STUDY ON THE DRAINAGE SYSTEM, MINERAL POTENTIAL AND FEASIBILITY OF MINING IN RIVER/ STREAM BEDS OF DISTRICT HAMIRPUR, HIMACHAL PRADESH

1 Introduction

There is a common feeling amongst general public that mining activity in river beds creates environmental pollution and damage to the public and private property and to safeguard it, numbers of Petitions are being filed in the court of law for justice. A similar Writ Petition No. 188/2001 was filed in Hon'ble High Court during 2001 titled Jagjit Singh Dukhiya V/s State of H.P. pointing a very important issue with respect to the mining operation in and upon the river beds of the State of Himachal Pradesh especially the rivers flowing near the bridges because of vital concern for the safety of the bridge structure. It was further stated in the petition that indiscriminate mining in and upon river beds has been going on unchecked and unregulated causing irreversible depletion as well as hazards and damage to the ecology and environment, including the change of course by the river because of the hazardous, unchecked and totally unregulated mining, as also, in the process threatening the safety of bridges and other structures causing various related problems. The Hon.ble High Court of Himachal Pradesh while passing the order on 16-12-2002 in the said Petition directed the State Government to constitute an appropriate Committee of the Officers and experts of the State Government to formulate the mining policy. The Govt. vide Notification Dated 16-1-2004 constituted a Committee under the Chairmanship of A.C.S. -cum -Secretary Industries to the Govt. of Himachal Pradesh including members from other Departments to formulate Policy and Guidelines for regulation and control of mining operation in and upon the rivers/streams/khallas. Accordingly, River/Stream Bed Mining Policy Guidelines for the State of H.P.-2004 was framed and notified vide notification No. Ind.-II(E)2-1/2001 dated 28-2-2004 and subsequently new mineral policy 2013 has been framed

Now Ministry of Environment, Forest & Climate change, Govt. of India vide notifications dated 15-01-16 and 20-01-16 has constituted the Distt. level Environment Impact Assessment Authority (DEIAA), for grant of Environmental clearance for category "B2" projects for mining of minor minerals having area either less than 5 hect. or equal to 5 hect, for all the distt. in the country. For the purpose of assisting the authority of the Distt. level Environment Impact Assessment Authority (DEIAA), distt. level expert appraisal committee (DEAC) has also been constituted.

In the notification dated 15-01-16, clause 7 (iii) pertains to preparation of Distt. Survey Report for sand mining or riverbed mining and mining of other minor minerals.

In this regard, matter was discussed with the Worthy Deputy Commissioner Hamirpur on 11-5-2016 to complete further formalities as per abid notifications.

During the discussion, the issue of Distt. Survey Report was discussed for further action as per the legislation of notifications dated 20th January, 2016 issued by MOEF, GOI. After completing codal formalities the Distt. Survey Report was placed in the public domain by keeping its copy in Collectrate and posting it on Distt. website as per the guidelines issued vide abid notifications.

Govt. of Himachal Pradesh Vide notification no. Ind-II(F)6-18/2013 dated 24-08-2013 has notified Himachal Pradesh Mineral Policy- 2013 for regulation of Mines and Minerals in Himachal Pradesh with following Objectives:-

Objectives of the New Mineral Policy-2013

a. To explore mineral wealth of the State by adopting modern exploration techniques.
b. To exploit mineral deposit by promoting adoption of mechanized and scientific mining with due regard to the conservation of mineral mine safety and environmental aspect.
c. Value addition through promotion of processing units and mineral based industries in the State.
d. To increase the employment opportunity in the mining sector, particularly in the interior/remote areas of the state.
e. To take effective measures for checking unauthorized mining and leakage of revenue.
f. To simplify and adequately modify Himachal Pradesh Minor Mineral (Concession) Revised, Rules, 1971.
g. To adhere to the guidelines issued by the Ministry of Environment and Forest (MOEF), Government of India, for exploitation of minor minerals.

