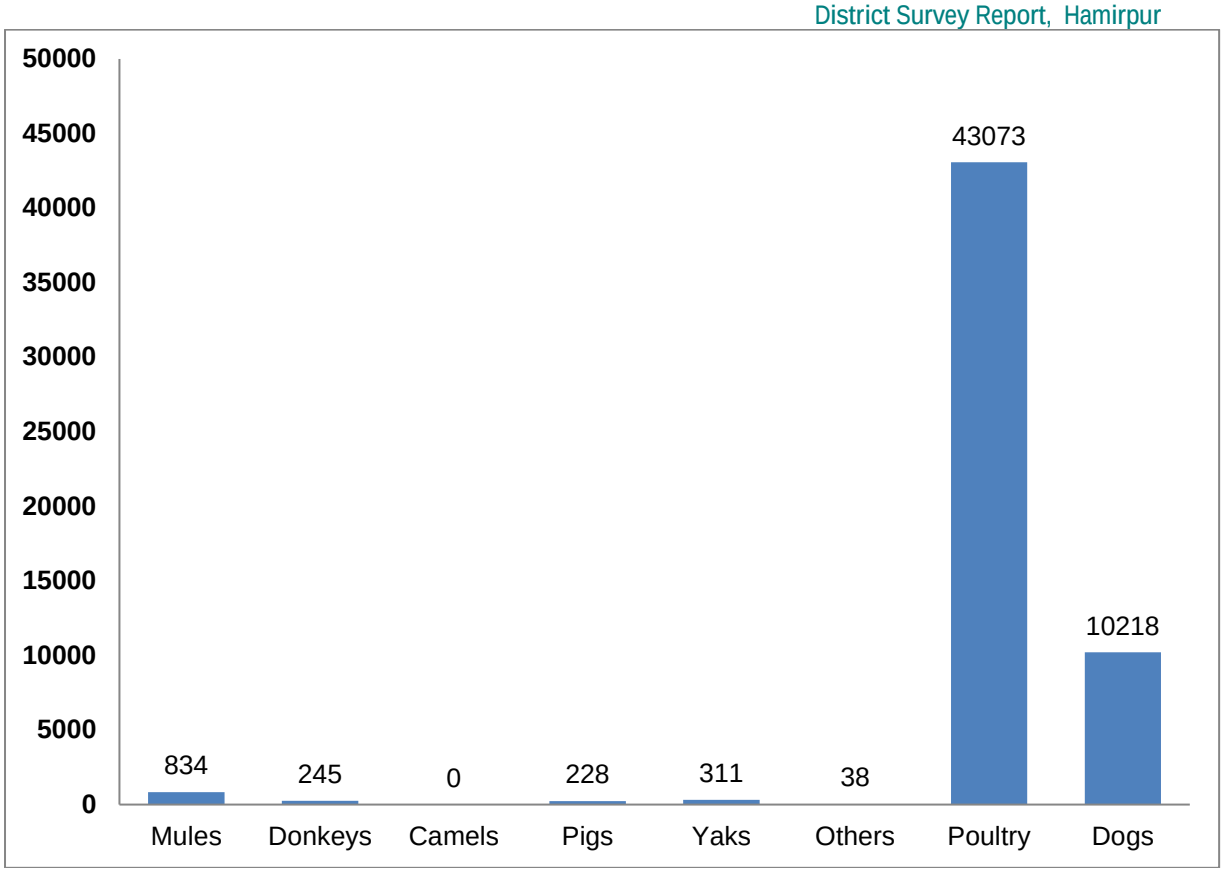


Graph Showing Livestock census of the District

Table Showing other Live Stock census District Hamirpur 2012

Other Livestock							
Mules	Donkeys	Camels	Pigs	Yaks	Others	Poultry	Dogs
834	245	...	228	311	38	43073	10218

Source: Directorate of Animal Husbandry, HP



Graph Showing other Live Stock census of the district

6.4 FISHERIES

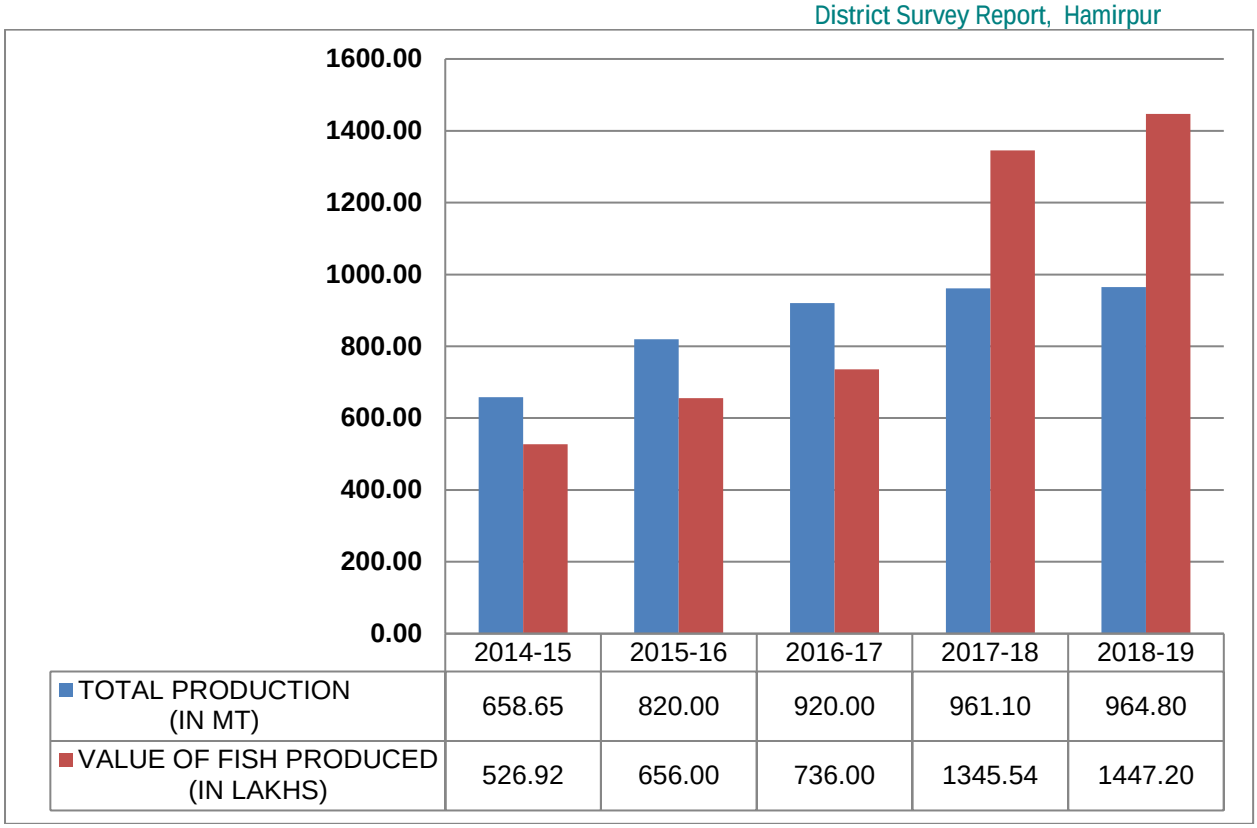
Following are important fishes in the River Beas and its main tributaries like Kunah, *Khad, Pung Khad and Man Khad* and of Satluj River are Sir Khad and Sukkar Khad.

I. Tor putitora (Mahaseer)
II. Schizothorareplagiostomus (Gulguli)
III. Lebeodero (Gid)
IV. LabeoCalbasu (Kalbans)
V. Channapunctatus(Sal)
VI. Mystusseenghala (Singhara)
VII. Labeodicheilus (Kunhi)

Table Showing annual production of fisheries and its value of catch

Table showing Annual Production of Fisheries at District Hamirpur		
YEAR WISE	TOTAL PRODUCTION (IN MT)	VALUE OF FISH PRODUCED (IN LAKHS)
2014-15	658.65	526.92
2015-16	820.00	656.00
2016-17	920.00	736.00
2017-18	961.10	1345.54
2018-19	964.80	1447.20

Source: Fisheries Department, HP



	2014-15	2015-16	2016-17	2017-18	2018-19
TOTAL PRODUCTION (IN MT)	658.65	820.00	920.00	961.10	964.80
VALUE OF FISH PRODUCED (IN LAKHS)	526.92	656.00	736.00	1345.54	1447.20

Total production and value of fish catch in district Hamirpur

FLORA AND FAUNA OF THE AREA

Flora

Majority of the Hamirpur district consist of Chil forest. Under the second category of the forest the Khair is predominant species. The third category consists of broad leave species but have lot of bushy growth as well.

The forest in the district, have been divided in to three categories:

1. Lower Siwalik Chil Pine forest
2. Northern dry mixed deciduous scrub forest.
3. Broad leaved forest.

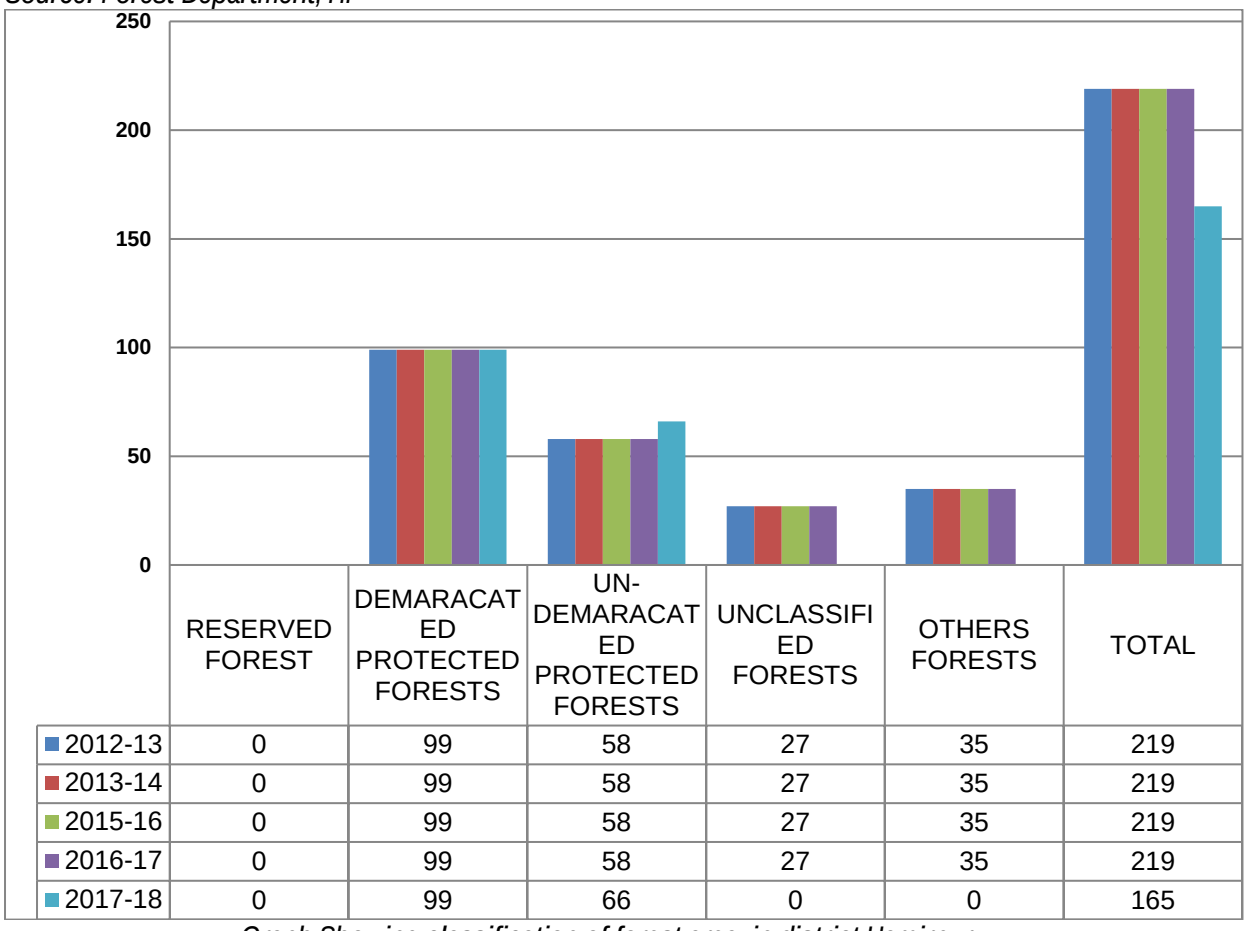
The most prominent verities of trees found in the area are
Simbal (Bombexmalabaricum)
Mango (Magniferaindica)
Tun (Cedrela toana)
Several species of acasia and albizia
Salambra (Odinawodier)
Termnalia
Jamun (Enginia jambolana)
Larger tour
Bamboo
Shurubs
Vitex
Munj
Ber
Ipomea
Dodenea

The forest area in Himachal Pradesh for the three years measured during 2001-2002. 2002-2003 and 2007-2008 is given in the following table:

Table Showing classification of forest area in district Hamirpur

CLASSIFICATION OF FOREST AREA (IN SQ.KM.) OF HAMIRPUR DISTRICT						
YEAR	RESERVED FOREST	DEMARACATED PROTECTED FORESTS	UN-DEMARACATED PROTECTED FORESTS	UNCLASSIFIED FORESTS	OTHERS FORESTS	TOTAL
2012-13	…	99	58	27	35	219
2013-14	…	99	58	27	35	219
2015-16	…	99	58	27	35	219
2016-17	…	99	58	27	35	219
2017-18	…	99	66	…	…	165

Source: Forest Department, HP



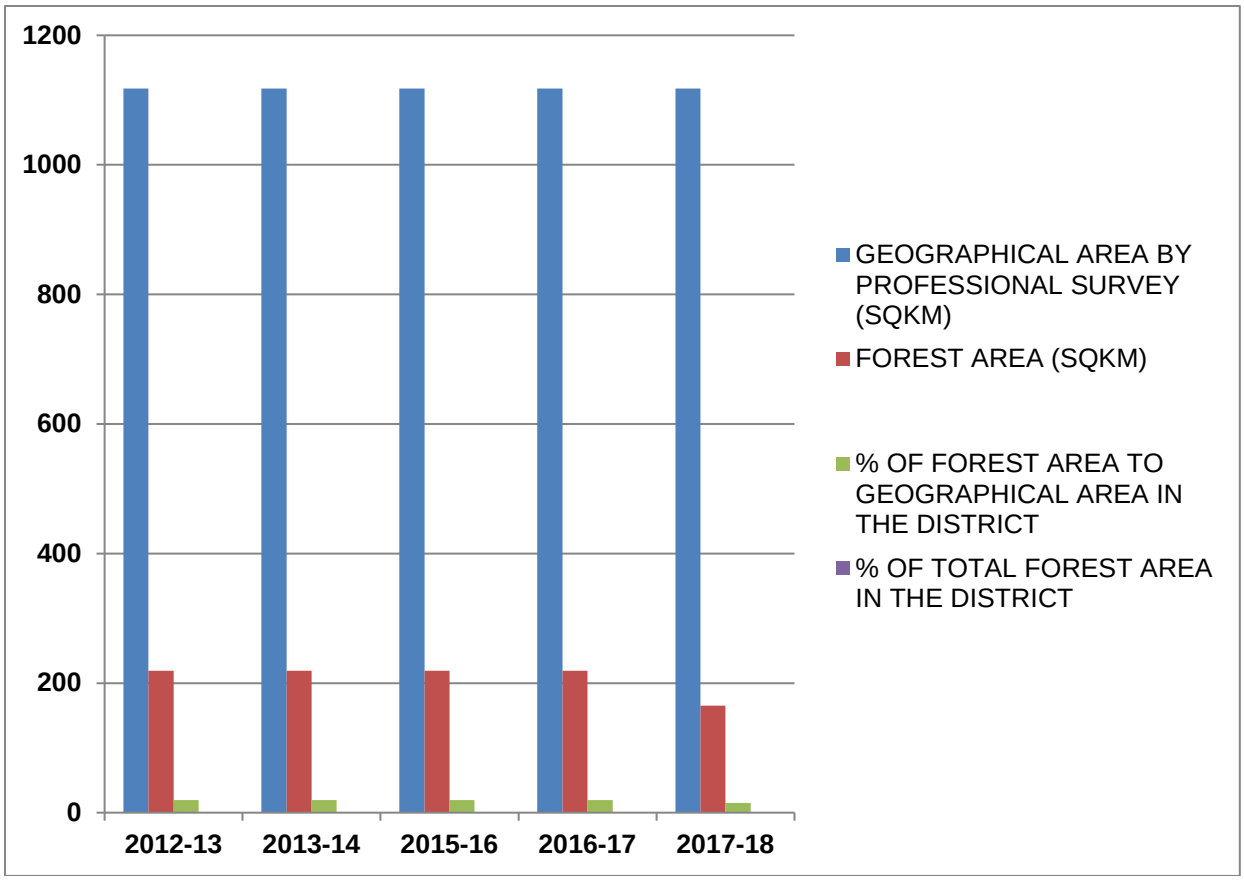
Graph Showing classification of forest area in district Hamirpur

Table Showing forest area of District Hamirpur

FOREST AREA OF HAMIRPUR DISTRICT

YEAR	GEOGRAPHICAL AREA BY PROFESSIONAL SURVEY (SQKM)	FOREST AREA (SQKM)	% OF FOREST AREA TO GEOGRAPHICAL AREA IN THE DISTRICT	% OF TOTAL FOREST AREA IN THE DISTRICT
2012-13	1118	219	19.6	0.6
2013-14	1118	219	19.6	0.6
2015-16	1118	219	19.6	0.6
2016-17	1118	219	19.6	0.6
2017-18	1118	165	14.76	0.44

Source: Forest Department, HP



Graph Showing forest area of Distt. Hamirpur

Fauna

Mammals in Hamirpur district

Zoological Name	English Name	Common Name
Felis bengalensis	Lepard cart	Mirag Bagh
Felis Chane	Jungle Cat	Jangli Billi
Muntucusmuntisk	Barking Sear	Kakkar
Vaulpesbengalnsis	Fox	Lomari,Fohiki
Comis aureus	Jackal	Giddar
Macaca mulatta	Ressus monkey	Lal Bandar
Preshytes entellus	Langour	Langour
Hystrix indica	Porcupine	Sehal
Lepus nigricoilis	Hare	Khargosh,Sehru,Farru
Axis	Spotted Dear	Chital
Cervus unicolor	Samber	Samber

Hylopetesfimbriatus	Flying Squirrel	
Panthra pardus	Leopard	Cheetah
Paradoxurus hermaphrodites	Indian civet	Sakralu
Felis chaus	Jungle cat	
Hipposiderous armiger	The great Himalayan leaf nosed Bat	Chamgadar
Pagumalavarta	Himalayan Palm civet	
BIRDS		
Zoological Name	English Name	Common Name
Milvus migrants	Vulture	Cheel, gidhEell
Endynamysscolopacca	Koel	Koel
Colambialivia	Pigeon	Kabuttar
Coracias benglalenses	Blue jay	Nilkantha
Columslivia	Hawk	Baj
Francoliusfrancolinus	Black partridge	Kala Tittar
Francolinuspondicerians	Grey partridge	Safed Tittar
Payocrisslatus	Pea cock	Mor
Coturnix colurnix	Common quail	Bater
Alectorisgraeca	Chakor	Chakor
Crovus splendens	Crow	Kanwa
Prottaculakarneri	Parrot	Totta
Picoisesmacei	Fulvour breasted pied woodpecker	Kathfoura
Strptopaliadecaocto	Ring dove	Ghugi
Strptopaliachinesis	Spotted dove	
Accipiter badius	Shikra	
Aquila rapexvindhian	Tawny eagle	
Dacula bicolor	Green pigeon	
Parus rufomuchalis	Titus	
Picuscamus	Black napped woodpecker	Wood pecker
Drycocopusjavensis	Woodpecker	
Acidotheres tristis	Common Myna	Ghatari
Terpsiphone paradise	Pradise flycatcher	Chotipinja
Passer domesticus	House sparrow	
Arduelisspinoides	Himalayan green finch	Chiria

ANIMALS

Leopard
Wild Bore
Barking Deer (kakkar)
Samber
Hare
Jackal
Monkey
Pig

BIRDS

Chakor
Red Jungle Fowl
Grey partridge (safedTittar)
Crow
Black Partridge (kala Tittar)
Wood pecker

7 PHYSIOGRAPHY

Hamirpur district is bounded in the north by Beas river which separate it from Kangra district. In the east Bakkar and Seer Khads separate it from Mandi district. In the south it is bounded by Bilaspur district and on the west by Una District

The elevation varies from 450 meters above MSL (Near confluence of Mutard/Masoh Khad with River Beas) to 1235 meters above MSL (Near Wah Devi) having the configuration ranging from almost flat lands that border the portion of the river Beas to the lofty height of the cliff, ergs and precipitous slopes of the hill ranges. Most of the district lies within the range of 600 to 900 Mts above MSL. In the eastern part of the district it varies from 900 to 1200 Mts above MSL and in NW part of district it varies from 300 to 600 Mts above MSL

Geomorphologically the district can be divided into following two categories:-

- Moderately steep to low hill and intervening valley of Siwaliks;
- Fluvial valley.