Based on the action plan as mentioned above, mining leases/ contracts shall be granted in accordance to the Himachal Pradesh Minor Minerals (Concession) and Minerals (Prevention of illegal Mining, Transportation and Storage) Rules 2015.
Accordingly, the Distt. survey report of the river beds/ parts of river beds of District Hamirpur has been prepared. The rivers/streams were studied based on the following parameters excluding the hill slope mining.

1, 1 **Principals:-**

- River natural resources must be utilized for the benefit of the present and future generation
- It is the responsibility of all sectors to maintain the river resources of the State and to ensure that it is prudently managed and developed
- Awareness is essential to ensure the protection of natural resources of river and their proper utilization and conservation

1.2 **Objectives:-**

To ensure

- scientific and systematic mining
- conservation of minerals
- protection of environment and ecology
- proper replenishment of river beds
- Proper protection of river banks
- Protection of soil erosion
- Protection of bridges and other structures of public utility and
- checking of illegal mining

In the said policy guidelines, it was provided that District level river/stream bed mining action plan shall be prepared according to 9.2 Strategy 2. The action plan shall be based on a survey document of the existing river/stream bed mining in each district and also to assess its direct and indirect benefits and identification of the potential threats to the individual rivers/streams in the State.

This survey shall be conducted by Geological Wing, Department of Industries, Himachal Pradesh and shall contain:-

a) District wise detail of Rivers/Streams/Khallas; and
b) District wise details of existing mining leases/ contracts in river/stream/khalla beds

Based on this survey, the action plan shall divide the rivers/stream of the State into the following two categories;-

a) Rivers/ Streams or the River/Stream sections selected for extraction of minor minerals
b) Rivers/ Streams or the River/Stream sections prohibited for extraction of minor minerals

1.3 Based on the action plan as mentioned above, mining leases/ contracts shall be granted in accordance to the Himachal Pradesh Minor Mineral (Concession) Revised Rules, 2015 and observing the Policy Guidlines. Accordingly, the survey report of the river beds/ parts of river beds of District Hamirpur has been prepared based on the field surveys conducted in the past and revisited **from time to time.**

a) Geomorphological studies

i) Place of origin
ii) Catchment area
iii) General profile of river stream
iv) Annual deposition factor
v) Replenishment
vi) Total potential of minor mineral in the river bed

b) **Geological Studies**
i) Lithology of catchment area
ii) Tectonics and structural behavior of rocks

c) **Climatic parameters**
I) Intensity of rainfall
II) Climate zone
III) Temperature variation

1.4 **In addition following are the important guiding Geo morphological features of rivers considered while recommending the river/ stream bed for collection of minor minerals:-**

- A stable river is able to constantly transport the flow of sediments produced by water shed such that its dimensions (width and depth) pattern and vertical profile are maintained without aggrading (building up) or degrading (scouring down)
- The amount of boulders, cobbles, pebbles, and sand deposited in river bed equals to the amount delivered to the river from catchment area and from bank erosion minus amount transported downstream each year.
- It is compulsive nature for river to meander in their beds for and therefore they will have to be provided with adequate corridor for meandering without let or hinderance. Any attempt to diminish the width of the corridor (Floodway) and curb their freedom to meander would prove counter productive
- Erosion and deposition is law of nature. The river/stream has to complete its geomorphological cycles from youth, mature to old age.
- River capturing is unavoidable.
- Fundamentally the lowest point of any stream is fixed by sea level

2 Over view of Mining Activity of District Hamirpur

2.1 The three types of minor mineral constituents such as sand stone and bajri are required for any type of construction apart from other material like cement and steel. In earlier times, the houses/ buildings were constructed in 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 during 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 **(Revised) Rules, 1971**, the mining was 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