These can be further classified as :

Fluvial terrace;
Structural Valley;

There are three principal ranges which nearly runs in SE-NW direction . The Jakh Dhar runs in continuation of Kali Dhar range in Kangra District.It enters in Hamirpur near Nadaun and traverse in the south east direction. The town of Hamirpur lies to the east of this range. The hills are bare, rugged and full of deep ravines. The Chabutra hills have the same dip and strike as in the Jakh Dhar and continue beyond the river Beas as a mass of rugged and broken hills. The Sola Singhi Dhar is the longest range of the tract and is Known by various names such as Chintpurni and Jaswan Dhar in Una and Sola Singhi Dhar in Hamirpur.

8 RAINFALL

The average annual rainfall of the district is 1462 mm (figure 3) . The district can be divided into two zones of rainfall i.e Medium (average 1200 to 1400 mm) and High (average above 1400) The isohyet of 1200 mm divide the district almost in two equal parts .The maximum precipitation is received during two months of July & August as shown

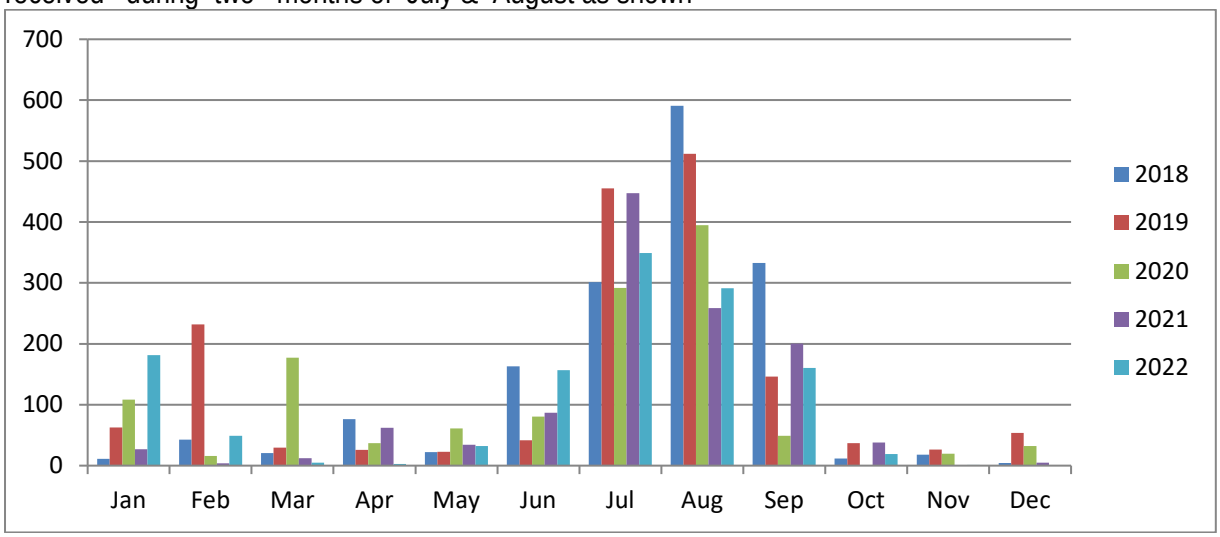


Figure 4. Showing yearwise rainfall from 2018 to 2022 in district Hamirpur

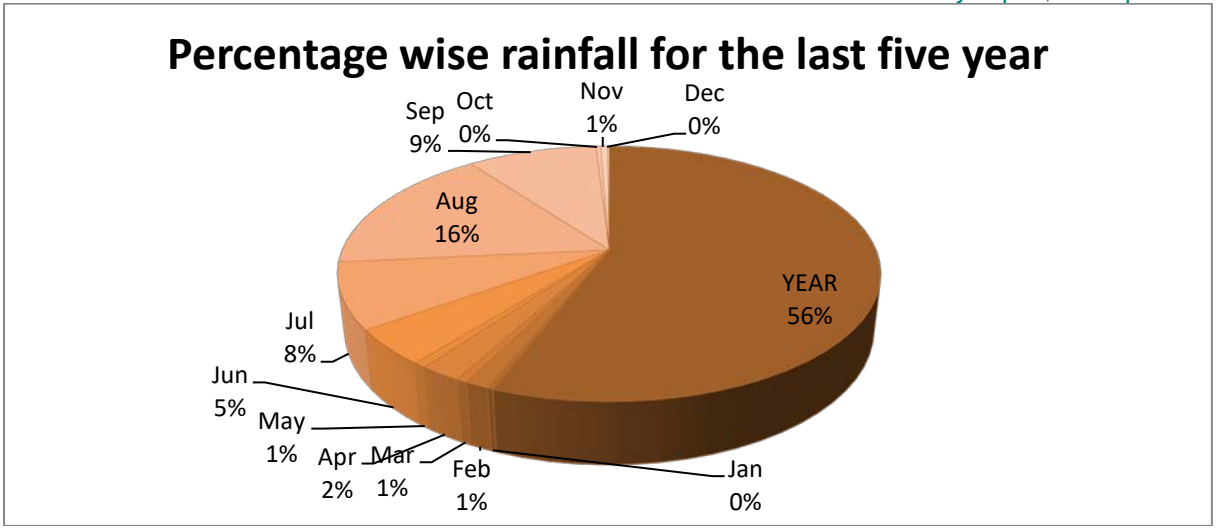


Figure-5 Pie diagram showing % agewise monthly rainfall for the last 05 years

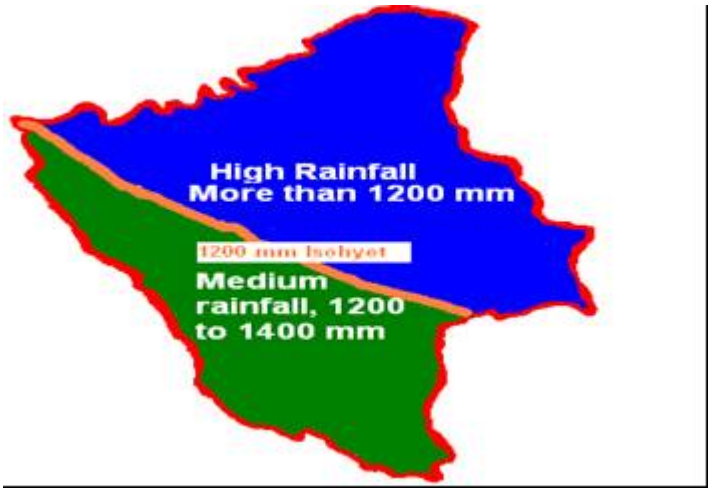


Figure-6. Showing areawise rainfall intensity in District Hamirpur

9 GEOLOGY AND MINERAL WEALTH:

In whole of Hamirpur District, rocks belonging to Siwalik Group are exposed. The Siwalik Group has been further categorized into Lower, Middle and Upper Siwalik rocks. In low lying areas, along river beds newer alluvium of recent age is exposed.

Siwalik Group

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, breccia and lumps of claystone are also observed at places. Often the size of bebbles 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 claybeds. The sediments were bought down 2 to 25 million years ago by the numerous fast flowing rivers originating 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 lithostratigraphy (Table 3)

Lower Siwalik: - The lower Siwalik consists essentially of a sandstone-clay alternation. In district Hamirpur the lower sequence of the lower Siwalik consists of medium grained subgraywacke 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 mts but in western part of the Sarkaghat anticline it is 1900 mts.

Middle Siwalik: - The Middle Siwalik Sub group comprises of large thickness of coarse micaceous sandstone along with some interbeds of earthy clay and conlomerate. It normally succeeds the Lower Siwalik along a gradational contact. The sandstone is less sorted than those in Lower Siwalik. Clay bands are dull coloured and silty. The general thickness is 1400 to 2000 mts

Upper Siwalik:-The Upper Siwalik is mainly represented by sandstone interbedded 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 mts.

Newer Alluvium:-The Newer alluvium deposit occupying the wide valleys including alluvium fans and terraces of unsorted sand, silt and clay and rock fragment and boulder beds.

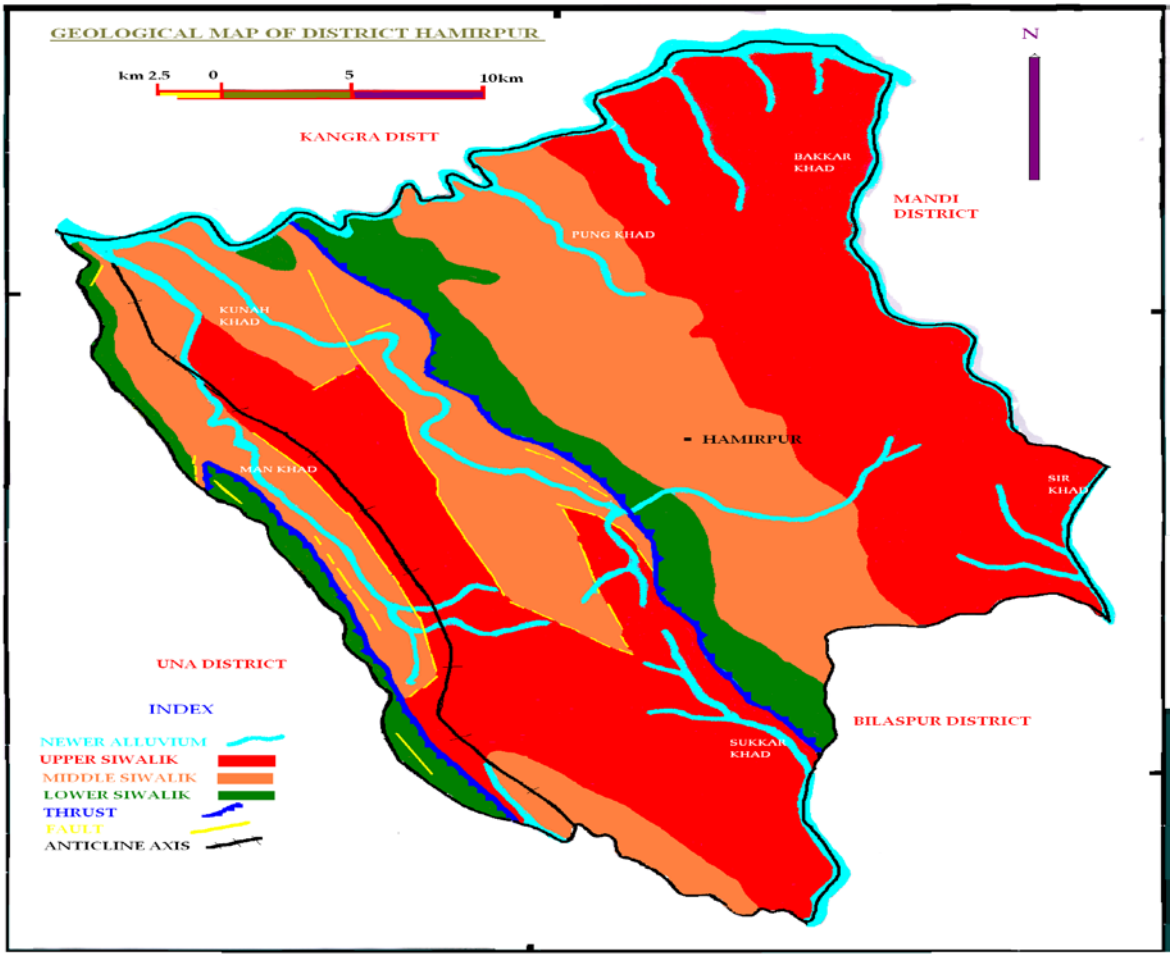
In Hamirpur all the three subgroups respectively the Lower, Middle and Upper are present on the
basis of lithostratigraphy (Table 3, figure 14)

Table 7 Lithostratigraphy of District Hamirpur

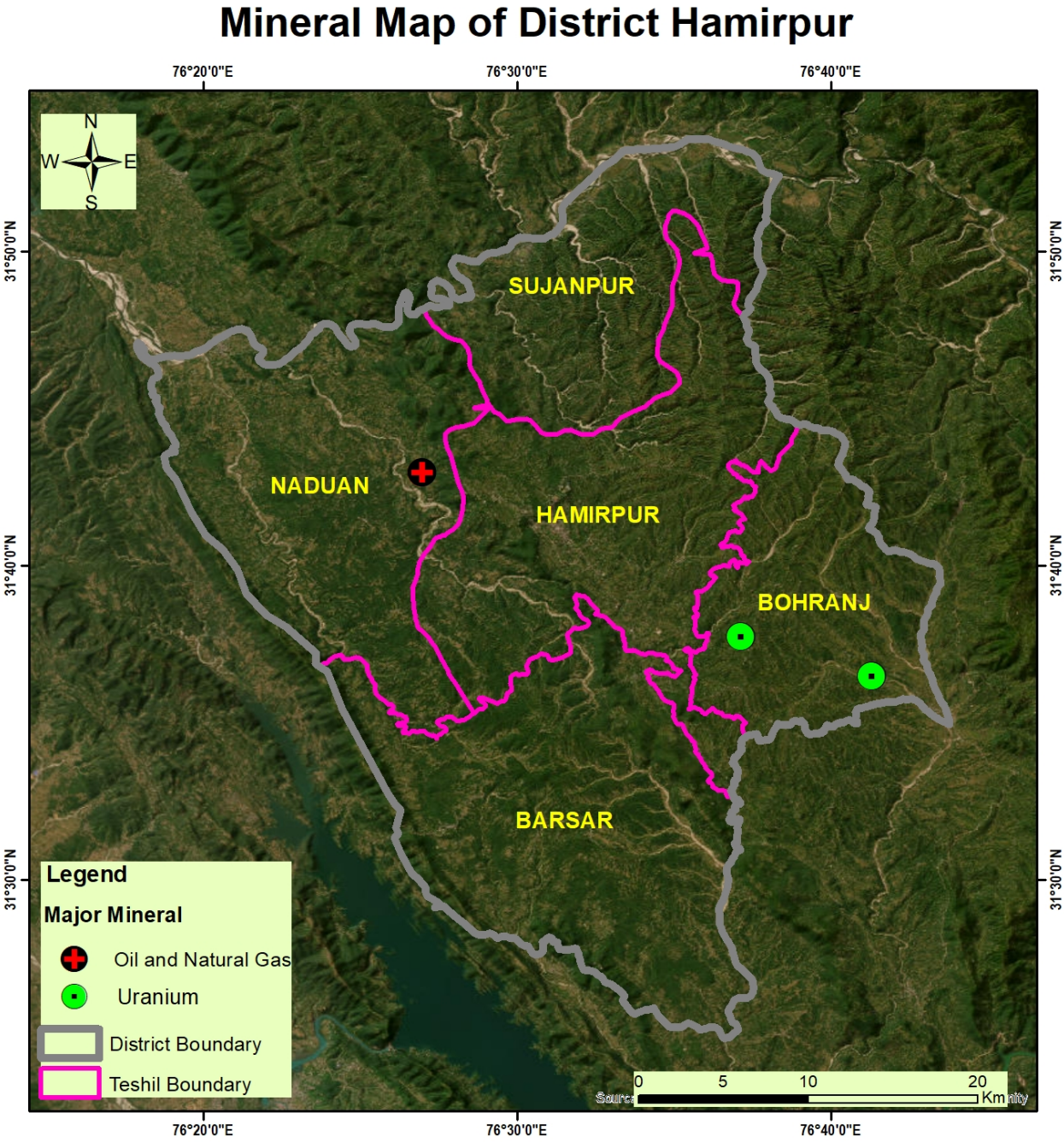
Lithostratigraphy of District Hamirpur

Group			Lithology	Age	Approx. Thickness
Newer Alluvium			Sand, silt, gravel and Pebbles	Quatenary	Variable
Siwalik Group	Upper Siwalik	B	Predominantly massive conglomerate with red and orange clay as matrix and minor sandstone and earthy buff and brown calystone	Neogene	2300 meter
		A	Sandstone, clay and conglomerate alternation		
	Middle Siwalik	B	Massive Sandstone with minor conglomerate and local variegated claystone		1400 to 2000 meter
		A	Predominantly medium to coarse- grained sandstone and red clay alternation, soft pebbly with subordinate clays stone, locally thick prism of conglomerate		
	Lower Siwalik	B	Alternation of fine to medium-grained sporadically pebbly sandstone, calcareous cement and prominent chocolate and medium maroon claystone in the middle part		1600 meter
		A	Red and mauve claystone with thin intercalations of medium to fine grained sandstone		

Figure - 7 Geological Map of District Hamirpur



10 MINERAL MAP OF DISTRICT



11 DETAIL OF RIVER OR STREAM & OTHER SAND SOURCE OF DISTRICT

Drainage System

The general drainage pattern of the Rivers/ streams in the district is dendritic pattern. All rivers/streams of Hamirpur district are forming part of two major river system catchments i.e. Beas river catchment and Satluj River catchment. The northern half part of the district form the catchment area of Beas river and southern half part form the catchment of Satluj river.:-

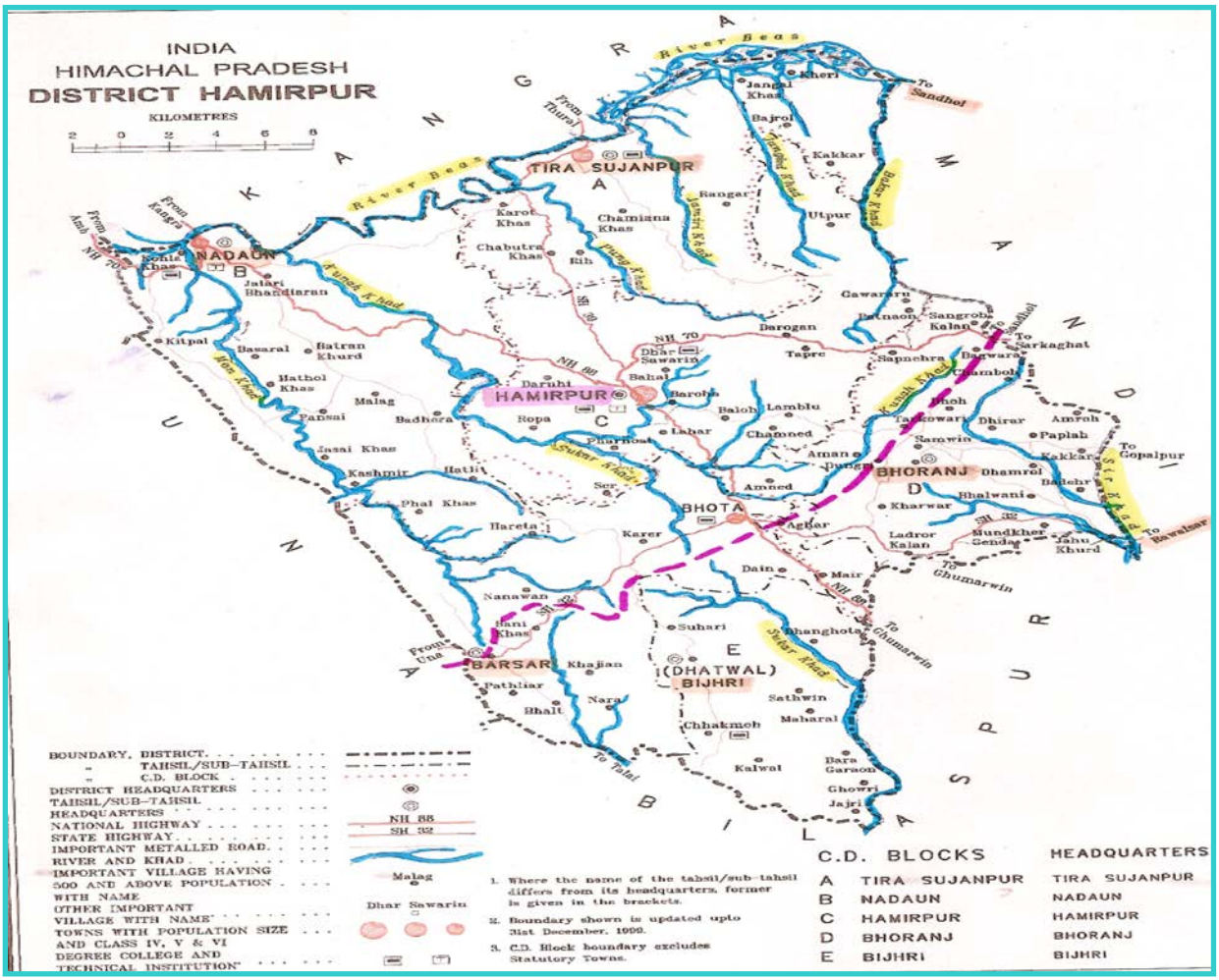


Figure- 8 Map Showing Catchment area of River Beas and Satluj

Beas River Catchment

In the Beas river catchment, 12 major rivers/streams are draining water into Beas river. There are other streams which are of smaller magnitude also form part of catchment area. The major sub-catchment area forming the Beas catchment are as follow

From East to West

1. Bakar Khad
2. Sukhad Khad
3. Jangled Khad
4. Powar khad
5. Baghera khad

6. Jamiri Khad
7. Riani Khad
8. Pung Khad
9. Salasi Khad
10. Kunah Khad (Including Lamblu Khad and Sukar Khad,)
11. Man Khad (Including Bumblu Khad)
12. Maseh Khad

Satluj River Catchment

In the Satluj river catchment area, 6 major rivers/streams are draining water into Satluj river. There are other streams which are of smaller magnitude also form part of the catchment area. The major sub-catchment area forming the Satluj catchment are as follow

From East to West

1. Sir Khad
2. Chainth Khad
3. Snail Khad
4. Sukkar Khad (Satluj Catchment)
5. Sirhyali Khad
6. Garli Khad

Table-8- Showing Length and Catchment of Rivrs and Streams of District Hamirpur

Sr. No.	Name of River/stream	Total length	Total Catchment
Beas River Catchment			
1	Bakar Khad	23	42.75
2	Sukahad khad	7	9.25
3	Jangled Khad	16.4	28.4
4	Powar Khad	3.5	2.6
5	Baghera Khad	4.0	4.00
6	Jamiri Khad	14	59.25
7	Riani Khad	5	7.5
8	Pungh Khad	19	77.5
9	Salasi Khad	15.5	31
10	Kunah Khad	48	312.25
	Sukkar Khad (tributary of Kunah Khad)	14	30.25
11	Man Khad	40	173.5
12	Bamblu Khad	12	15.75
13	Maseh Khad	13	31.00
Beas River		55	825.00(forming total catchment of all tributaries)
Satluj River Catchment			
15	Sir Khad	10	15.75
16	Chainth Khad	16	31.55
17	Snail Khad	12	47.75
18	Sukar Khad	25	128.25
19	Saryali Khad	14	46.95
20	Garli Khad	12.5	22.75
Satluj river		---	293

	Total	378.9	1118(825+293)

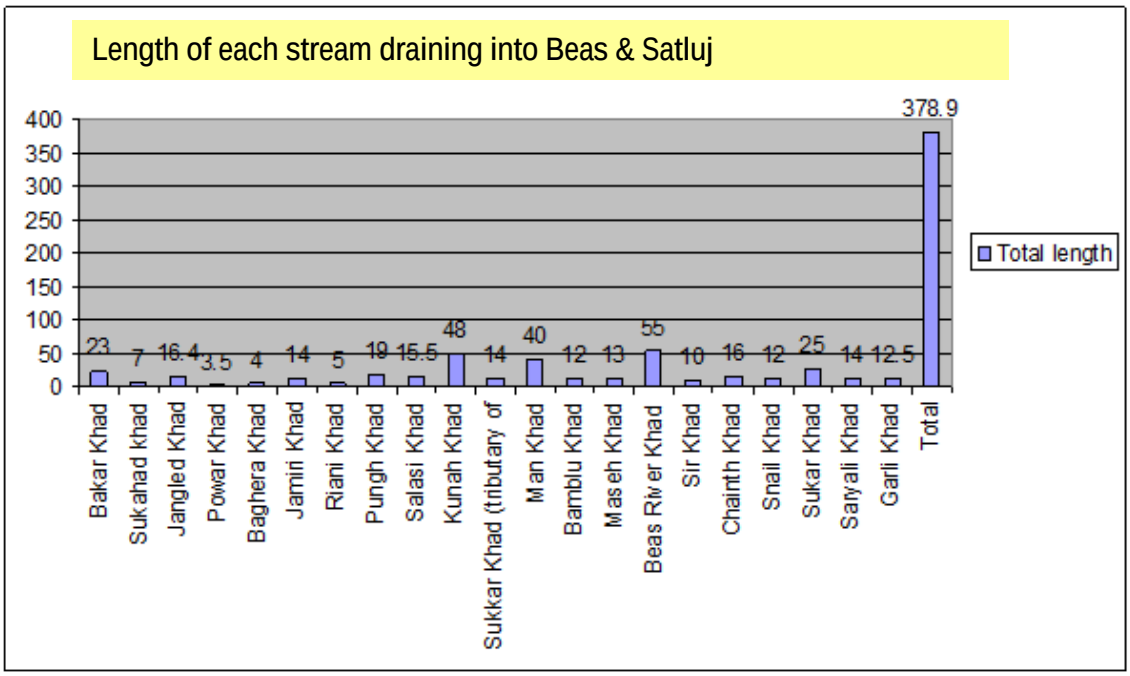


Fig.9 Describing the length of Tributaries of Beas & Satluj

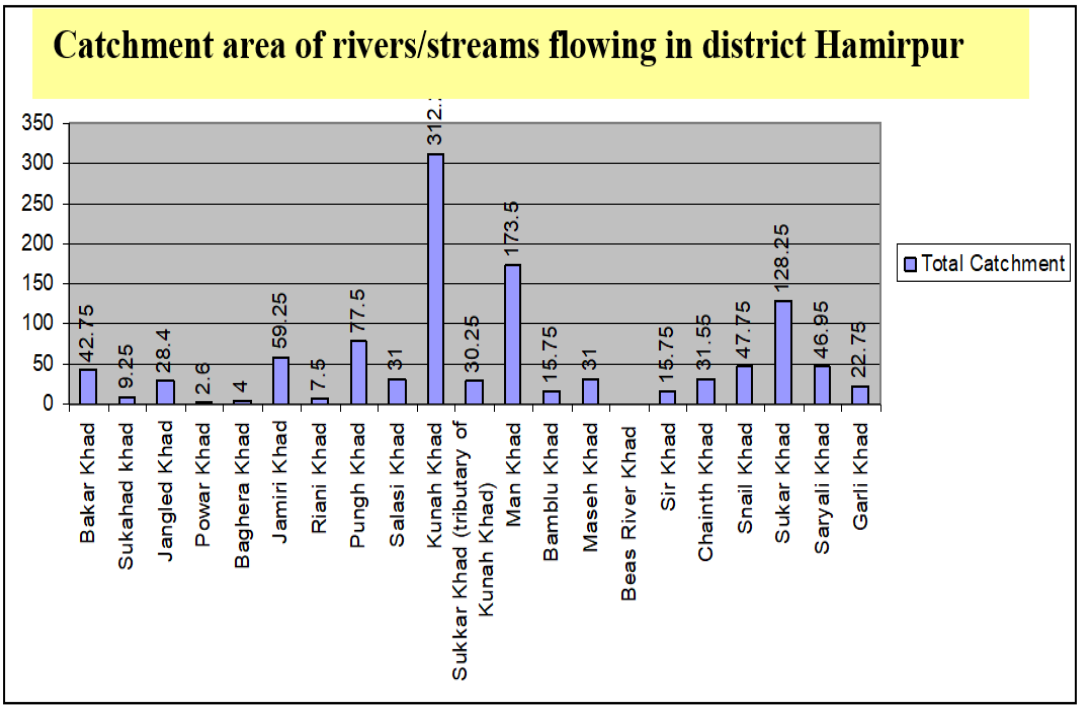


Figure-10- Graph showing Catchment area of rivers/streams flowing in district Hamirpur

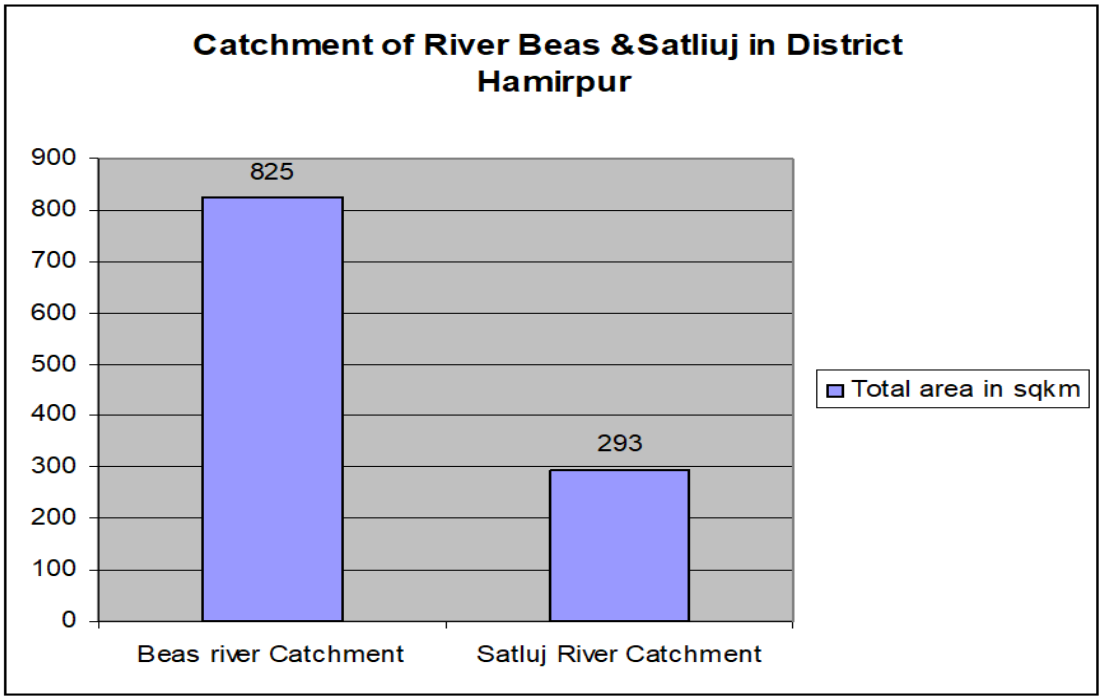


Figure-11 The catchment area of River Beas and River Satluj

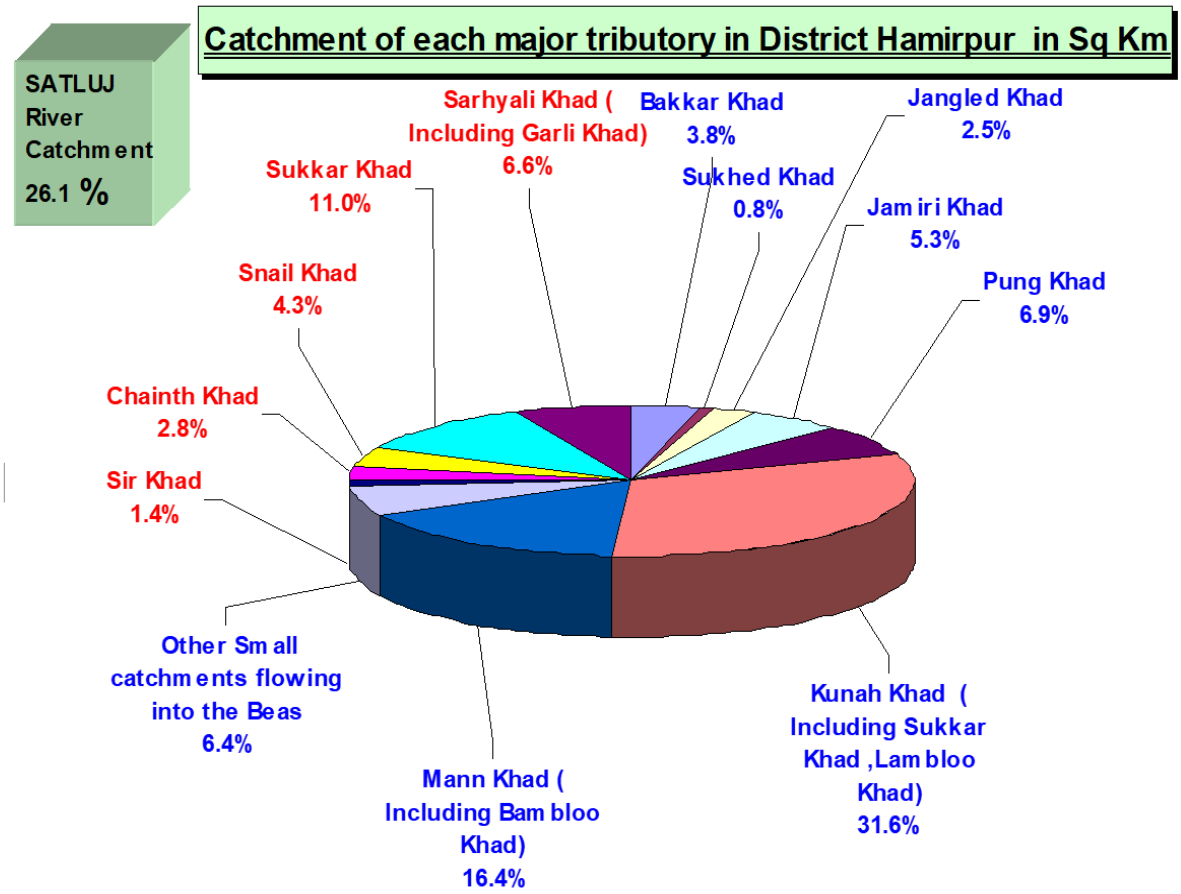


Figure-12- showing catchment of each major tributary in district Hamirpur in (Sqkm)

12 CALCULATION OF MINERAL DEPOSITS AND ANNUAL DEPOSITION IN THE STREAM BEDS

The deposition will occur when a loss of kinetic energy due to loss of gradient results in a decrease in velocity of river water.Many factors such as declining gradient, a decrease in water volume, an increase in cross-sectional area (particularly pools, lakes, and oceans), or by local obstructions affect the deposition of minerals . An excessive load produced by increased erosion in the drainage basin or tributary valleys or from glaciofluvial outwash will also inevitably lead to deposition. The accumulations of stream deposits are called alluvium. The alluvium in river bed is deposited containing a mixture of different constituents of various particle sizes. Further, minerals as deposited and converted into sedimentary, metamorphic and igneous rocks by the result of riverine and earth dynamics movements ashall also be converted into M- Sand and various usable grits in rock crushers.The quality of M–sand and grits depends on mineral matrix of the host rock whether sedimentary, metamorphic or igneous rocks. The Wentworth, 1935, Allen, 1936, Twenhofel, 1937 defined the limits of common grade and rock terms which are given in following table.

Table-9- Showing particle size(Wentworth's table)

Size	Rounded, Subrounded, Subangular		
	Fragment		Aggregate
256 mm--	Boulder	" Roundstone"	Boulder gravel Boulder conglomerate
	Cobble		Cobble gravel Cobble conglomerate
	Pebble		Pebble gravel Pebble conglomerate
64 mm---	Granule		Granule gravel
	Sand		Sand sandstone
	Silt		Silt Siltstone
4 mm--- 2 mm-- 1/16 mm--- 1/256 mm----	clay		Clay Shale

The Boulder is defined as a detached rock mass somewhat rounded or otherwise modified by abrasion in transport and larger than a cobble with minimum size of 256mm (about 10inch). A cobble is defined in the same manner as boulder except that it is restricted in size from 64 to 256mm. A pebble is a rock fragment larger than a coarse sand grain or granule and smaller than a cobble which has been rounded or otherwise abraded by the action of water,wind or ice it is therefore between 4 and 64mm in diameter. The unconsolidated accumulation of pebble, cobbles, or boulders is gravel which may be designated pebble-gravel, cobble-gravel etc. The term sand is used to denote an aggregate of mineral or rock grains greater than 1/16mm and less than 2mm in diameter. Wentworth (1922) proposed the

term granule to cover material 4- 2mm in size. Silt defined as from 1/16 to 1/256mm in size and clay less than 1/256mm in diameter completes the list of common size terms.

The deposition in a river bed is more pronounced during rainy season although the quantum of deposition varies from stream to stream depending upon numbers of factors such as catchment lithology, discharge, river profile and geomorphology of the river course. The particle size may vary depending upon the stage of river i.e. youth, mature and old age. In Hamirpur District during field survey it is observed that annual deposition in various streams vary from 4 cms to 6 cms. However there are certain geomorphological features developed in the river bed such as channel bars, point bars etc. where annual deposition is much more even two three metres.It is also important to mention here that there is a provision in the river/strem bed mining policy guidelines where collection of material upto a depth of 02 metres can be allowed in a single season where mineral concessions have been granted, but it is noticed that during flood season whole of the pit so excavated is completely filled up as it was works as a mineral trap for various sediments loaded in the river water and as such the excavated area is available for new harvest of minerals.

In order to calculate the mineral deposits in the stream beds, the mineral constituents have been categorized as clay, silt, sand, bajri and boulder and there average %age is taken into account. It is observed in different rivers/streams that % age of boulders varies from 30% to 40%, bajri from 20% to 35 %, sand from 20% 40% and silt and clay totalling from 10% 20 %. Only boulder bajri and sand is the resource mineral i.e. usable mineral and rest is taken as the waste which if usefd for any work shall also be included as mineral. Further the Survey of India Topo-Sheets were used as base map to know the extent of river course. The mineral reserves have been calculated only upto 1.00 metre depth although there are some portions in the river beds such as channel bars, point bars and central islands where the annual deposition is raising the level of river bed thus causing shifting of the rivers towards banks resulting cutting of banks and at such locations, removal of this material upto the bed level is essential to control the river flow in its central part to check the bank erossion.

a) <u>Reserve Calculation</u>

The reserve calculations are based on the following expression:
Total reserve = Volume X Tonnage Factor Where volume of the deposit approximated by average Length, Breadth
and height parameters in the river bed.

b) <u>Calulation of tonnage factor in the area</u>

Tonnage factor is the parameter that directly converts the volume of the mineral to the weight of the mineral. In metric system, the tonnage factor is the specific gravity of the ore and the specific gravity is a function of the mineral composition of the ore. The most accurate method of determination of specific gravity of the ore is to determine the average specific gravity of the individual mineral of the ore provided with the accurate relative percentages.

Relative percentage of minerals in Rivers of Hamirpur district is as below:
Sand Stone= 35%, Quartzite = 30 % , Granite = 20 % and Phyllite , Silt Stone & Clay Stone=15 %

Therefore, the total specific gravity of the mineral in Hamirpur district is calculated by

Sand Stone = > 2.4 ×0.35 = 0.84
Quartzite = > 2.4 × 0.30 = 0.72
Granite = > 2.5 × 0.20= 0.50
Phyllite = > 2.6 × 0.15 = 0.39

Total Specific Gravity = 2.4

The above calculated tonnage factor is not site specific which may vary at any point.