2.2 At present 24 Nos of mining leases have been granted under the ibid rules in different parts of the District and the detail is tabulated 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)***	***Status (working/non-working), if non-working reason thereof with the***

								date of non-working
	Barsar Sub-Division							
1	*Sh. Raj Kumar Prop: M/S Jai Bhole Shankar stone crusher V.P.O.Samtana Teh Barsar , DistricrHamirpur*	*Datwal/Samtana*	*31°32' 25"N/76° 34' 44"E*	*4-96-62 Hect*	*River Bed*	*5 years/16-01-2012 to 15-01-2017*	*Stone Crusher*	*Non Working*
2	*Smt.Saroti Devi Prop M/S Jai Baba stone crusher V.P.O.Dhangota Teh Barsar , Districrt-Hamirpur*	*Datwal/Batlahu*	*31° 30' 42" N /76° 36' 15" E*	*4-44-00 Hect*	*River Bed*	*5 years/23.5.2015 to 22.5.2020*	*Stone Crusher*	*Working*
3	*Sh. Subhash Chand S/o Sh. Mukadam Singh V.Kulwal P.o Laharli Teh.. Barsar Distt. Hamirpur.*	*Jajari /Ghori Dhawiri*	*31° 26' 42" N /76° 36' 18" E*	*19-34-61 Hect.*	*River Bed*	*15 years/2-11-11 to 1-11-26*	*Stone Crusher*	*Working*
4	*Sh. Ajay Kumar, S/o Shri Kuldeep Singh Rana,*	*Datwal/Khann*	*31°30' 24" N /76° 32' 42" E*	*3-83-26 Hect*	*River Bed*	*5 years/10-02-2012 to 09-02-2017*	*Open Sale*	*Non Working/Suspended since 5-8-2013 for*

	VPO-Dhangota, Tehsil-Barsar, District-Hamirpur							*want of Environment Clearance*
	Nadun Sub-Division							
1	*Sh. Bharat Bhushan S/o Sh. Ravinder Nath V.P.O. Dhaneta Tehsil-Nadaun, Distt. Hamirpur*	*Jasai/Mansai*	*31° 38' 22" N /76° 23' 37" E*	*1-65-71 Hect*	*River Bed*	*5 years/05-08-15 to 04-08-20*	*Open Sale*	*Working*
2	*Sh. Ashok Thakur Prop. Maheshwar stones crushing & washing unit V. Kuthera P.O Jalari, Tehsil-Nadaun Distt. Hamirpur.*	*Jalari/Kuthera*	*31° 47' 30" N /76° 22' 30" E*	*4-03-97 Hect.*	*River Bed*	*15 years/13-3-14 to 12-3-29*	*Stone Crusher*	*Working*
3	*M/s Shivalik Stones crushers Prop. Sh.Dharambir Thakur V.P.O Rangas, Distt. Hamirpur.*	*Naungi/Bari*	*31° 44' 20" N /76° 26' 05" E*	*4-05-33 H*	*River Bed*	*5 years/17-1-12 to 16-1-17*	*Stone Crusher*	*Non Working*

4	*Shri Vijender Jain,S/O Shri Sudershn Jain, Village-Seri P. O. & Tehsil-Nadaun, Distt. Hamirpur.*	*Saproh/Bagarti*	*31° 46' 23" N /76° 22' 50.5" E*	*3-47-58 H*	*River Bed*	*5 years/20-10-2015-19-10-2020*	*Stone Crusher*	*Working*
5	*Sh. Lekh Raj Sharma S/o Sh. Jaishi Ram Vill. Badehra P.O Batran Tehsil-Nadaun, Distt. Hamirpur*	*Hathol/Dadhoon*	*31° 40' 28.78" N /76° 22' 43.4" E*	*6-29-34 H*	*River Bed*	*5 years/28-12-2015-27-12-2020*	*Stone Crusher*	*Working*
6	*Sh. Satish Kumar S/o Sh. Bidhi Chand vill. Baloh P.O. Jallan Tehsil-Nadaun, Distt. Hamirpur*	*Hathol/Baloh*	*31° 41' 46.5" N /76° 21' 46.1" E*	*1-73-37 H*	*River Bed*	*5 years/4-4-2016 to 3-4-2021*	*For free sale*	*Working*
7	*Smt. Nilam SharmaW/O Shri Lekh Raj Sharma, Village Badera, P O Batran, Tehsil-*	*Hathol/Ghandoh*	*31° 42' 24.44" N /76° 21' 19.34" E*	*4-79-80 H*	*River Bed*	*5 years/5-5/2016 to 4/5/2021*	*For free sale*	*Working*