Annual Replenishment Factor

Annual replenishment is based on the location of the depositional spot in the river bed, meandering of the river, geology, weathering condition and height of the rainfall in the area. The annual replenishment is determined here by the average of the various heights of deposition per year at a point and taken as 60% of mineral potential, during mining operations at a particular spot. Further, it is also noticed that the annual replacement factor cannot be fixed in such a dynamic Beas River basin which have experienced and experiencing high floods, Cloud bursts and tectonic disturbances.

Method adopted for calculation of minerals

As already explained, the stream cut its course through the boulder beds of upper Siwalik rocks and this formation is the prominent source of annual deposition in the river beds. During flood season, the water carries heavy sediment load comprising gravels and sand which are deposited in the bed of stream. The following mineral potentials have been calculated based on the %age of minerals depending on the range of size i.e. boulder, river borne bajri, sand upto a depth of one metre only to decipher the further potential with increasing depth leaving the clay and silt as waste. The annual replacement factor cannot be fixed in such a dynamic river basins which have experienced and experiencing high floods, Cloud bursts and tectonic disturbances.However, in order to justify the following calculations the average replenishment factor of 6 cms has been considered. As seen in photographs the banks comprise of boulder beds are steep and stable in nature.

Description of Important Rivers and Streams

a) Bakar Khad

Location Toposheet No. 53A/9 & 53A/10

The Bakar Khad is the tributary of river Beas and it flows on the north eastern side of the District forming boundary between the Districts of Hamirpur and Mandi and originates from Awah Devi at an altitude of 1235 mtrs. The stream is seasonal in nature and water flows only during rainy season. From Awah Devi Dhar to Sankota it flows roughly in North West direction and then it takes a swing and flows onwards in roughly northern direction. It joins with river Beas near Thathi village where the R.L. drops to 560 mtrs.The salient feature of the stream are as under;-

Altitude at origin	=1235 mtrs.
Total length	=23 Kms
Total Catchment	=92.95 sqKm 42.75 sq Kms in Hamirpur District 50.25 sq Kms in Mandi District
Total River Bed area	=170-00-00 hect

Effective river bed area for reserve calculation =102-00-00 hect (Hamirpur side)

Width of river

50-100 m from Wah Devi to Sankota
150-200m from Sankota to Thathi
300-500 m from Thathi to confluence with Beas river

Total tributaries	61 Nos. 32 on right bank 29 on left bank Important tributaries 9 Nos.

Geological Conditions

The Bakar Khad cut its course all along its length through Siwalik rocks comprising predominantly massive conglomerate with red and orange clay as matrix and minor sandstone and earthy buff and brown claystone. The river bed is occupied with recent deposits comprising sand, silt, gravel and pebbles of Newer Alluvium belonging to Quatenary age. The boulder beds are considered the prominent source of river borne deposits and during monsoon season the stream carries heavy sediment load and deposit it annually on the river bed. This stream has developed a high flood plain near the confluence of river Beas as during flood season the velocity of this stream is checked by the water of Beas river and most of sediment load is deposited at the confluence point.

Figure- 13 Veiw of Bakar Khad

Present Status of Mining

Presently the following stretch of river bed has been put to auction forming part of Bakar Khad

S. No.	Name of the Party	Annual Bid	Average Annual Production in metric tonnes
Through Auction			
1.	Sh. Piar Chand Chauhan Vill- Kakriar P.O. Himmer Tehsil- Tauni Devi, Distt. Hamirpur (H.P)	75,00000/-	As per Mining Plan
2.	Smt. Usha Devi W/o Sh. Piar Chand Chauhan Vill- Kakriar P.O. Himmer Tehsil- Tauni Devi, Distt. Hamirpur (H.P)	1,05,00000/-	As per Mining Plan
3	Sh.Jagdish Thakur S/o Sh. Hem Raj H. No.-18 W. No.-10 Gandhi Nagar Teh & Distt- Hamirpur	1,19,10500/-	As per Mining Plan
4	Smt. Usha Devi W/o Sh. Piar Chand Chauhan Vill- Kakriar P.O. Himmer Tehsil- Tauni Devi, Distt. Hamirpur (H.P)	73,00000/-	As per Mining Plan

Table Showing Mineral Potential of Baker Khad

Boulder in metric tonnes	River borne Bajri in metric tonnes	Sand in metric tonnes	Total Mineral Potential in metric tonnes
18,36,000	13,77,000	9,18,000	41,31,000
Potential in Hamirpur District			
9,18,000	6,88,500	4,59,000	20, 65,500
Total Annual Deposition			
1,10,160	82,620	55,080	2,47,860
Annual deposition in Hamirpur District			
55,080	41,310	27,540	1,23,930

Recommendation

It is evident from the above table that about 20, 65,500 metric tones of different sizes of minor minerals are available upto depth of one metre in the river bed of Bakar khad in the Hamirpur District. Similarly the annual deposition of minor mineral in the river bed is calculated apprixmately to the tune of 1,23,930 metric tones as conceptualized in Hamirpur side of the river. At present the river bed is put for auction and average annual production is around 20,000 metric tones from the river bed which is insignificant as compared to the total mineral deposits in the river bed. Further the deposition of mineral as already specified in former chapters depends upon amount of mineral erosion, transport, and accumulation by rivers which are always a complex phenomenun of every year that are governed by a combination of physical, chemical, and environmental factors and the recommendation of any mineral concession shall be point specific depending upon the condition at that time.

SUKAHAD KHAD

Topo sheet no 53 A/9(west of Bakar khad)

The Sukahad khad originates from Bagru village at an elevation of 954 mtrs and remains dry in most of the months except during monsoon season. This stream flows in north 10 ° west and joins with river Beas near village Kheri where the altitude drops to 540 mtrs.
The salient features of the river are as under

1. Altitude at origin =954 m
2. Total length =7km
3. Total catchment area =9.25 sqkms
4. Total river bed area =85-50-00hect
5. Effective river bed area =51-30-00 hect(for reserve calculation)
6. Width
   a. Bagroo to Ghiana =20 to 30 mtrs
   b. Ghiana to Thath =50-120mtrs
   c. Thathi to confluence with Beas= 500 to 700 mtrs

Main Tributaries=24

14 on right bank
10 on left bank

Geological conditions:- The Upper Siwalik rocks are exposed in the catchment area of this stream comprising boulder, conglomerate with thin lenses of sandstone and clays. The banks are formed of upper Siwalik rocks with deep valleys at some places. The river in large part is flowing along the strike of the beds.

Figure 15 View of Sukahad khad

Present status of mining –

No mineral concession has been granted in the river bed of this stream.

Mineral Potential in River Bed-

As already explained, the catchment area comprises of boulder, conglomerate beds and during monsoon season the flood water carries heavy sediment load comprising cobbles, pebbles, boulders and sand is deposited on the river bed.

Table showing mineral potential of minor mineral

S.No	Boulder in	River borne	Sand in metric	Total in metric

	metric tonnes	deposite in metric tonnes	tonnes	tonnes
	4,61,000	4,03,987	2,30,850	10,95,837
Annual Deposition				
	27,702	20,776	13,850	63,325

Recommendations

It is evident from the above table that there is total potential of 10,95,837MT of mineral available in the bed of Sukahad khad upto a depth of 1mtr as already projected above and annual deposition has been estimated to the tune of 63,325 MT. This stream is auctioned with Beas river from down stream of bridge located on Sujanpur-Sandhol road forming part of Beas river auction. No other mineral concessions have been granted in the river bed. Keeping in view the significant amount of minor mineral lying in the river bed, it is recommended that minor mineral such as sand stone and bajri can be allowed to be lifted from this river bed. Further the deposition of mineral as already specified in former chapters depends upon amount of mineral erosion, transport, and accumulation by rivers which are always a complex phenomenun of every year that are governed by a combination of physical, chemical and environmental factors and the recommendation of any mineral concession shall be point specific depending upon the condition at that time.

JANGLED KHAD

Topo-Sheet No. 53A/9

The Jangled Khad is the tributary of Beas river which is perenial in nature. This stream flows in N-S direction from origin to Bhamlon village then it swings toward western side and flows in N-15°W upto confluence with Beas river. It originates near Uhal village south of Bhamlon at an elevation of 1070 mtrs. It joins with river Beas near village Jangled where the RL drops to 534 mtrs
The Salient features of the stream are as under:-

Altitude at origin -1070m near village Bhamlon
Total length -16.4km
Total catchment -28.4 sqkm
Total river bed area -178-00-00hect
Effective river bed area =106-80-00 hect(for reserve calculation)
Width
Uhal to Chaptehar -80 to 150m
Chaptehar to confluence with Beas river -400-500m
Total tributaries-32
Right Bank=13
Left Bank=19
Important tributaries -1(Palbhu khad)

Geological conditions-

The Jangled khad passes through rocks of upper Shiwaliks containing boulder beds, and small lenses of clay and sand stone. This formation is considered the potential source of river borne deposites in the stream bed. The stream bed is occupied with huge deposits of gravel and sand. Near the confluence with Beas river this stream has developed a vast flood plain as the velocity of water of this stream during monsoon is checked at the confluence and sediment load is deposited at this place forming vast flood plain. The banks are steep comprising of boulder beds and stable in nature

Figure 16 View of Jangled Khad

Figure -17 View of Jangled Khad

Present Status of Mining-

The Jangled khad had been put for auction for ten years w.e.f 23-09-2017 to 22-9-2027 for an annual bid of Rs 18,02,000/- . No other type of mineral concession has been granted in this stream bed.

S. No.	Name of the Party	Area (in Hects.)	Average AnnualProduction in metric tonnes
	Sh. Udesh Kumar Annual bid 18,02,000/= Wef 23-09-2017 to 22-9-2027	5-44-00	As per Mining Plan

Mineral potential in the river bed-

The following quantity of mineral potential has been calculated based on the percentage of each mineral constitute like boulder, river borne bazri and sand upto a depth of one metre leaving the clay and silt as waste.

S.No	Boulder in metric tonnes	River borne deposit in metric tonnes	Sand in metric tonnes	Total in metric tonnes
	9,61,200	7,20,200	4,80,600	21,62,700
Annual Deposition				
	57,672	43,254	28,836	1,29,762

Recommendations-

It is evident from the above table that 21,62,700MT of different sizes of minor mineral is available up to a depth of 1m as assumed in the bed of the stream. Similarly, the annual deposition of minor mineral is calculated approximately to the tune of 1,29,762 MT. At present no mineral concession has been granted in the river bed as such there is no productions of any minor mineral from this stream. Further the deposition of mineral as already specified in former chapters depends upon amount of mineral erosion, transport, and accumulation by rivers which are always a complex phenomenun of every year that are governed by a combination of physical, chemical, and environmental factors and the recommendation of any mineral concession shall be point specific depending upon the condition at that time.

POWAR KHAD

The powar khad is the tributary of river Beas and it flows roughly in N35° West. This stream orginates from NE side of village Thana Tikkari at an altitude of 906 mtrs RL. This stream remains dry during most of the year and water flows only during the monsoon season.The salient features of the stream are as under:-

Altitude at origin -906m near village Thana Tikkari
Total length -3.5 Km
Total catchment -2.6sqkm
Total river bed area -21-60-60 hect
Effective river bed area =13-00-00hect(for reserve calculation)
Width

From origin to Bahru-5-10m
From Bahru to Confluence with Beas-50-100m

Important tributaries-11

Right bank-2
Left bank-9

Geological Conditions-

The Powar khad traverses through upper Siwalik formation comprising predominantly massive conglomerate with red and orange clay as matrix and minor sandstone and earthy buff and brown claystone. This formation is the potential source for accumulation of river borne deposits in this stream. The banks are moderately steep and comprise of boulder beds exhibiting stable topography.

Figure - 18 View of Powar Khad

Present Status of mining-

At present no minor concession has been granted in the Powar khad

Total mineral Potential-

The following mineral potentials have been calculated based on the percentage of each mineral constituent ..

S.No	Boulder in metric tonnes	River borne deposite in metric tonnes	Sand in metric tonnes	Total in metric tonnes
	1,03,600	51,800	64,800	2,20,000
Annual Deposition				
	10,500	6,000	7,500	24,000

Recommendations

Since the stream has a very narrow width as such it is not considered suitable for grant of any mineral concessions until unless special conditions if prevail. Further, the deposition of mineral as already specified in former chapters depends upon amount of mineral erosion, transport, and accumulation by rivers which are always a complex phenomenun of every year that are governed by a combination of physical, chemical, and environmental factors and the recommendation of any mineral concession shall be point specific depending upon the condition at that time.

BAGHERA KHAD

Toposheet No.53A/9

This is a small tributary of river Beas. It originates from south of Tariunda village near 906 m RL the stream flows in NW direction up to village Baghera and then it swing to western direction and joins with river Beas. Near confluence the RL drops to 525m.
The salient features of the stream are as under:

Altitude at origin -906m near south of Tariunda village
Total length -4km
Total catchment -4.21 sqkm
Total river bed area -35-00-00 hect
Total effective river bed area =20-00-00hect (for reserve calculation)
Width

Origin to Bir forest -20-40m
Bir forest to confluence -100-150m
Tributaries -11
Right bank-5
left bank-6

Figure - 19 View of Bagehra Khad

Geological conditions-

The Baghera khad traverses through the rocks of Shiwalik formation which contains boulder bed. The boulder beds are potential source of deposition of river borne material comprising gravels and sand. The stream exhibits wide flood plain near confluence with Beas river.The upstream course of this stream is narrow and the banks are stable.The rocks on both the banks are composed of moderately hard sandstone and clay bands with beds of upper boulder beds.

Present status of mining-

No mineral concessions have been granted in this stream bed.

Minor mineral potential-

The following mineral potential are available in the river bed.

S.No	Boulder in metric tonnes	River borne deposite in metric tonnes	Sand in metric tonnes	Total in metric tonnes
	1,57,000	90,000	1,13,000	3,60,000
Annual replishnment				
	14,000	7,000	8,700	29,700

Recommendation-

It is evident from above table that about 3,60,000 MT of minor mineral are available up to a depth of 1m as aassumed already.The annual deposition is very insignificant i.e about 29700 MT, the stream width is narrow in major portion as such this stream is not fit for grant of mineral concession. It is therefore recommended that no mineral concession may be accorded in this stream from origin to confluence with Beas river. However, Further the deposition of mineral as already specified in former chapters depends upon amount of mineral erosion, transport, and accumulation by rivers which are always a complex phenomenun of every year that are governed by a combination of physical, chemical, and environmental factors and the recommendation of any mineral concession shall be point specific depending upon the condition at that time.

JAMIRI KHAD:

Toposheet No.53A/9

The Jamiri Khad is the tributary of river Beas and it originates near Chauri village at an altitude of 1003 mtrs. It joins with river Beas near village Palahi where the RL drops to 515 mtrs. The stream remains dry during most of the year except monsoon season.. It roughly flows in North-West direction upto village Dharol, then swings roughly towards Northern direction and than takes a slight swing towards north west side. The salient features of the stream are as under;

Altitude of origin:	1003 mtrs near Chauri village
Total length :	14.0 Kms
Total catchment:	59.25 Sq. Kms
Total river bed area	-142-50-00 hect
Effective River bed area	=85-50—00hect((for reserve calculation)
Width of river	
Chauri to Mehlru 50-150 mtrs	
	Mehlru to Kachh 100-200
	Kachh to confluence with Beas 300-500 mtrs
Total tributaries 44	
	Right Bank 24
	Left Bank 20
	Important Tributary 1 (Mahili Khad)

Geological Conditios:

The Jamiri khad cut its course all along its length through Siwalik Formation. comprises of boulder beds of upper Shiwalik with thin beds/lences of sandstone and clay. The bed of the river exhibit deposits of river borne material comprising of gravel and sandstone. The stream has developed a wide flood plain ranging from 250-500 mtrs width in a stretch of about 1 kms. Near confluence with Beas river The boulder beds are considered the potential source of river borne deposit which is evident from the huge deposit of material lying in the river bed.

Figure 20-View of Jamiri Khad

Figure 21 -View of Jamiri Khad

Present Status of Mining:

At present no mineral concession has been granted in the stream.

Minor Mineral potential :

The mineral potential in the river beds are as under:

Boulder (In Metric Tons)	River borne Bajri(In Metric Tons)	Sand (In Metric Tons)	Total (In Metric Tons)
7,69,500	5,77,125	3,84,750	17,31,375
Annual Deposition			
46,170	34,627	23,085	1,03,882

Recommendations:

It is evident from the above table that about 17,31,375MT of different sizes of minor minerals are available up to a depth of one mtr. as assumed in the river beds of Jamiri Khad. Similarly, the annual deposition of minor mineral in the river bed is calculated approximately to the tune of 1,03,882 MT. At present the river bed has been put to auction and average annual production of mineral is around 8000 MT. as such mineral concession can be granted in this stream from village Jol Lambri to confluence with river Beas, However, Further the deposition of mineral as already specified in former chapters depends upon amount of mineral erosion, transport, and accumulation by rivers which are always a complex phenomenun of every year that are governed by a combination of physical, chemical, and environmental factors and the recommendation of any mineral concession shall be point specific depending upon the condition at that time.

Riani Khad

Toposheet No. 53A/9

Riani Khad is a small tributary of Beas river. It originates from Jamir ka Tiba at an elevation of 865 mtrs. The river course is dry in most of the year except during monsoon season.The Riani Khad joins with river Beas near opposite to Bhag village where RL drops to 510 mtrs near confluence.

The salient features of the stream are as under;

Altitude of origin: 865 mtrs

Total length : 5.0 Kms
Total catchment: 7.5 Sq. Kms
Total river bed area 85-00-00 hect
Effective river bed area =50-00-00hect(for reserve calculation)
Width of river 100-150
Total tributaries 17

Right Bank 09
Left Bank 08

Geological conditions

The Riani Khad cut its course all along the length through shiwalik rocks comprising boulder bed and alternate bands of sandstone and clay.

Figure 22-View of Riani khad

Present status of mining

At present no mineral concession has been granted in the river bed of Riani Khad.

Mineral potential

The following quantity of mineral potential are available in the river bed of Riani Khad.

Total Mineral Potential

Boulder (In Metric Tons)	River borne Bajri(In Metric Tons)	Sand (In Metric Tons)	Total (In Metric Tons)
3,94,000	2,25,000	2,81,000	9,00,000

Annual deposition

Boulder (In Metric Tons)	River borne Bajri(In Metric Tons)	Sand (In Metric Tons)	Total (In Metric Tons)
27,800	13,000	16,200	57,000

Recommendations

It is evident from the above table that about 9, 00,000 MT of different size of minor minerals are available up to a depth of one meter as already assumed. The annual deposition is about 57000 MT. The stream course is very narrow as such no mineral concession may be granted in this stream bed. However, further the deposition of mineral as already specified in former chapters depends upon amount of mineral erosion, transport, and accumulation by rivers which are always a complex phenomenun of every year that are governed by a combination of physical, chemical, and environmental factors and the recommendation of any mineral concession shall be point specific depending upon the condition at that time.

Pung Khad

(Topo-sheet No. 53 A /5, 53 A /9, 53 A /10)

The Pung Khad is the tributary of Beas river and it originates from village Guwararu at an altitude of 1075 Mtrs. It joins with river Beas near village Mayana at an altitude of 500 Mtrs. The stream is perennial and water flows in it through out the Year. From origin to Thalakna village, the stream flows in roughly western direction than it slightly swings toward north flowing almost in north-west direction.

The salient features of the stream are as under;

Altitude of origin:	=1075 mtrs village Guwararu	
Total length:	=19.0 Kms	
Total catchment:	=77.50 Sq. Kms	
Total river bed area	=215-00-00 hect	
Effective river bed area	=129-30-00hect(for reserve calculation)	
Width of river		
	From origin to Kasiri 40-50 mtrs	
	From Kasiri to confluence with Drug Khad 100-150 mtrs.	
	From Drug Khad to confluence with river Beas 120-200	
Total tributaries	45	
		Right Bank 19
		Left Bank 26
		Important Tributaries 04

Geological conditions

The Pung Khad cut its course all along the length through Siwalik rocks predominantly of massive conglomerate with red and orange clay as matrix and minor sandstone and earthy buff and brown calystone of upper Siwalik and Predominantly medium to coarse- grained sandstone and red clay alternation, soft pebbly with subordinate clays stone, locally thick prism of conglomerate of middle Siwalik.The stream in certain stretches display meandering course and the material is seen deposited on the convex side of the meander. In the stream bed number of point bars have been developed which are the important Geomorphological feature for deposition of mineral. The sandstone and clay stone of Siwalik group belongs to Middle Miocene to early Pleistocene.