	Nadaun, Distt. Hamirpur							
8	*Sh. Gian Chand, S/o Sh. Chunni Lal, VPO Bharmoti, Tehsil Nadaun, Distt.Hamirpur.*	*Kohla/Kaloor*	*31° 46' 03.8" N /76° 18' 40.8" E*	*14-58-14 H*	*River Bed*	*15 years/16-6-2016 to 15-6-2031*	*For stone crusher*	*Working*
	Sujanpur Sub-Division							
1	*Sh. Rajat Thakur S/o Mohinder Singh V. Chanjiar P.o Dhawali Teh. Skt(Mandi)*	*Jangal Rajgir/Khanauli*	*31° 52' 44"N/76° 38' 50"E*	*4-61-54 H*	*River Bed*	*5 years/15-7-11 to 14-7-2021*	*Stone Crusher*	*Working*
2	*Smt. Ashlata Devi w/o Sh. Nand Lal Vill. Manjhot P.O Ropa Tehsi. & Distt. HMR.*	*Panoh/Sdapahal*	*31° 45' 12.3"N/76° 32' 57.2"E*	*1-06-73 H*	*Hill Slope*	*2-3-16 to1-3-2019*	*Stone Crusher*	*Working*
	Bhoranj Sub-Division							
1	*M/s Sanjay Chouhan stones crusher-2 ,Jahu*	*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*	*Working*

	Tehsil. Bhoranj Distt. Hamirpur.							
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*	*Working*
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*	*Working*
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*	*Working*
5	*Sh. Santosh Kumar Negi S/O Sh. Tulsi Ram Negi. M/s Negi Stone Crusher, V.P.O. Nawahi, Tehsil-Sarkaghat, Distt. Mandi*	*Mewa/Balh Arjun*	*31° 71' 40" N /76° 44' 95" E*	*1-85-45 Hect.*	*River Bed*	*5 years/28-07-15 to 27-07-20*	*Stone Crusher*	*Working*
6	*Sh Purshotam Chand Prop M/sHimachal stone crusher Mundkhar Teh.Bhoranj*	*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*	*Working*

	Distt. Hamirpur							
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*	*5 years/19-11-2015 to 18-11-2020*	*Stone Crusher*	*Working*
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*	*5 years/19-11-2015 to 18-11-2020*	*Stone Crusher*	*Working*
	Hamirpur Sub-Division							
1	*M/S Jagdamba crusher co vill. P.O Massiana Teh. &distt. Distt. Hamirpur (H.P)*	*Dhaned/Berry*	*31° 39' 10"N/76° 29' 15"E*	*1-75-85 H*	*River Bed*	*18-3-2016 to 17-3-2021*	*Stone Crusher*	*Working*
2	*Sh. Parveen Kumar, Prop M/s Mahabir stones crusher V.P.O Bhatera, Tehsi & Distt. Hamirpur.*	*Bharnot/Sapahal*	*31° 44' 27"N,/76° 32' 06"E,*	*4-19-23 H*	*River Bed*	*15 years/12-7-11 to 11-7-26*	*Stone Crusher*	*Working*

3 Through Auction

The auction of minor mineral quarries of District Hamirpur was conducted on 17.9.2015, 21.4.2016 and 14 numbers of stream beds have been put to auction for extraction of sand, stone and bajri

Table-2- list of auctioned querries

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	Highest Bid Amount (Rs.)
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)	6,75,000/-
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)	10,25,000/-
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)	15,00000/-
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)	32,25000/-
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)	34,00000/-
06.	Kunah Khad Part-III	7-26-31	Sh. Raj Kumar, S/o Sh.Kalidass, Vill-Lalin, P.O-Changar, Teh & Distt-	35,25000/-