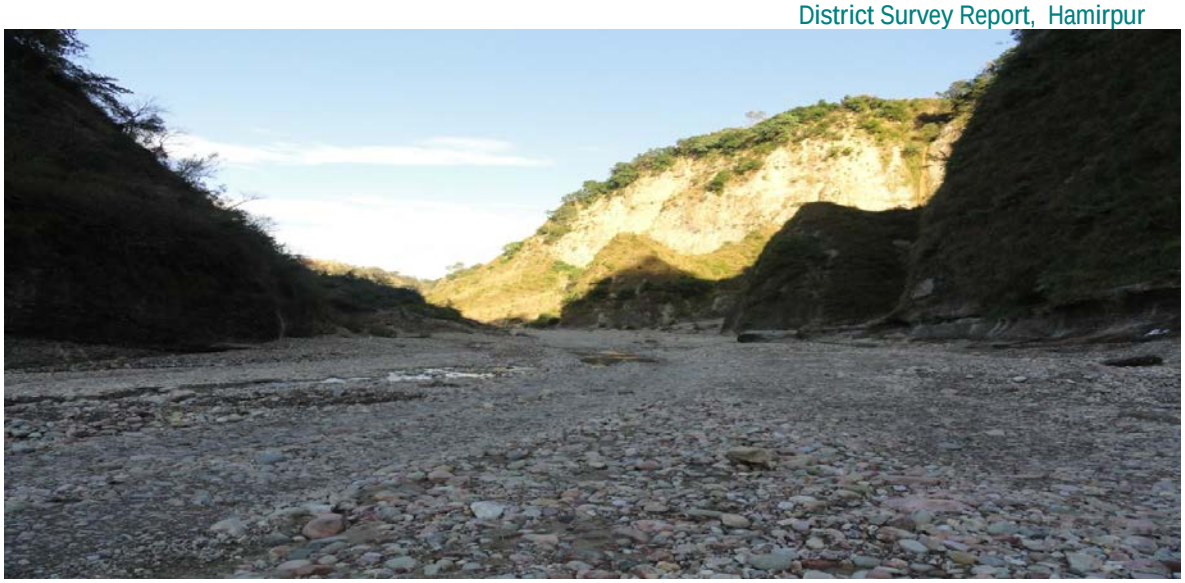


Figure 23- View of Pung Khad

Figure 24- View of Pung Khad

Present status of mining

At present following type of mineral concessions have been granted.

Sr. No.	Name of party	Area in Hectare	Purpose of Lease	Average Annaul Production (in Metric Tons)
1	Sh. Parveen Kumar,Prop. M/s Mahavir Stone Crusher Village, Mulana P.O. Bohani, Tehsil & District Hamirpur.	4-19-23	Stone Crusher	54000
2.	Sh. Ashish Sharma M/s Mahadevi Stone Crusher H. No-190, W. No.8 Teh & Distt-Hamirpur	2-27-68	Stone Crusher	33050

Minor Mineral mineral potential

The following quantities of mineral potential are available in the river bed of Pung Khad.

Boulder (In Metric Tons)	River borne Bajri(In Metric Tons)	Sand (In Metric Tons)	Total (In Metric Tons)

10,18,237	8,72,775	7,27,312	26,18,324

Annual Replenishment

Boulder (In Metric Tons)	River borne Bajri(In Metric Tons)	Sand (In Metric Tons)	Total (In Metric Tons)
50,911	43,638	36,365	1,30,914

Recommendations

It is evident from the above table that about 26,18,324MT of different size of minor minerals are available upto a depth of one meter as already assumed in the river bed of Pung Khad. The annual deposition is calculated to the tune of 1,30,914MT. At present two mining leases have been granted and part of river bed has been put to auction and the annual average production of minor minerals from the river bed is about 67000 MT only. It is recommended that mineral concession may be granted from 1 Kilometre upstream of Kasiri village (Kot Darogan) to confluence with Beas. However, further the deposition of mineral as already specified in former chapters depends upon amount of mineral erosion, transport, and accumulation by rivers which are always a complex phenomenun of every year that are governed by a combination of physical, chemical, and environmental factors and the recommendation of any mineral concession shall be point specific depending upon the condition at that time.

Salasi Khad

(Toposheet No. 53 A /5, 53 A /6)

The Salasi Khad is the tributary of Beas river and it originates from village Matahni at an altitude of 890 Mtrs. It joins with river Beas at an altitude of 490 Mtrs. The stream is perennial in nature and water flows in it through out the year.

The salient features of the stream are as under;

Altitude at origin: = 890 mtrs

Total length : =15.5 Kms

Total catchment: =31.0 Sq. Kms

Total river bed area =75-00-00 hect

Effective river bed area =43-00-00hect(for reserve calculation)

Width of river

From origin to Kadhia Kalsi 20-60 mtrs

From Kadhia Kalsi to confluence with river Beas 60-120

Total tributaries 42

Right Bank 22

Left Bank 20

Geological conditions

The Salasi Khad cut its course all along the length through shiwalik rocks comprising of alternate bands of sandstone and clay with pocket of boulder beds. The river bed contains deposits of river born material comprising of Boulder, Bajri and sand.

Present status of mining

At present no mineral concession has been granted in this river bed.

Minor mineral potential in the stream bed

The following quantity of mineral potential are available in the river bed of Salasi Khad.
Total Mineral Potential

Boulder (In Metric Tons)	River borne Bajri(In Metric Tons)	Sand (In Metric Tons)	Total (In Metric Tons)
338000	1,93,400	2,41,000	7,72,000

Annual Deposition

Boulder (In Metric Tons)	River borne Bajri(In Metric Tons)	Sand (In Metric Tons)	Total (In Metric Tons)
25,000	14,000	17,800	56,800

Recommendations

It is evident from the above table that about 772000 MT of different sizes of minor minerals are available up to a depth of one meter as already assumed. The annual deposition is about 56800 MT. The stream width is very narrow and it mostly passes through forest area it is therefore recommended that no mineral concession may be granted in this stream. However, further the deposition of mineral as already specified in former chapters depends upon amount of mineral erosion, transport, and accumulation by rivers which are always a complex phenomenun of every year that are governed by a combination of physical, chemical, and environmental factors and the recommendation of any mineral concession shall be point specific depending upon the condition at that time.

Kunah khad

(Toposheet No.53A/5, 53 A /653 A /10)

Kunah khad is the tributary of river Beas and it originates near village Sangroh at an altitude of 1198m R.L. It joins with river Beas near village Bilkeshwar where its RL drops to 480 m. The stream is perennial in nature forming largest catchment area amongst all the tributaries of river Beas flowing in District Hamirpur and number of small perenial streams such as Ghasoti, Lamblu, Hathli and Kamlah khad joins with this stream along its course at different locations.

The salient feature of this stream are as under:-

Altitude at origin -1198m
Total length -48km
Total catchment -353.5 km(including 30.25 sqkm catchment of Sukkar khad
Total river bed area -950-00-00 hect
Effective river bed area =570-00-00hect(for reserve calculation)
Width
Sangroh to Maseraru-50-100m
Maseraru to confluence with Sukar Khad -100-150m
From Sukar khad confluence to confluence with Beas-200-400m
Total tributaries -62
Right bank-38 (Rain,Gasoti,,Koli,Hathli, Kamloh,Mandher)
Lft bank-24(Bhota,Sukar,Dadh,Kapara,Kangu

Geological condition

The Kunah khad cut its course all along through Shiwalik Formation comprising upper, middle and lower shiwalik. The upper Siwalik rocks contain predominantly massive conglomerate with red and orange clay as matrix and minor sandstone and earthy buff and brown claystone.. The middle and lower Siwalik contains medium to coarse- grained sandstone and red clay alternation, soft pebbly with subordinate clays stone, locally thick prism of conglomerate of middle Siwalik. The boulder bed are

considered prominent source of river borne deposit.The rocks on both the banks up to Bari village consists boulder conglomerate bed and then by moderately hard sand stone and clay bands of Siwalik Group belonging to Middle Miocene to Early Pleistocene age.

Figure 25- View of Kunah Khad

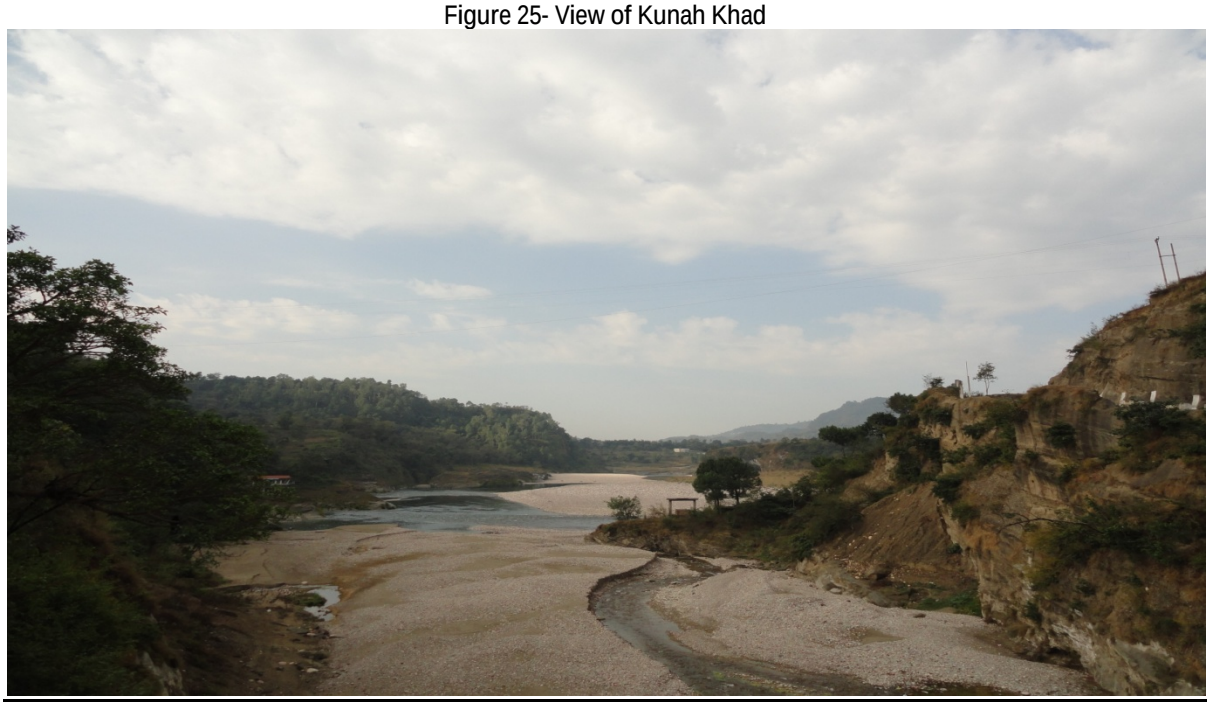


Figure 26-View of Kunah Khad

Present Status of Mining-

At present following type of mineral concession have been granted.

Sr. No.	Name of party	Area in Hectare	Purpose of lease
1.	Sh Vijay Chopra, M/S Jagdambey Stone Crusher, village Massiana, District Hamirpur,	2-86-67	Stone Crusher
2	Smt. Kailash Thakur Prop: M/s Kailash Stone Crusher VPO-Bairi, Teh-Barsar Distt Hamirpur	04-54-89 Hect	Stone Crusher

3	M/s Mahadev SCU, Sh. Ashish Sharma S/o Sh. Ved Parkash Vill-Mulana, PO- Bohni, Tehsil and district-hamirpur and Sh Rakesh Kumar, Vill-Bela, Nadaun, Partners M/s Mahadev Stone crusher, Jol sapper	03-50-73 hectares	Stone Crusher
4	Sh. Ashish Sharma S/o Sh. Ved Parkash Vill- Mulana, PO- Bohni, Tehsil and District-Hamirpur and Sh Rakesh Kumar, Vill- Bela, Nadaun, Partners M/s Mahadev Stone crusher, Jol sapper Teh-Nadaun Distt-HMR	02-84-89 Hectares	Stone Crusher
5	Sh. Ashok Thakur Prop. Maheshwar stones crushing & washing unit V. Kuthera P.O Jalari, Tehsil- Nadaun Distt. Hamirpur.	4-03-97	Stone Crusher
6	M/s Trident Industries Prop: Virender Jain V. P.O -Jalari, Tehsil-Nadaun Distt. Hamirpur.	3-47-58	Stone Crusher
7	M/s Trident Industries Prop: Virender Jain V. P.O -Jalari, Tehsil-Nadaun Distt. Hamirpur.	03-30-60 Hectares	Stone Crusher
8	Smt. Raksha Rani, W/o Late Sh Parkash Chand , Vill- Har masanda, Po- Sanahi, Nadaun, District-Hamirpur	04-88-94 hectares	Open Sale
Sr. No.	Name of the Khad	Area in Hectares	Name of the Party
01.	Kunah Khad Part-I	21-16-08	Sh. Anmol Kumar, S/o Sh. Jai Chand, Flat No.-08, Ward No.-7, Housing Board Colony Hamirpur (H.P)
02.	Kunah Khad Part-II	5-59-06	Sh. Som Dutt Sharma S/o Sh. Purshotam Dass Sharma, Vill-Larha, P.O-Galore, Teh- Nadaun, Distt-Hamirpur (H.P)
03.	Kunah Khad Part-III	7-26-31	Sh. Raj Kumar, S/o Sh.Kalidass, Vill- Lalin, P.O-Changar, Teh & Distt-Hamirpur (H.P)
04.	Kunah Khad Part-IV	14-94-32	Sh. Raj Kumar, S/o Sh. Punnu Ram, Vill-Sorad, P.O- Jol Sapper, Teh-Nadaun, Distt- Hamirpur (H.P)
05.	Kunah Khad Part-V	6-64-95	Sh. Raj Kumar, S/o Sh. Punnu Ram, Vill-Sorad, P.O- Jol Sapper, Teh-Nadaun, Distt- Hamirpur (H.P)

Total Mineral Potential In the River Bed:

Total Mineral Potential			
Boulder	Bazri	Sand	Total
44,88,750	38,47,500	32,06,250	1,15,42,500
Annaul depostion			
1,79,550	1,71,900	1,28,250	4,79,750

Recommendations-

It is evident from the above table about 1,15,42,500MT of mineral of different sizes are available up to a depth of 1 m as already assumed. The annual deposition of mineral in the stream bed has been calculated approximately to the tune of 4,79,750MT. At present in this river bed, the average annual production is about 86100 MT from the mineral concession granted in the river bed which is insignificant as comared to the total deposits of mineralo. As such mineral concession can be granted in the river bed. It is recommended that from Kanjian to confluence with Beas river, mineral concession may be granted. However, Further the deposition of mineral as already specified in former chapters depends upon amount of mineral erosion, transport, and accumulation by rivers which are always a complex phenomenun of every year that are governed by a combination of physical, chemical, and environmental factors and the recommendation of any mineral concession shall be point specific depending upon the condition at that time.

SUKKAR KHAD (Tributary of Kunah Khad)

(Toposheet No. 53 A /10, 53 A /6)

The Sukkar Khad is the sub - tributary of Kunah Khad and it originates near village Panjyariri at an altitude of 1016m R.L. It joins with Kunah Khad near village Bari where its RL drops to 602 m. The stream is seasonal in nature and water flows only during monsoon. The river flows roughly in northwest direction from origin

The salient feature of this stream are as under:-

Altitude at origin - 1016m near village Panjyariri
Total length -14km
Total catchmen -30.25 km
Total river bed area -192-00-00hect
Total effective River bed area =112-00-00hect(for reserve calculation)
Width
Dhamian to Galoh-100-120m
Galoh to confluence with Kunah Khad -150-200m
Total tributaries -33
Right bank-19
Left bank-14
Important Tributaries 3

Geological condition

The Sukkar khad cut its course all along through Shiwalik Formation comprising upper, middle and lower shiwalik. The upper Siwalik rocks contain boulder beds with lenses of sand stone and clay. The middle and lower Siwalik contains alternate beds of sand stone and clay. The boulder bed are considered prominent source of river borne deposit..

Present Status of Mining-

At present only no mining lease has been granted in this river bed.

Total Mineral Potential In the River Bed:

Total Mineral Potential			
Boulder	Bazri	Sand	Total
900000	7,50,000	600000	22,50,000
Annaul depostion			
36,000	30,000	24,000	90,000

Recommendations-

It is evident from the above table about 22,50,000 0MT of mineral of different sizes are available up to a depth of 1 m as already assumed. The annual deposition of mineral in the stream bed has been calculated approximately to the tune of 90,000 MT. At present in this river bed, the average annual production is about 5000MT only As such mineral concessions can be granted in the river bed. It is recommended that from Galoh to confluence with Kunah Khad, mineral concession may be granted. However, Further the deposition of mineral as already specified in former chapters depends upon amount of mineral erosion, transport, and accumulation by rivers which are always a complex phenomenun of every year that are governed by a combination of physical, chemical, and environmental factors and the recommendation of any mineral concession shall be point specific depending upon the condition at that time.

MAN KHAD

Topo-Sheet No. 53A/5 & 53 A/6

This stream is a tributary of Beas river and it originates from Barsar at an RL of 1048m and joins with river Beas near Kot village where the RL drops to 470m The stream flows in roughly NNW direction showing number of hairpin bends.

The salient features of the river are as under:-

Altitude at origin -1048m
Total length -40km
Total catchment -183.5sqkm
Total river bed area -892-50-00 hect
Effective river bed area =535-50-00hect(for reserve calculation)
Width-
origin to confluence with Bamblu khad-30-50m
Bamblu khad to Baragran-100-200m
Baragran to confluence with Beas-200-400m
Total tributaries-55
Right bank-21
(Bamblu,Harneta,Laharkar khad &Dug Khad)
Left bank-34
(Dhaneta,Sera Khad)

Geological condition:-

This stream traverses through rocks comprising middle and upper Siwalik. The upper Siwalik rocks contain Siwalik Formation comprising upper, middle and lower Siwalik. The upper Siwalik rocks contain predominantly massive conglomerate with red and orange clay as matrix and minor sandstone and earthy buff and brown claystone.. The middle Siwalik contains predominantly medium to coarse-grained sandstone and red clay alternation, soft pebbly with subordinate clays stone, locally thick prism of conglomerate of middle Siwalik. The boulder bed are considered prominent source of river borne deposit.The rocks on both the banks consists boulder conglomerate bed and by moderately hard sand stone and clay bands of Siwalik Group belonging to Middle Miocene to Early Pleistocene age.

Figure 27-View of Man Khad

Present Status of Mining

At present following mineral concession has been granted in the stream

Through mining lease:			
Sr. No.	Name of party	Area in Hectare	Purpose of lease
1	M/S Mahalakshmi stone Crusher Village-Dadoon (Hathol) PO Pansai,Tehsil- Nadaun Distt. Hamirpur	04-06-86 Hect	Stone crusher
2	M/S Mahalakshmi stone Crusher Village-Dadoon (Hathol) PO Pansai,Tehsil- Nadaun Distt. Hamirpur	04-42-27 Hect	Stone crusher
3	Smt. Meera Devi W/o Sh.Som Dutt Sharma Vill-Larha, P.O-Galore, Teh-Nadaun, Distt-Hamirpur (H.P)	04-53-70 Hect	Open sale
4.	Sh. Prakash Chand S/o Sh. Sunder Ram VPO Chamned Teh & Distt Hamirpur	03-76-87 Hect	Stone crusher
	Through Auction		
Sr.No	Name of the strem/Khad	Area in Hectares	
01.	Maan Khad Part-I	12-62-72	
02.	Maan Khad Part-III	8-48-12	

Total Mineral potential

Total deposition			
Boulder	Bazri	Sand	Total
42,17,062	36,14,625	30,12,187	1,08,43,874
Annaul depostion			
1,68,682	1,44,585	1,20,487	4,33,754

Recommendation-

Upto confluence with Hareta Khad, the both banks are stable banks and valley is represented by steep slopes of hard rocks, After Hareta Khad, the river flows through the thickly populated area.It is evident from above table that 1,08,43,874MT of minerals are available up to a depth of 1m as already assumed in the river bed. Similarly 4,33,754 MT of annual deposition of mineral is calculated in the river bed. The average annual production of mineral in the river bed is around 84,900MT from the mineral concession granted in the river bed.Hence further lifting of minor mineral from this river bed can be allowed. It is recommended that mineral concession can be granted from confluence of Bumbloo Khad to confluence with Beas river. No mineral Concession may be granted from origin of river from Barsar to confluence with Bamblu Khad as the stream passes through a very narrow gorge and in tributaries namely Pansai, Kashmir Khad originating from Loharkar and in Hareta Khad for proper replenishment of mineral. However, Further the deposition of mineral as already specified in former chapters depends upon amount of mineral erosion, transport, and accumulation by rivers which are

always a complex phenomenun of every year that are governed by a combination of physical, chemical, and environmental factors and the recommendation of any mineral concession shall be point specific depending upon the condition at that time.

BUMBLU KHAD

Topo-sheet No. 53A/6 & 53A/10

The Bumblu Khad is the sub -tributary of Man khad which is the primary tributary of Beas river. It originates near village Matrina at an altitude of 987 m The stream flows in west direction and near Nauhal it takes a swing and flows towards south western side. It joins with Man khad near village Rajputan..

Figure 28- View of Bumbloo Khad

The salient features of the stream are as under

Altitude at origin -987m
Total length -12km
Total catchment -15.75sqkm
Total river bed area -123-00-00 hect
Effective river bed area =73-80-00hect(for reserve calculation)
Width-
From origin to Nahaul-50-200m
Nahaul to confluence with Man khad-80-200
Total tributaries -10
Right bank-7
Left bank-3

Geological conditions-

This stream traverses all along its length through Siwalik rocks of middle and upper Siwaliks. The middle Siiwalik rocks contain alternate bands of sand stone and clay and upper shiwalik contains boulder beds. The upper Siwalik rocks are considered the potential source for deposition of mineral in the river bed.

Mineral Potential in the River bed

Boulder	Bazri	Sand	Total
5,81,175	4,90,150	4,15,125	14,86,450
Annaul depostion			
23,247	19,926	16,605	59,756

Recommendations

It is evident from the above table about 14,86,450MT of minor minerals are available up to a depth of 1m as already assumed in the river bed. Similarly annual deposition in the river bed is about 59,756 MT. At present only one mining lease has been granted in the river bed. The annual average production of minor mineral is around 1100 MT. Hence further lifting of boulder, bajri and sand can be allowed in this bed. It is recommended that mineral concession can be granted from Har village (from road bridge) up to confluenc with Man khad. No concession may be granted from Matrina village to Har village . However, Further the deposition of mineral as already specified in former chapters depends upon amount of mineral erosion, transport, and accumulation by rivers which are always a complex phenomenun of every year that are governed by a combination of physical, chemical, and environmental factors and the recommendation of any mineral concession shall be point specific depending upon the condition at that time.

MASEH KHAD

Topo-sheet No. 53A/5 & 53A/6

It originates from Behlan P.F. at an altitude of 789m and joins with river Beas at an altitude of 460m near Jatoli village. This stream separates the boundaey between Hamirpur and Una Districts. The salient features of this stream are as under

Altitude at origin -789m
Total length -13km
Total catchment -31sqkm
Total river bed area -107-00-00 hect

Effective river bed area =64-00-00hect (for reserve calculation)
Total tributaries -23
Right bank-9
Left bank-14

Geological conditions

This stream traverses its course through Siwalik rocks comprising lower Siwaliks rocks containing alternate bands of sand stone and clay. The stream is flowing in northern direction and follows the strike of the beds.

Figure 29-View of Maseh Khad

The following mineral concession have been granted

Sr. No.	Name of party	Area in Hectare	Purpose of lease	Status of land	Average Annaul Production (in Metric Tons)
1.	Sh. Gian Chand Prop. M/s Ambey Stone Crusher, VPO Bharmoti, District Hamirpur.	*14-58-14*	Stone crusher	Private	109125

Minor Mineral Potential in the River bed

Minor Mineral Potential			
Boulder	Bazri	Sand	Total
500000	3,60,000	3,60,000	12,20,000
Annaul depostion			
20,000	14,400	14,400	48,800

Recommendations-

It is evident from the above table that 12,20,000MT mineral potentials are available in the river bed up to 1m of depth as already assumed. Similarly 48,800MT of mineral is deposited annually in the river bed. At present only one mining lease has been granted in the river bed and part of river bed has been put to auction with average annual production of 21000 MT of mineral only Hence it is recommendation that mineral concession may be granted from Kitpal P.F. boundary to up to confluence with Beas river. No concession may be granted granted from Behlan P.F.boundary to Kitpal P.F. boundary. However, Further the deposition of mineral as already specified in former chapters depends upon amount of mineral erosion, transport, and accumulation by rivers which are always a complex phenomenun of every year that are governed by a combination of physical, chemical, and environmental factors and the recommendation of any mineral concession shall be point specific depending upon the condition at that time.

BEAS RIVER

Topo-sheet No. 53A/5 &53A/9

This is the major river flowing along the northern boundary of District Hamirpur, The District Hamirpur lies on left bank whereas District Kangra lies on right bank. The river cut across all the Siwalik formations from lower to upper Siiwaliks and all its catchment in District Hamirpur belongs to Siwalik Formation.. The river in District Hamirpur enters at an elevation of 580m and leaves it at Chomukha village at an elevation of 455m From Sachuhi village situtated near North East boundary of District up to Palahi,. the river bed has developed very wide flood plain which ranges in width from 500-1500m forming braided pattern in the said stretch.. Numbers of sand bars and islands have been developed in this stretch.The meandering is very common in this part of river and flow of water shifts annually from one side to another side. From Palahi to Nadaun the river course is narrow and width of river bed varies from 100-250m from Nadaun to onward up to Chomukha , the river course widens. The salient features of the river are as under

Altitude at origin- -580m at entry point of Hamirpur
Total length -55km
Total catchment -825.00sqkm
Total river bed area -950-00-00 hect
Effective river bed area =570-00-00hect(Hamirpur side) (for reserve calculation)
Width upto Palahi-500-1500m
Palahi to Nadaun-100-1200m
Nadaun to –Chomukha-250-1200m

Total tributaries -29

Geological conditions

The Beas river traverses its course all along through Siwalik Formations from lower to upper Siwaliks. All the tributaries of the river in District Hamirpur are flowing along the strike of different Siwalik formations. The river has developed a wide flood plain and shows meandering pattern upto Palahi. From Palahi to down stream up to Nadaun the river course becomes narrow. The river bed is occupied with thick deposits of river borne material comprising sand stone and bazri. The deposition of mineral in some stretches is huge.

Figure-30-View of Beas River

Figure-31-View of Beas River

Figure 32 & 33 View of Beas River

Present Status of Mining

The following mineral concession have been granted

Sr. No.	Name of party	Area in Hectare	Purpose of lease
1.	Sh Rajat ThakurS/o Sh. Mahinder Singh Vill. Chanjiar, P.O. Dhawali, Tehsil Sarkaghat, Distt. Mandi	4-61-54	Stone Crusher
Through Auction			
Sr. No.	Name of River/ Stream	Area in Hectare	Name of the Party
01.	Beas River Sujanpur-III	22-93-07	Sh. Rahul Pathania S/o Sh. Ranjit Singh, Vill- Thapkor, P.O- Bhadroya, Teh- Nurpur, Distt- Kangra (H.P) & Smt.Seema Devi, W/o Sh.Dharamveer Singh, V.P.O- Kandwal,Teh- Nurpur, Distt- Kangra (H.P)
02.	Beas River Sujanpur-IV	16-24-89	Sh. Ravi Kumar, S/o Sh. Daulat Ram, Vill-Puar, P.O- Bir Bagehra, Teh- Sujanpur, Distt- Hamirpur (H.P)
03.	Beas Dariya Nadaun	5-39-24	Smt.Sunita Devi W/o Sh.Ranbir Singh,V.P.O-Kandwal,Teh- Nurpur, Distt- Kangra (H.P) & Smt.Muskan Thakur W/o Kanwar Rahul Singh,Vill- Thapkor, P.O- Bhadroya, Teh- Nurpur, Distt- Kangra (H.P)
04.	Beas Dariya IV Sujanpur	8-55-33	Sh. Ajay Pal S/o Sh. Sher Singh Vill-Kachhali, P.O & Teh-Sandhole, Distt- Mandi (H.P)

Minor Mineral Potential in the River Bed

Minor Mineral Potential			
Boulder	Bazri	Sand	Total
8977000	51,29,000	64,12,000	2,05,18,000
Annaul depostion			

179000	1,02,500	1,28,000	4,09,500
Minor Mineral Potential in Hamirpur side			
44,88,000	25,64,500	32,06,000	1,02,59,000
Annual Deposition			
2,40,000	1,50,000	1,80,000,	5,70,000

Recommendations

It is evident from the above table that 1,02,59,000MT mineral potentials are available in the river bed up to 1m of depth as already assumed in District Hamirpur, similarly 5,70,000 MT of mineral is deposited annually in the river bed. At present only 4 mining leases have been granted in the river bed and auctioned in two parts with average annual production of 1,48,240 MT. The river bed has been put to auction from Sachuhi to Balehu and Choru to Chomukha. It is recommendation that mineral concessions may be granted from Sachuhi to Chomukha in the Beas river bed. Auction may be continued from Sachuhi to Balehu and from Bilkeshwar to Chomukha as per the earlier practice. However, further the deposition of mineral as already specified in former chapters depends upon amount of mineral erosion, transport, and accumulation by rivers which are always a complex phenomenun of every year that are governed by a combination of physical, chemical, and environmental factors and the recommendation of any mineral concession shall be point specific depending upon the condition at that time.

SIR KHAD

Topo-sheet No.53A/6

The Sir Khad is the major tributary of river Satluj. It originates from near Sarkaghat in Distt. Mandi and it enters in District Hamirpur near Village Bhukhar at an altitude of 880 mtrs. and the RL drops to 710 mtrs.when it leaves District Hamirpur. The stream roughly flows in southern direction in Hamirpur District.
The salient features of the stream are as under:-

Altitude at origin -1120 mtrs near Sarkaghat
Total length -10 km in District Hamirpur
Total river bed area -96-00-00 hect

Effective river bed area =57-50-00 hect (in Hamirpur distt) (for reserve calculation)
Width of stream
From Bhukar to Nalta 50-70 mtrs
Nalta to Jahu 200-400 mtrs

Total catchment -15.75 sq. km (in District Hamirpur)
Total tributaries in -14
Right Bank-7 (in Hamirpur)
Left bank-7 (in district Mandi)
Main tributaries are Kakkar, Chainth and Snail Khad.

Geological conditions

The Sir Khad traverses its course through Siwalik rocks belonging to upper Siwalik. The upper Siwalik rocks contain predominantly massive conglomerate with red and orange clay as matrix and minor sandstone and earthy buff and brown claystone The rocks on both banks are represented by soft

to moderately hard sandstone and claystone. The river Sir Khad has developed a very wide valley and passes through thickly populated areas. The banks and river terraces are used for agriculture purposes.

Figure 34- View of Sir Khad

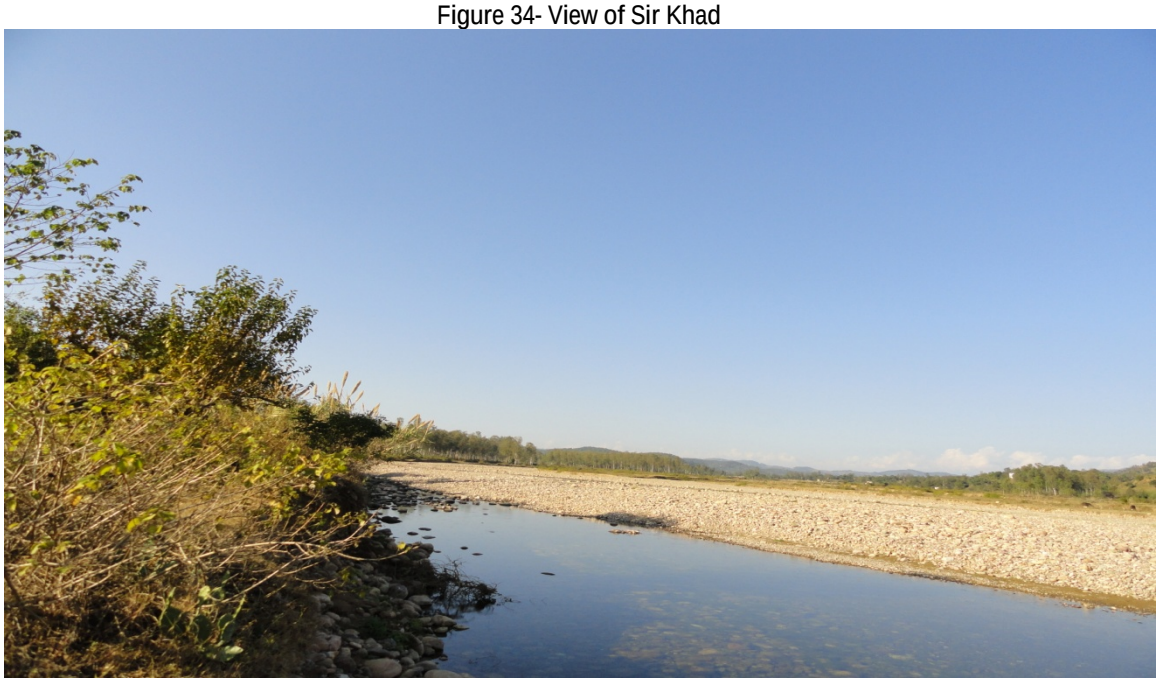


Figure 35- View of Sir Khad

Present status of mining

At present no mineral concession has been granted in this river bed.

Mineral Potential in the river Bed

Mineral Potential in the river Bed			
Boulder (in Metric Ton)	Bazri(in Metric Ton)	Sand(in Metric Ton)	Total
9,86,000	5,64,000	7,04,000	22,54,000

Annaul depostion			
59,600	34,000	42,600	1,36,200

Potential in Hamirpur district

Total deposition			
Boulder(in Metric Ton)	Bazri(in Metric Ton)	Sand(in Metric Ton)	Total
4,93,000	2,82,000	3,52,000	11,27,000
Annaul depostion			
29,800	17,000	21,300	68,100

Recommendations

The Govt. vide Notification No. udyog-II (E) 6-32.99-1 dated 20-1-2007 had imposed a complete ban on excavation collection of sand, stone and bajri in Sir Khad from village Barchhwar in Distt. Mandi upto its confluence with Saryali Khad near Mandwa in District Bilaspur. However after detailed studies were undertaken on the spot and recommendations made by the State Geologist H. P., the ban was lifted for extraction/ collection of sand, stone and bajri imposed vide Notification dated 20-1-2007 0n 27-2-2009. Subsequently the Govt. has issued instructions not to put on auction the river bed of Sir Khad vide letter dated 20-11-2009. Further, the deposition of mineral as already specified in former chapters depends upon amount of mineral erosion, transport, and accumulation by rivers which are always a complex phenomenun of every year that are governed by a combination of physical, chemical, and environmental factors and the recommendation of any mineral concession shall be point specific depending upon the condition at that time.

Sr. No.	Name of party	Area in Hectare	Purpose of lease	Status of land
1	M/s Sanjay Chouhan stones crusher-2 , Jahu Tehsil. Bhoranj Distt. Hamirpur.	30-80-76	Stone Crusher	Govt. Land
2	M/s Sanjay Chouhan stones crusher- ,Jahu Tehsil. Bhoranj, Distt.- Hamirpur.	1-50-46	Stone Crusher	Private Land
3	Sh Amardeep S/0 Sh. Bram Chand V.P.O Bhambala Distt. Mandi (H.P)	1-07-69	Stone Crusher	
4.	Sh Amardeep S/o Sh. Bram Chand V.P.O Bhambala Distt. Mandi (H.P)	1-04-58	Stone Crusher	Private Land

List of mining leases granted in Sir Khad

Chainth Khad

Topo-sheet No.53A/10

The Chainth Khad is a tributary of Sir Khad. It originates from near Wah Devi at an altitude of 1235 mtrs. It joins with Sir Khad at an elevation of 745 mtrs above mean sea level. The salient features of the stream are as under:-

Altitude at origin -1235 mtrs near Wah Devi
Total length - 16 km
Total river bed area -210-00-00 hect
Effective river bed area =126-00-00hect(for reserve calculation)
Width of stream
from origin to Jahog 20-50 mtrs
Jahog to confluence with Sir Khad 100-250 mtrs
Total catchment -31.72 sq. km
(31.50 sq. km in Hamirpur and 0.22 sq.km in Mandi district)
Total tributaries -18
Right Bank-10
Left bank-8
Main tributaries -2.

Figure 36- View of Chainth khad

Geological conditions

The Chainth Khad traverses through Siwalik rocks comprising of boulder beds of upper Siwalik rocks. The upper Siwalik rocks contain predominantly massive conglomerate with red and orange clay as matrix and minor sandstone and earthy buff and brown claystone The stream flows in south to South-East direction in most of the stretch. There is lot of agriculture activity adjoining to the banks as the river has developed a wide valley. The rocks on both banks are represented by soft to moderately hard sandstone and claystone.

Present status of mining

Minor Mineral Potential in the River Bed

Minor Mineral Potential in the River Bed			
Boulder (in Metric Ton)	Bazri(in Metric Ton)	Sand(in Metric Ton)	Total

9,92,250	7,08,750	5,67,000	22,68,000
Annaul depostion			
39,690	28,350	22,680	90,720

Recommendations

It is evedent from the above table that 22,68,000MT of minor minerals are available in the river bed upto a depth of one meter as already assumed. Similarly, annual deposition of minor minerals in the river bed has been calculated to the tune of 90,720MT. The annual production of minor mineral from the river bed is around 3800 MT only from the mining leases. Hence future lifting of minor mineral can be allowed from the river bed. It is therefore recommended that Mineral Concession can be granted from village Badhan to its confluence with Sir Khad . No Mineral Concession may be granted from origin near Wah Devi to village. Badhan. However, Further the deposition of mineral as already specified in former chapters depends upon amount of mineral erosion, transport, and accumulation by rivers which are always a complex phenomenun of every year that are governed by a combination of physical, chemical, and environmental factors and the recommendation of any mineral concession shall be point specific depending upon the condition at that time.

SNAIL KHAD

Topo-Sheet No. 53A/10

The Snail khad is the tributary of Sir Khad and it originates near village Mandetar at an altitude of 1048 mtrs. .It joins with Sir Khad near village Jahu where its RL drops to 710 mtrs. The stream is seasonal in nature and water flows only during Monsoon season. The Stream flows in South –East direction.The salient features of the stream are as under:-

Altitude at origin -1048 mtrs
Total length -12 km
Total catchment -47.75 Sq. km
Total river bed area -160-00-00 hect
Effective river bed area =96-00-00hect(for reserve calculation)
Width
Origin to Chamyog 20-50 mtrs
Chamyog to confluence with Sir Khad 150-250 mtrs
Total tributaries-31
Right bank-19
Left bank-12

Geological conditions

The Snail Khad passes through Siwalik rocks comprising of boulder beds of upper Siwalik rocks. The upper Siwalik rocks contain predominantly massive conglomerate with red and orange clay as matrix and minor sandstone and earthy buff and brown claystone. This formation is the potential source for annual deposition of mineral in the river bed. The catchment area comprising of low lying hills of moderately steep to steep slopes. The tributaries of this stream has carved a wide flood plain as the banks comprises of soft rocks.