			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)	13,50000/-
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)	8,75000/-
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)	51,00000/-
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)	46,00000/-
11.	Sukker Khad	9-15-94	Sh. Balwant Rai, S/o Sh. Kanshi Ram, V.P.O- Saloni, Teh- Barsar, Distt- Hamirpur (H.P)	30,00000/-
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)	70,00000/-

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	Highest Tender Amount (Rs.)
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)	25,00800/-
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)	18,02,000/-

2.4 Table-3 Sub-Divisionwise list of stone crushers installed in Hamirpur

Sub- Division Sujanpur

Name and Style	***Workiong on Lease(L) or Other Sources (O)***	***Working (W) or Not working (NW)***	***Name and address of lease***
M/s Mahabir stones crusher Prop: Sh. Parveen Kumar	*On Lease*	*Working*	*Sh. Parveen Kumar Prop M/s Mahabir stones crusher V.P.O Bhatera, Tehsi & Distt. Hamirpur.*
M/s Raj Stone	*On Lease*	*Working*	*Smt.Ashalata Devi Village -Bhatera*

Crusher, Prop: Smt. Ashlata Devi			*Tehsil, Sujanpur, District Hamirpur.*

Sub -Division Hamirpur

Name and Style	*Workiong on Lease(L) or Other Sources (O)*	*Working (W) or Not working (NW)*	*If on Lease then Name and address of lease*
M/s Jagdamba Crusher Company , Prop: Sh. Sh. Vijay Chopra	*On Lease*	*Working*	*Shri Vijay Kumar Chopra, V.P.O- Masyana Teh & Distt- Hamirpur (H.P)*
M/s Jai Shankar Stone Crusher , Prop: Smt. Sneh lata	--	*Not Working*	
M/s Matri Shakti Stone Crusher Prop:Sh. Sh. Surinder kumar.	--	*Not Working*	
M/s Shiv Shakti Stone Crusher Prop:Smt. Usha Devi	--	*Not Working*	

Sub Division Nadaun

Name and Style	*Workiong on Lease(L) or Other Sources (O)*	*Working (W) or Not working (NW)*	*If on Lease then Name and address of lease*
M/s Sheetal Stone Crusher , Prop:Sh. Lekh Raj Sharma	*On Lease*	*Working*	*Sh. Lekh Raj Sharma S/o Sh. Jaishi Ram Vill. Badehra P.O Batran Tehsil-Nadaun, Distt. Hamirpur*
M/S. Maheshwar stones crushing & washing unit Prop: Sh. Ashok Thakur Prop	*On Lease*	*Working*	*Sh. Ashok Thakur Prop. Maheshwar stones crushing & washing unit V. Kuthera P.O Jalari, Tehsil- Nadaun Distt. Hamirpur.*
M/s Shivalik Stones crushers Prop. Sh.Dharambir Thakur	--	*Not Working*	
M/s Deepika Stone Crusher Prop: Sh. Vijender Jain	*On Lease*	*Working*	*Shri Vijender Jain,S/O Shri Sudershn Jain, Village-Seri P. O. & Tehsil-Nadaun, Distt. Hamirpur.*
M/s Ambay stone crusher Prop: Sh.Gian Chand	*Other Sources*	*Working*	

Sub-Division Barsar

Name and Style	*Workiong on Lease(L) or Other Sources (O)*	*Working (W) or Not working (NW)*	*If on Lease then Name and address of lease*
M/S Jai Bhole Shankar stone crusher Prop: Sh. Raj Kumar	*On Lease*	*Working*	*Sh. Raj Kumar Prop: M/S Jai Bhole Shankar stone crusher V.P.O.Samtana Teh Barsar , Districr-Hamirpur*
M/S Jai Baba stone crusher Prop: Smt.Saroti Devi	*On Lease*	*Working*	*Smt.Saroti Devi Prop M/S Jai Baba stone crusher V.P.O.Dhangota Teh Barsar , Districr-Hamirpur*
M/s Datwalia Stone Crusher Prop: Sh. Subhash Chand	*On Lease*	*Working*	*Sh. Subhash Chand S/o Sh. Mukadam Singh V.Kulwal P.o Laharli Teh.. Barsar Distt. Hamirpur.*
M/s Sukkar Stone Crusher, Prop: Sh. Sanjay Kumar	*Other Sources*	*Working*	*Sh. Sanjay Kumar Vill-Chowki, Tehsil,Barsar,Distt. Hamirpur*
M/s Himachal Gramin Udyog, Prop: Sh. Kamal Pathania	*--*	*Not Working*	*Sh. Kamal Pathiana vpo-Kathiana, Tehsil,Barsar,Distt. Hamirpur*
M/s Kailash Stone Crusher Prop:Smt.Kailash	*Other sources*	*Working*	*Smt. Kailash Thakur VPO-Bairi, Teh-Barsar Distt Hamirpur*

Thakur			
M/SC & C Pvt. Ltd, Dhangota, Tehsil- Barsar, Distt. Hamirpur	--	*Not Working*	

Sub-Division Bhoranj

Name and Style	*Workiong on Lease(L) or Other Sources (O)*	*Working (W) or Not working (NW)*	*If on Lease then Name and address of lease*
Sh. Sanjay Chauhan M/s Sanjay Chauhan Stone Crushe Village,Manoh Tehsil,Bhoranj Distt. Hamirpur	*On Lease*	*Working*	*Sh.Sanjay Chouhan stones crusher- ,Jahu Tehsil. Bhoranj, Distt.- Hamirpur.*
Sh. Sanjay Chauhan M/s sanjay Chauhan Stone Crushe Village,Jahu,Tehsil,Bhoranj Distt. Hamirpur r	*On Lease*	*Working*	*M/s Sanjay Chouhan stones crusher- ,Jahu Tehsil. Bhoranj, Distt.- Hamirpur.*
M/S Laxmi Stone Crusher Prop: Sh. Pyar Chand Village- Jahu Kalan, Tehsil- Bhoranj	-----	*Not Working*	*Sh. Pyar Chand Village- Jahu Kalan, Tehsil- Bhoranj Distt. Hamirpur*

Distt. Hamirpur			
Sh Purshotam Chand Prop M/sHimachal stone crusher Village,Mundkha-r, Tehsil,Bhoranj Distt. Hamirpur	*On Lease*	*Working*	*Sh Purshotam Chand Prop M/sHimachal stone crusher Mundkhar Teh.Bhoranj Distt. Hamirpur*

2.5 Detail of Royalty and Production of Minor Mineral

In Hamirpur District only minor mineral such as sand stone and bajri is available and the royalty is received only from such minerals only. The royalty received since 1984 onwards is tabulated in the following table.

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

Sr No.	Year	Royalty in lacs	Production of mineral
1	1984-85	.60	
2	1985-86	1.7	
3	1986-87	.9	
4	1987-88	1.5	
5	1988-89	2.6	
6	1989-90	3.0	
7	1990-91	5.9	
8	1991-92	5.6	
9	1992-93	9.6	
10	1993-94	8.5	31400
11	1994-95	8.8	126000
12	1995-96	10.4	170000

13	1996-97	10.0	108500
14	1997-98	13.3	104000
15	1998-99	20.2	180000
16	1999-2000	38.8	681860
17	2000-2001	62.2	714224
18	2001-2002	82.2	1057804
18	2002-2003	75.4	760956
19	2003-2004	80.0	482136
20	2004-2005	83.13	556117
21	2005-2006	72.11	550602
22	2006-2007	60.59	535301
23	2007-2008	86.51	505122
24	2008-2009	93.21	526509
25	2009-2010	145.83	466690