Figure -37 View of Snail Khad

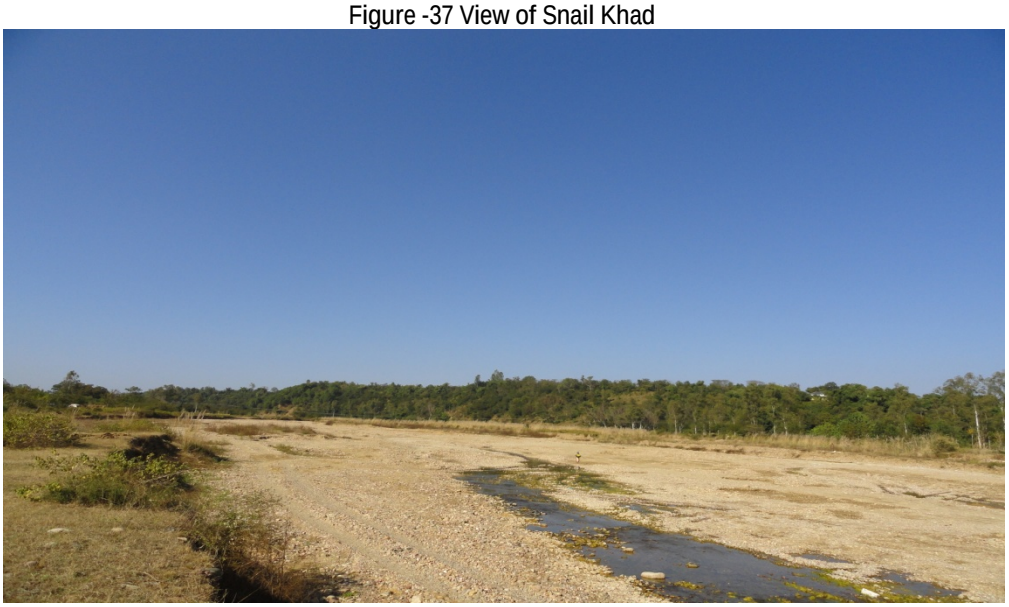


Figure 38- View of Snail Khad

Present status of mining

At present following minig leases have been granted in this river bed.

Sr. No.	Name of party	Area in Hectares	Purpose of lease	Status of land
1.	Sh. Purshotam Chand Prop.M/S Himachal Stone Crusher VPO Mundkhar, Tehsil Bhoranj Distt Hamirpur Hamirpur, District Hamirpur	11-44-74	Stone crusher	Govt. Land
2.	Sh. Sanjay Chauhan Manoh District Hamirpur,	7-02-05	Stone Crusher	Govt. Land
3.	Sh. Sanjay Chauhan Manoh District Hamirpur,	17-30-76	Stone Crusher	Govt. Land

Total Potential

Total deposition			
Boulder (in Metric Ton)	Bazri(in Metric Ton)	Sand(in Metric Ton)	Total
7,56,000	5,40,000	4,32,000	17,28,000
Annaul depostion			
30,240	21,600	17,280	69,120

Recommendations

It is evident from the above table that 17,28,000 MT of minor minerals is available in the river bed upto a depth of one meter as already assumed. Similarly, annual deposition of minor minerals in the river bed has been calculated to the tune of 69,120MT. the annual production of minor mineral from the river bed is around 25750 MT. Hence minor mineral can saftly allowed to be lifted from the river bed. It is therefore recommended that Mineral Concession can be granted from Chamyog village to its confluence with Sir Khad . No Mineral Concession may be granted from Mandetar village to Chamyog Village. However, Further the deposition of mineral as already specified in former chapters depends upon amount of mineral erosion, transport, and accumulation by rivers which are always a complex phenomenun of every year that are governed by a combination of physical, chemical, and environmental factors and the recommendation of any mineral concession shall be point specific depending upon the condition at that time.

SUKAR KHAD (Flowing Towards Bilaspur side)

Topo=Sheet No. 53A/10

The Sukar khad is the tributary of Sir Khad and it originates near village Dagwar at an altitude of 1016 mtrs.and leaves District Hamirpur near village Riana where the R.L. drops to 538 mtrs. Near origin it flows in eastern direction and then it swings towards south eastern direction up to Bilaspur boundary. The stream is seasonal in nature and water flows in it only during rainy season. .The banks near Dhangota village comprises of sandstone and clay are moderately hard The salient features of the stream are as under:-

Altitude at origin -1016 mtrs
Total length -25 km
Total catchment -128.25 Sq. km
Total river bed area -455-00-00hect

Effective river bed area =272-50-00hect (Hamirpur side) (for reserve calculation)
Width

Origin to Samtahna Khurd	100-250 mtrs
Samtahna Khurd to Dhaviri	200-550 mtrs
Dhaviri to Bilaspur border	90-120

Total tributaries-31
Right bank-14
Left bank-17
Important tributaries =6

Geological conditions

The Sukar Khad traverses through Siwalik rocks comprising of Siwalik rocks of Middle and Lower Siwaliks.. The middle and lower Siwalik contains medium to coarse- grained sandstone and red clay alternation, soft pebbly with subordinate clays stone, locally thick prism of conglomerate of middle SiwalikThese rocks are soft to moderately hard in nature.The catchment area hills comprising of low

lying hills of moderately steep to steep. The tributaries of this stream has carved a wide flood plain as the banks comprises of soft rocks. However, Further the deposition of mineral as already specified in former chapters depends upon amount of mineral erosion, transport, and accumulation by rivers which are always a complex phenomenun of every year that are governed by a combination of physical, chemical, and environmental factors and the recommendation of any mineral concession shall be point specific depending upon the condition at that time.

Figure 39-View of Sukar Khad

Figure-40 View of Sukar Khad

Present status of mining

At present following minig leases have been granted in this river bed.

Sr. No.	Name of party	Area in Hectares	Purpose of lease	Status of land
1.	Sh. Subhash Chand Prop: M/s Datwalia Stone Crusher Vill Jajri PO Railly Jajri Tehsil Barsar Distt HMR	(503 kanals) 19-06-02 Hect	Stone Crusher	Govt. Land

2.	Sh. Ashish Sharma Partner M/S Sukker Stone Crusher Vill-Chowki, PO Baragram Tehsil-Barsar,Distt. -Hamirpur	19-21-06 Hect	Stone Crusher	Govt. Land
3.	Ms . Sikha Kapil D/o Sh. Rakesh Chander Vill - Gharyani, PO- Lafran, Teh-Bijher Distt-Hamirpur	02-68-31 Hect	Stone Crusher	Private land
4.	Smt.Saroti Devi Prop M/S Jai Baba stone crusher V.P.O-Dhangota Teh Barsar , District-Hamirpur	4-46-92 Hect	Stone Crusher	Private land
5.	Sh. Raj Kumar Prop: M/S Jai Bhole Shankar stone crusher V.P.O.Samtana Teh Barsar , District-Hamirpur	07-02-15 Hect	Stone Crusher	Govt. Land
6.	Sh. Raj Kumar Prop: M/S Jai Bhole Shankar stone crusher V.P.O.Samtana Teh Barsar , District-Hamirpur	06-10-05 Hect	Stone Crusher	Govt. Land

Minor Mineral Potential in The River Bed

Total deposition			
Boulder (in Metric Ton)	Bazri(in Metric Ton)	Sand(in Metric Ton)	Total
21,45,800	1226000	15,32,800	49,03,000
Annaul depostion			
86,000	49,000	62,000	1,97,000

Recommendations

It is evident from the above table that 49,03,000 MT of minor minerals are available in the river bed upto a depth of one meter as already assumed. Similarly, annual deposition of minor minerals in the river bed has been calculated to the tune of. 1,97,000 MT The annual production of minor mineral

from the river bed is around 79,300 MT only. Hence river borne mineral such as sand, stone and bajri can safely allowed to be lifted from the river bed. It is therefore recommended that mineral concession can be granted from Dagwar to border with Bilaspur.

SARYALI KHAD

Topo=Sheet No. 53A/6 & 53A/7& 53A/11

The Saryali khad is the tributary of Satluj river and it originates near village Tarandal at an altitude of 900 mtrs.and leaves District Hamirpur near village Chhinjian where the R.L. drops to 612 mtrs. From origin upto Chhaproh village it flows almost towards south direction and then it takes a swing towards south east direction up to confluence with Satluj.. The stream is perennial in nature. The stream course from origin to Chhaproh is narrow and then the river course becomes wide. The salient features of the stream are as under:-

Altitude at origin -900 mtrs near Tarandol
Length -14 km
Catchment area -46.95 Sq. km excluding the area of garli Khad
Total river bed area -109-00-00hect
Effective river bed area =65-00-00hect(for reserve calculation)
Width
Origin to Chhaproh 50-100 mtrs
Chhaproh to Bilaspur border 60-150 mtrs
Total tributaries-15
Right bank-6
Left bank-9
Important tributaries =4

Geological conditions

The Saryali Khad traverses through Siwalik rocks comprising of Siwalik rocks of Middle and Lower Siwaliks.. These rocks are soft to moderately hard in nature.The catchment area hills comprising of low lying hills of moderately steep to steep. The tributaries of this stream has carved a wide flood plain as the banks comprises of soft rocks.

Figure 41-View of Sariali Khad

Present status of mining

At present no minig lease has been granted in this river bed.

Minor Mineral Potential in The River Bed

Total deposition			
Boulder (in Metric Ton)	Bazri(in Metric Ton)	Sand(in Metric Ton)	Total
338000	1,93,400	2,41,000	7,72,000
Annaul depostion			
12,500	7,000	8,900	28,400

Recommendations

It is evident from the above table that 7,72,000 MT of minor minerals is available in the river bed upto a depth of one meter as already assumed. Similarly, annual deposition of minor minerals in the river bed has been calculated to the tune of. 28,400 MT Hence minor mineral such as sand, stone and bajri can safly be allowed to be lifted from the river bed. It is therefore recommended that mineral concessions can be granted from Khawaja bridge to border with Bilaspur Mineral concession may not be granted from Tarandal village to Khawaja bridge. However, Further the deposition of mineral as already specified in former chapters depends upon amount of mineral erosion, transport, and accumulation by rivers which are always a complex phenomenun of every year that are governed by a combination of physical, chemical, and environmental factors and the recommendation of any mineral concession shall be point specific depending upon the condition at that time.

GARLI KHAD

Topo=Sheet No. 53A/10 & 53A/11

The Garli khad is the tributary of Saryali Khad and it originates near village Matriana at an altitude of 987 mtrs.and joins with Saryali khad near Chhinjian where the R.L. drops to 612 mtrs. Near origin it flows in south direction up to Bilaspurr boundary. The stream is dry in nature and water flows in it only during rainy season. The salient features of the stream are as under:-

Altitude at origin -987 mtrs near village Matriana
Total length -12.5 km
Total catchment -22.75 Sq. km
Total river bed area -102-00-00hect
Effective river bed area =61-00-00hect(for reserve calculation)
Width
Origin to Badloi 20-40 mtrs
Badloi to Batiana 80-100 mtrs
Batiana to Chhinjian Bilaspur border 20-30
Total tributaries-8
Right bank-2
Left bank-6

Geological conditions

The Garli Khad traverses through Siwalik rocks comprising of Siwalik rocks of Middle and Lower Siwaliks. These rocks are soft to moderately hard in nature.The catchment area hills comprising of low lying hills of moderately steep to steep. The tributaries of this stream has carved a wide flood plain as the banks comprises of soft rocks. The banks comprises of sandstone and clay which are moderately hard

Present status of mining

At present no mineral concession has been granted in this river bed.

Minor Mineral Potential in The River Bed

Total deposition			
Boulder (in Metric Ton)	Bazri(in Metric Ton)	Sand(in Metric Ton)	Total
4,79,000	3,42,000	3,42,000	11,63,000
Annaul depostion			
19300	13800	13800	46,900

Recommendations

It is evident from the above table that 11,63,000 MT of minor mineral is available in the river bed upto a depth of one meter as already assumed. Similarly, annual deposition of minor minerals in the river bed has been calculated to the tune of. 46,900 MT. Mineral concession can be granted from Badloi to up to Bilaspur border.Mineral concession may not be granted from Matriana to Badloi village as the river is very narrow and not feasible to work scientifically.

River/Stream bed wise summary of Recommendations

Table-10- Showing River/stream bed wise summary of Recomendations

S.No	Name of Khad	Total length in Km	Total area of river bed in Sqkm	Effective area of river/stream in Sqm for reserve calculation	Altitude at origin	Altitude at confluence	Catchments area in sqm	Area proposed for mineral concession	Remarks
	1	2	3	4	5	6	8	9	10
1	Bakar Khad	23	170-00-00	102-00-00	1235	560	42.75	Matlana to confluence with Beas river	No concession may be granted from Awah Devi to Matlana and in small tributaries of Bakkar khad for proper replishment
2	Sukhad	7.00	85-	51-30-00	954	540	9.25	From	

	Khad		50-00					Ghian village to confluence with Beas river	
3	Jangled Khad	16.4	178-00-00	106-80-00	1070	534	28.4	Bohru water supply scheme to confluence with Beas river	No mineral concession from Bhamnol to Bohru water supply scheme
4	Powar Khad	3.5	21-60-60	13-00-00	906	530	2.6	No concession	
5	Bagher a Nala	4.00	35-00-00	20-00-00	906	525	4.00	No concession	
6	Jhamiri Khad	14	142-50-00	85-50-00	1003	515	59.25	Jhor Nambri to confluence with Beas	No concession from Chauri village to JhorNumbr i village includes mahili khad
7	Riani	5.00	85-00-00	50-00-00	865	510	7.5	No concession	
8	Pung	19	215-00-00	129-30-00	1075	500	77.50	1 km upstream of Kasiri village to confluence with Beas	No concession from Ghawararu to 1km upstream of kasiri village and in Drug khad
9	Salasi	15.5	75-00-00	43-00-00	890	490	31	No concession	
10	Kunah Khad	48	950-00-00	570-00-00	1198	480	312.25	Kanjain to confluence with Beas	No concession from Sangroh village to Kanjian village

11	Sukkar khad (kunah Khad)	14	192-00-00	112-00-00	1016	602	30.25	Galoh to confluence with Kunah khad	No concession from Panjyariri to Galoh village
12	Man khad	40	892-50-00	535-50-00	1048	470	173.5	Confluence with Bamblu khad to confluence with bbeas river	No concession from Barasr to confluence with Bumblu khad
13	Bamblu khad	12	123-00-00	73-80-00	987		15.75	Har village(near road bridge) to confluence with man khad	No concession from Matrina village to Har village
14	Maseh	13	107-00-00	64-00-00	789	460	31	Kitpal PF boundary to confluence with Beas river	No concession from Behlan PF boundary to Kitpal PF boundary
15	Beas river	55	950-00-00	570-00-00	580	455	825.75	From Sachuhi to Chamukha	
16	Sir khad	10	96-00-00	57-50-00	1120	880	15.75	Only through mining leases	No mineral concession may be granted through auction
17	Chainth khad	16	210-00-00	126-00-00	1235	745	31.55	Badan to confluence with Sir khad	No concession from Wah devi to Badan vvillage
18	Snail khad	12	160-00-00	96-00-00	1048	710	47.75	Chamyog village to confluence with Sir khad	No concession from Mandetar to chamyog village

19	Sukkar Khad9 Bilaspur side)	25	455-00-00	272-50-00	1016	538	128.25	Dagsar to border with Bilaspur	
20	Saryali khad	14	109-00-00	65-00-00	900	612	46.95	Khwaja bridge to border with Bilaspur	No concession from Tarandal to Khawaja bridge
21	Garli	12.5	102-00-00	61-00-00	987	612	22.75	Badloi to Bilaspur border	No concession from Matriana village to Badloi village
	Total	378.9	5354-10-60	3204-20-00					

NOTE: - The mineral reserves have been calculated only upto 1.00 metre depth however, in general the minor mineral in the form of sand, stone, boulder, bajri is is available at least upto a depth of 03-05 meters. Although there are some portions in the river beds such as channel bars, point bars and central islands where the annual deposition is raising the level of river bed thus causing shifting of the rivers towards banks and causing cutting consequently of banks and at such locations, removal of this material upto the bed level is essential to control the river flow in its central part and to check the bank cutting. While calculating the mineral potentials, the mineral deposits lying in the sub-tributaries of that particular stream/river has not been taken into consideration. Since these mineral deposits are adding annually to the main river, the mineral deposits will be much more.

13 SURFACE AND GROUND WATER SCENERIO OF DISTRICT HAMIRPUR

Hamirpur District, located in the state of Himachal Pradesh, India, is characterized by its rich surface water resources, primarily sourced from the Satluj and Beas rivers. The district shares borders with the neighbouring districts of Mandi to the east, Bilaspur to the south, Una to the west, and Kangra to the north. The River Beas separates Hamirpur from Kangra district and is a parent river to two tributaries, namely Maan Khad and Kunah Khad flowing across either side of Hamirpur district, to the adjacent Sutlej. Hamirpur district has a considerable amount of pine forests and it is also surrounded by Shivalik Ranges. Hamirpur is also home to mango trees. The Hamirpur District encompasses porous geological strata of Shiwalik Formations mainly having varous alternating layers of sandstone, clay stone, conglometare and siltstones.

b. Surface water

Surface runoff in the lands of Hamirpur District sources by the two major rivers that's Satluj and Beas. Both these rivers with vaiours its tributaries contribute surface water as parinial source for the fertile lnds of the district.

Beas River Catchment

In the Beas river catchment, 12 major rivers/streams are draining water into Beas river. There are other streams which are of smaller magnitude also form part of catchment area. The major sub-catchment area forming the Beas catchment are as follow From East to West

1. Bakar Khad
2. Sukhad Khad
3. Jangled Khad
4. Powar khad
5. Baghera khad
6. Jamiri Khad
7. Riani Khad
8. Pung Khad
9. Salasi Khad
10. Kunah Khad (Including Lamblu Khad and Sukar Khad,)
11. Man Khad (Including Bumblu Khad)
12. Maseh Khad

Satluj River Catchment

In the Satluj river catchment area, 6 major rivers/streams are draining water into Satluj river. There are other streams which are of smaller magnitude also form part of the catchment area. The major sub-catchment area forming the Satluj catchment are as follow

From East to West

1. Sir Khad
2. Chainth Khad
3. Snail Khad
4. Sukkar Khad (Satluj Catchment)
5. Sirhyali Khad
6. Garli Khad

Both these rivers along with above-mentioned tributaries drains 1100 sqkm area of the district.

Groundwater

In view of groundwater, the Hamirpur district encompasses porous hydrogeological formations in the valleys with declination in ground water every year at most points and rising in some points. According to the CGWB report 2011, Hamirpur is a district that falls under the safe category because of the groundwater resources and lots of scope is available for future development of groundwater resources. The factors influencing groundwater recharge are slope, drainage density, geology, geomorphology, lineament density, land use/land cover and soil texture. The water levels are being monitored by CGWB four times in a year. The dynamic groundwater resource estimates have been computed only for Indora and Nurpur area. The annual fluctuations of groundwater in district Hamirpur is as flows:-

Annual Fluctuation of May 2019- May 2020, August 2019- August 2020 November 2019- November 2020 and January 2020- January 2021

State	Himachal Pradesh				
District	HAMIRPUR	Annual fl may (19-20)	Annual fl Aug (19-20)	Annual fl Nov (19-20)	Annual fl Jan (20-21)
1	Bagnalla	0.25	-0.79	-1.52	-0.87
2	Bijari	-1.23	0.01	-0.58	0.09
3	Galore	0.43	-0.12	-0.74	0.04
4	Kangu	1.00	5.71	-0.72	0.01

Soil type and texture of any area largely influence the seepage and percolation of surface water into the groundwater, hence directly influencing the recharge capacity of the soil. Soils having a high infiltration rate will be best suitable for artificial recharge whereas soils having low infiltration are not considered good for artificial recharge. Alluvial soils and non-calcic soils are the major types of soils present in Hamirpur. Most of the area in Hamirpur is covered by non-calcic loamy soils. Due to the variation in the value of the slope, loamy soil also varies. Furthermore, also Recharge capacity of any surface is greatly influenced by the geomorphology of the area. Major geomorphic units present in Hamirpur are (i) Structural hills & uplands, and (ii) Valley/ alluvial plains. Following are the maps showing the geomorphology and LULC of Hamirpur District with regions of high recharge potential.