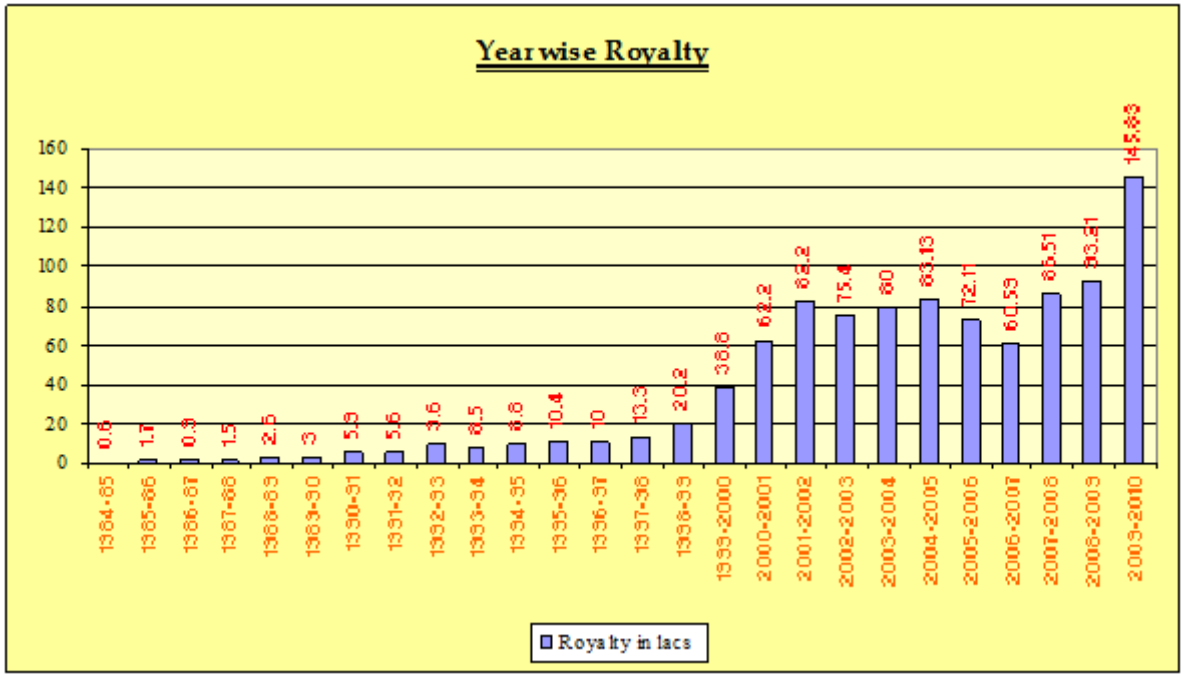


Figure-1 Showing detail of yearwise Royality

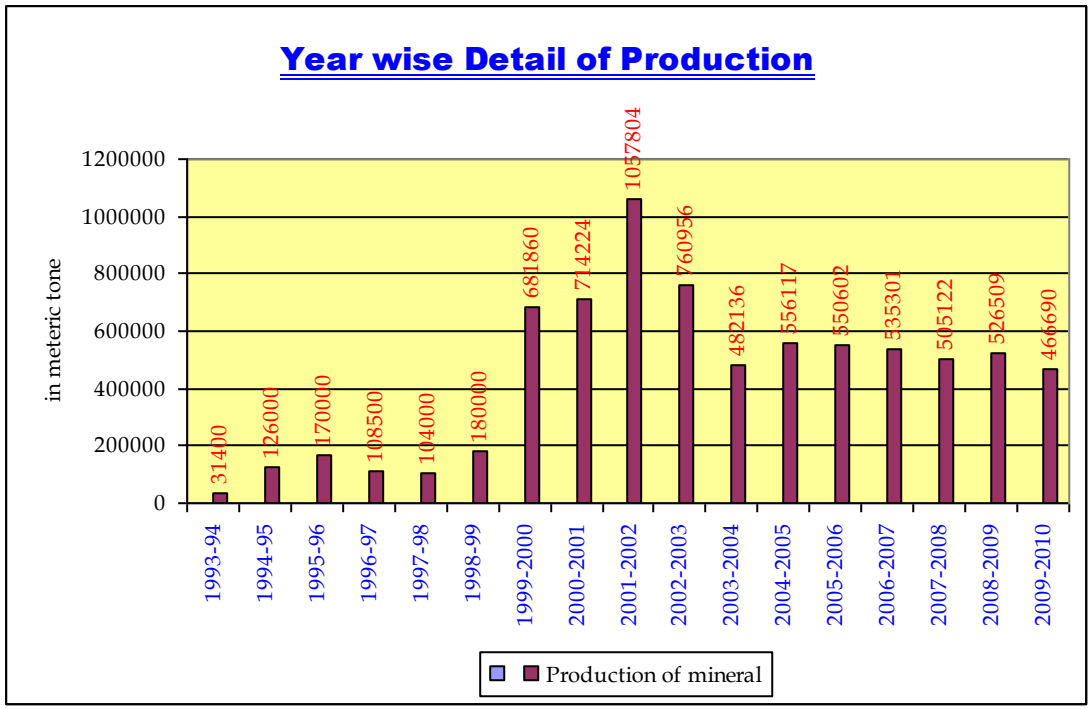


Figure-2 Showing detail of yearwise production of mineral

3 Process of Deposition of Sediments in the River Bed

3.1 Deposition is the opposite of erosion. Deposition is where a river lays down or drops the sediments or material that it is carrying. Rivers carries lots of different sediments, including rocks, boulders, silt, mud, pebbles and stones. Normally, a river has the power to carry sediments. If the force of a river drops, the river cannot carry sediment. This is when the river deposits its sediment.

The work done by a river consists of the following

1) Erosion
2) Transport of the material produced by erosion
3) Accumulation (deposition) of the transported material

The erosion and transport of material go hand in hand with the deposition of the latter. 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 the erosion and transport definitely prevails 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.