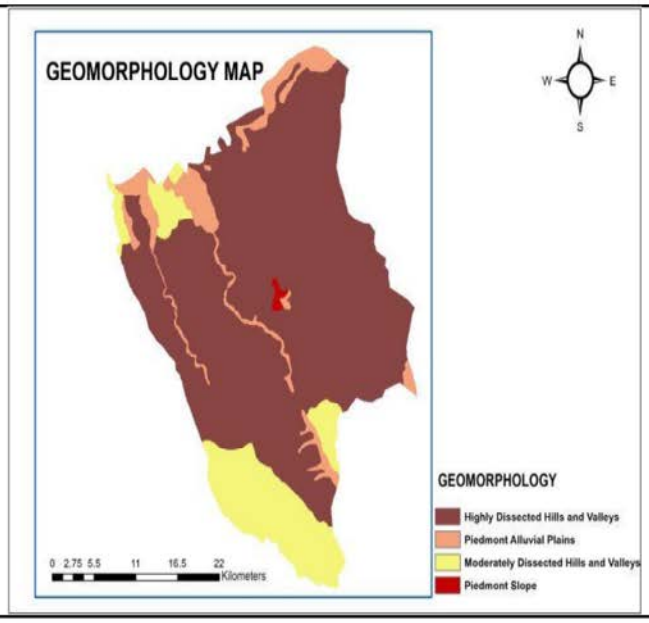


Figure 5. Geomorphology Map

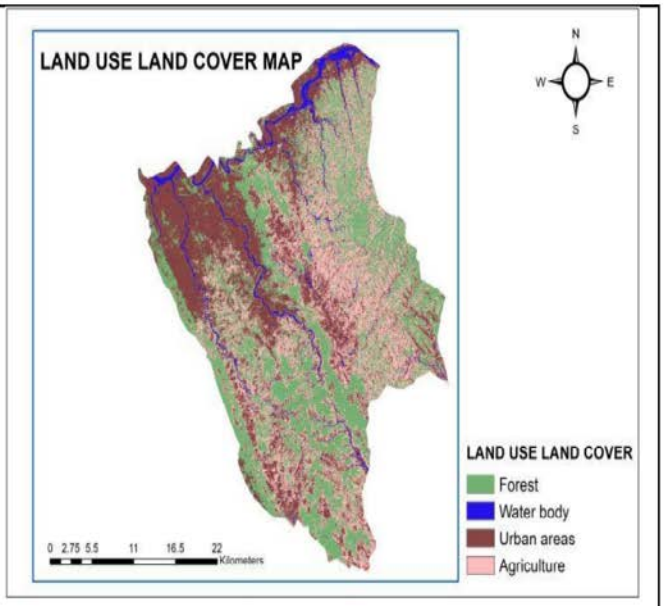


Figure 6. Land Use Land Cover Map

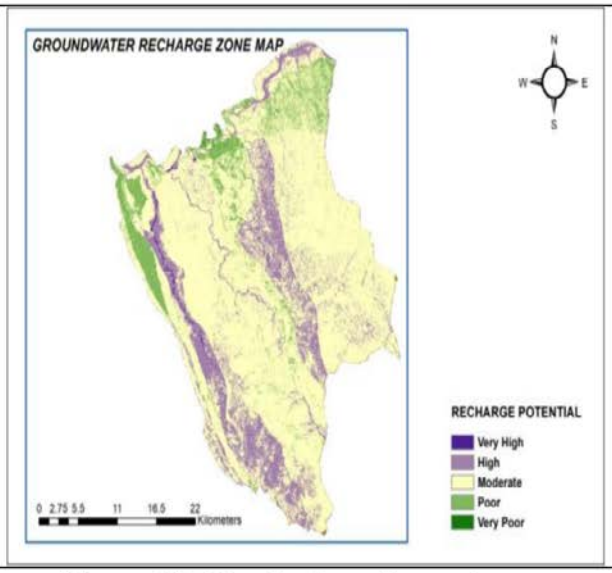


Figure 10. Distribution of groundwater potential zone in Hamirpur

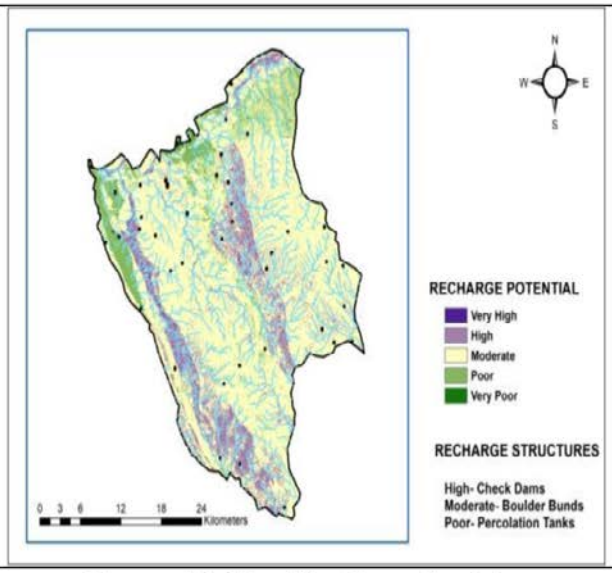


Figure 11. Identified Location Map

14 QUALITY /GRADE OF MINERAL AVAILABLE IN DISTRICT

The rock types commonly seen in the district are shale, clay, quartzite and sandstones of Shiwalik Group. The quality of Shiwalik boulder bed and salt and papper textured sand stone is good for construction material.

Major part of the district is occupied by the Siwalik Group. All subgroups of Siwaliks are found in the Hamirpur district. They composed of mudstone, sandstone and coarsely bedded conglomerate ranging in age from Miocene to Recent. These sediments are deposited by the rivers flowing southward from the Great Himalayas.

Siwalik Group is divided into four major sub-groups namely Lower Siwaliks, Middle Siwaliks, Upper Siwaliks and Post Siwaliks.

Lower Siwaliks

Lower Siwalik mainly composed of pebbly sandstone with various alternations of clay stone. In kangra district lower Siwaliks are mainly exposed in the central part extending from North West to south east directions. These are over lain by the Middle Siwaliks. Upper part of lower Siwaliks composed of conglomerates with well-rounded clasts of quartzite. Total thikness is around 1600 meters.

Middle Siwaliks

Middle Siwaliks are composed of thick sequence of massive sandstone with characteristic sand and pepper texture. The sandstone stratum is altered with thin beds of clay and conglomerate. Middle Siwaliks have approximate thickness of 1400 to 2000 meters and mainly exposed in the central part of the district along with Lower Siwaliks.

Upper Siwaliks

Upper Siwaliks are mainly composed of sandstone, brown clay stone and boulder conglomerate. Sandstone is exposed in the lower part of Upper Siwaliks while the uppermost portion composed of boulder conglomerate. Sandstone of Upper Siwaliks is very soft and altered silt particles. This sub-group is mainly exposed in the South eastern and north western part of the district. The average thickness is about 2300 mts.

Post Siwaliks

Post Siwaliks mainly composed of alluvium laid down by the rivers in the plain stage. The alluvium is consist of fine to course grained sand, silt, boulders, cobbles, pebbles and clays. In Hamirpur district Post Siwaliks are maily exposed in the Valleys.

15 USE OF MINERAL

As stated earlier, occurrence of a number of economic rocks are found in the district but except minor minerals like Sand, Stone, Bajri and to some extent, slab stone, none have commercial significance in the district. Sand, stone and bajri are being used as constructin material in the district only.

16 DEMAND AND SUPPLY OF THE MINERAL IN THE LAST THREE YEARS:

Mainly three types of minor mineral constituents such as sand stone and bajri are the main constituents required for the modern construction/developmental activities apart from other material like cement and steel. With the increase in the developmental activities in the State as well as in the district the demand of minor mineral in the district started in an increasing trend. The increase could be gauged from the fact that during 1993-94 the royalty receipt on minor mineral was merely 31,400 Rupees which increased up to 4.66 lac in 2009-2010 and 6.7 crore in 2022-23. The royalty received since 2018-19 onwards is tabulated in the following table.

Sr No.	Year	Royalty in Crore	Production of mineral
01.	2018-2019	21169740	352829
02.	2019-2020	24197460	403291
03.	2020-2021	35581680	593028
04.	2021-2022	36018960	600316
05.	2022-2023	67934000	849175

17 IMPACT ON THE ENVIRONMENT DUE TO MINING ACTIVITY

Mining in District Hamirpur is restricted only to the extraction/collection of minor minerals such as sand, stone, bajri and slabstone to some extent. This type of mining is done by adopting the open cast scheme of mining in the sanctioned lease areas as per the perception of the mining plan. The mining lease areas are predominantly barren and no any type of blasting material is required for such type of mining. The major contributors of pollution in such type of open cast mining are excavation, loading, transportation, and generation of dust which leads only to momentary rise in the suspended particulate matter (SPM). Though there is no large-scale impact of opencast mining on the Environment, however, obtaining Environment Clearance for grant of any type of mining lease has been made mandatory in the Rules.

18 REMEDIAL MEASURES TO MITIGATE THE IMPACT OF MINING ON THE ENVIRONMENT

As stated earlier, the mining activities in the district are predominantly carried out in barren areas and no any type of blasting material is required for such type of mining. As such there is hardly any impact on Environment other than dust emissions to a smaller extent. Such types of dust emmissions can be controlled by sprinkling water on the working face of mine so that the dust is suppressed. Moreover, to mitigate the impact of mining on the Environment, if any, the mining lease holder has to get approved the Environment clearece as well as mining plan of the area prior to mining wherein adequate procedure for prevention of Environment degradation is prescrived.

19 RECLAMATION OF MINED OUT AREA AND DISASTER MANAGEMENT PLAN.

For the development and conservation of minerals in the State, it has been provided under Rule 35(1) of Himachal Pradesh Minor Minerals (Concession) and Minerals (Prevention of Illegal Mining Transportation and Storage) Rules, 2015 that "No mining lease or contract shall be granted in the State of Himachal Pradesh, unless there is a mining plan approved from the Competent Authority. As such, prior to mining, the mining lease holder has to get approved the mining plan of the area. The said mining plan is required to be prepared in accordance with Form "M" appended with the said Rules wherein sufficient provisions for the reclamation of mined out area as well as management planning is prescribed as per the site-specific conditions.

20 DETAILS OF OCCUPATIONAL HEALTH ISSUES TUBERCULOSIS PATIENTS.

The annual risk of tuberculosis infection is 1.9% in Himachal Pradesh against a national average of 1%. Extra pulmonary cases ranged in between 56% and 73%, normal being 15-20%. The highest category-1 varies from 42% to 48%. New smear positive case detection rates (78-90%) and cure rates (88-91%) were the highest as compared to figures of the state and country. The tuberculosis cases have fallen down from 6,462/100, 000 in 1999 to 2,195/100, 000 in 2005 following the introduction of RNTCP in 1999. Age specific (15-55 years) and sex-wise males were more affected than the females (59-64%). The CMO Hamirpur formed a joint team of health and rural development department in all the development blocks of the district to investigate the TB cases of these panchayats in their respective areas till February 29. Hamirpur: Sixty-eight out of 248 gram panchayats of the district claim to have become TB free.

Sr No.	Year	No.of patients
1.	2019	875
2.	2020	707
3.	2021	801
4.	2022	753
5.	2023	875
6	2024 (till 22-04-2024)	247

21 PLANTATION AND GREEN BELT DEVELOPMENT IN RESPECT OF LEASES ALREADY GRANTED IN THE DISTRICT.

Specific conditions are being imposed by the state pollution control board during grant of consent to operate to the mines to develope adequate no. of plantation as per the recommendation made in the approved mining plan during operation period and closure of mining activity. Most of the mines of the district are situated in the riverbed areas and reclamation measures are been undertaken by the lease holders including plantation of local species in the peripheral safety zones of the quarries/clusters and along the the haul roads.

The District Survey Report of District Hamirpur has been updated by covering the mineral bearing areas after taking in to consideration all the relevant features pertaining to geology and mineral wealth in replenish-able and non-replenish-able (paleo- channels) areas of rivers/terraces, stream and other sources related with hill slopes as stated earlier. Mostly the minor mineral such as, sand, stone, bajri are well available in various parts of the district, including private and Govt Lands. However, whenever, any of the abovesaid mineral bearing area is applied by any of the project proponent for the grant of

mining lease, the same is further inspected by the committee constituted under the chairmanship of concerned Sub Divisional Officer (C) comprising members from Public Works Department, Irrigation and Public Health Department, Forest Department, Pollution Control Board and Mining Officer/Geologist etc. for submission of their recommendations. Thereafter, only as per the site-specific recommendations of the committee, and approval of the detailed “Mining Plan” comprising details of mineral reserves, method of mining, progressive mine closure plan, extent of proposed mining and other related details of the allotted area, the mineral concessions are granted by the Competent authorities after completion of all the codal formalites required under law.

22 ANY OTHER INFORMATION

-NIL-

23 MONITORING & EVALUATION

The Ministry of Environment, Forest & Climate Change has published "Enforcement & Monitoring Guidelines for Sand Mining" in the year 2020 wherein Monitoring Mechanism has been defined very specifically and recommended that a uniform monitoring mechanism is required to assess the regulatory provision in quantitative terms, with robust institutional and legal framework. Based on past experience and suggestions available, the following requirements are suggested for defining a mechanism for monitoring of mining activities which will help in identification of mining which is operating either illegally or are violating the regulatory provisions. Some suggestion will facilitate direct or indirect information to help in such an assessment.

1. All precaution shall be taken to ensure that the water stream flows unhindered and process of Natural river meandering doesn't get affected due to mining activity.
2. River mining from outside shall not affect rivers, no mining shall be permitted in an area up to a width of 100 meters from the active edge of embankments or distance prescribed by the Irrigation department.
3. The mining from the area outside river bed shall be permitted subject to the condition that a safety margin of two meters (2 m) shall be maintained above the groundwater table while undertaking mining and no mining operation shall be permissible below this level unless specific permission is obtained from the Competent Authority. Further, the mining should not exceed nine-meter (9 m) at any point in time.
4. Survey shall be carried out for identifying the stretches having habitation of freshwater turtles or turtle nesting zones. Similarly, stretches shall be identified for other species of significant importance to the river eco-system. Such stretch with adequate buffer distance shall be declared as no-mining zone and no mining shall be permitted. The regulatory authority as defined for granting Environmental Clearance, while considering the application of issuance of ToR and/or EC for the adjacent block (to non-mining zone) of mining shall take due precaution and impose requisite conditions to safeguard the interest of such species of importance.
5. District administration shall provide detailed information on its website about the sand mines in its district for public information, with an objective to extend all information in public domain so that the citizens are aware of the mining activities and can also report to the district administration on any deviation observed. Appropriate feedback and its redressal mechanism shall also be made operational. The details shall include, but not limited to, lease area, geo-coordinates of lease area and mineable area, transport routes, permitted capacity, regulatory conditions for operation including mining, environmental and social commitments etc.
6. A website needs to be maintain to track the movement of centralised sand mining and a Centralised server system should be made to manage the data related to sand mining across India.
7. The mineral concession holders shall maintain electronic weighbridges at the appropriate location identified by the district mining officer, in order to ensure that all mined minerals from that particular mine are accounted for before the material is dispatched from the mine. The weighing bridge shall have the provision of CCTV camera and all dispatch from the mine shall be accounted for.
8. The mineral movement shall be monitored and controlled through the use of transit permit with security features like printing on IBA approved MICR papers, Unique bar/QR, fugitive ink background, invisible ink mark, void pantographs and watermarks papers or through use of RFID tagged transit permits and IT /IT-enabled services. Such monitoring system shall be created and made operationalised by State Mining department and district level mining officer shall be responsible for ensuring that all legal and operational mines are connected and providing the requisite information on the system.
9. State Government shall constitute a District Level Task Force (DLTF) under the Chairmanship of Deputy Commissioner/District Magistrate/Collector with Superintendents of Police and other

related senior functionaries (District Forest Officer, District transport officer, Regional officer-SPCBs, Senior Officer of Irrigation Department, District Mining Officer) with one/two independent member nominated by the Commissioner concerned. The independent member shall be retired government officials/teacher or ex-serviceman or ex-judiciary member. The DLTF shall keep regular watch over the mining activities and movement of minerals in the district. The DLTF shall have its regular meeting, preferably every month to reconcile the information from the mining activity, and other observations made during the month and take appropriate corrective and remedial action, which may include a recommendation for revoking mining lease or environmental clearance. The DLTF may constitute an independent committee of the expert to assess the environmental or ecological damage caused due to illegal mining and recommend recovery of environmental compensation from the miner's concern. The recommendation may also include action under the provision of E(P) Act, 1986.

10. The area not identified for mining due to restriction or otherwise are also to be monitored on a regular basis by the DLTF. Any observations of mining activity from the restricted area shall be reported and corrective measures shall be initiated on an urgent basis by the DLTF.
11. The dispatch routes shall be defined in the Environmental Clearance and shall be avoided through densely habituated area and the increase in the number of vehicle movement on the road shall be in agreement with the IRC guidelines / carrying capacity of the road. The alternate and dedicated route shall be explored and preferred for movement of mining to avoid inconvenience to the local habitat. The mining production capacity, by volume/weight, shall be governed by total permissible dispatch calculated based on the carrying capacity of dispatch link roads and accordingly, the production should be regulated.
12. The movement of minerals shall be reconciled with the data collected from the mines and various Naka/check posts. Other measures may also include a general survey of the potential mineable area in the district which has not been leased/auctioned or permitted for mining due to regulatory or other reasons.
13. The location and number of check post requirement shall be reviewed by DLTF on a regular basis so that appropriate changes in location/number could be made as per the requirement. Such review shall be carried out on a regular basis for the district on inter-state boundary or district providing multiple passages between two districts of different states.
14. The district administration shall compile the information from their district of the permitted and legal mined out minerals and other details and share such information and intelligence with the officials of the adjoining district (Inter or/and Intra State) for reconciliation. The information shall include the area of operation, permissible quantity, mined out minerals (production) the permitted route etc., and other observations, especially where the mine lease boundary is congruent with the district boundary. Such coordination meeting shall be held on a quarterly basis, alternatively in two district headquarters or any other site in two districts decided mutually by the District Magistrate.
15. The in-situ and ex-situ environmental mitigative measures stipulated as EMP, CER, CSR and other environmental and safety conditions in mines including the welfare of labours shall properly reflect in the audit report.

24 COMMENTS/ SUGGESTIONS:

HPSEIAA in its 69th meeting on dated 18th June, 2024 approved the DSR of district Hamirpur and decided to upload the DSR on public domain/ official websites of Department of Industries and Department of Environment, Science Technology & Climate Change for twenty-one days. The comments, if received, shall be considered and if found fit, shall be incorporated in the final Report. As per the decision of the HPSEIAA the DSR was uploaded on the portal. The suggestions received from the users through e-mail on ms.hpseiaa@gmail.com & remarks of the Industries Department are as under:

#	District	Email dated	Comments	Forwarded to industries	Remarks from Industry Deptt., if any
1.	Hamirpur	18-July-24	Not included in DSR - Rakesh Chander S/o Late Sh. Kishori Lal, Distt. Hamirpur.	18-Jul-24	Please see email sent on 19.07.2024 sent to ms.hpseiaa@gmail.com

The Deptt. of Industries vide email dated 19th July, 2024 informed that the Department grants mineral concessions by two modes, one through auction and another through mining leases. In both the cases, as per the provisions contained in the Himachal Pradesh Minor Minerals (Concession) and Minerals (Prevention of Illegal Mining, Transportation and Storage) Rules, 2015, the areas are inspected by the Joint Inspection Committee under the Chairmanship of SDO (Civil) concerned comprising members from other department like Irrigation & Public health, State Pollution Control Board, Forest Department, HP Public Works Department, Geologist or Mining Officer and as such, the letter of intents are issued only after recommendations of the Joint Inspection Committee which is continuous process.

The letter of intent is in-principle approval to obtain the required clearances for the grant of mineral concession. The applicant has to complete the codal formalities like preparation of a mining plan and has to obtain environmental clearance before the grant of mineral concession. As such, it is an ongoing process and as soon as the clearances are obtained, the letters of intent are converted into mining lease. Also, if the letter of intent holder is unable to obtain the required statutory clearances within the validity period of letter of intent, the period is either extended or withdrawn.

So, the list of letters of intents cannot be provided at this stage as these are dynamic in nature and only the information of granted mineral concessions is provided in the updated DSR.