Both discharge and load depend on the climate and geology(litholgy, structure and relief) of the river basin concerned and both co-operate in carving out the channels down and down.

3.2 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*.

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

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.

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.

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.

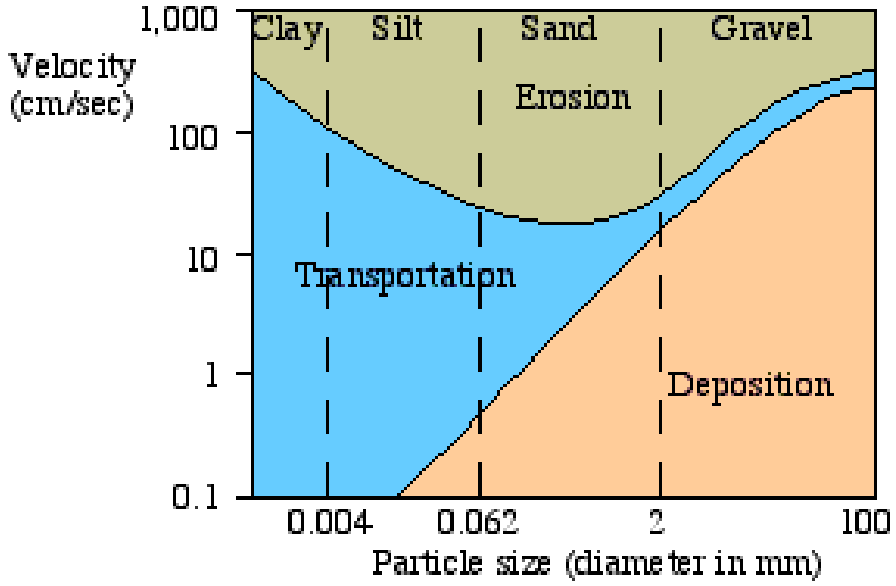


Figure 3. Hjulstrom diagram showing the stream velocity required to erode, transport and deposit particles of various sizes.

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.

4.0 GENERAL PROFILE OF HAMIRPUR DISTRICT

4.1 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	=4

1 Hamirpur
2 Nadaun
3 Barsar
4 Bhoranj
5 Sujanpur

Number of Tehsils = 6

1 Nadaun
2 Hamirpur

3 Bhoranj
4 Barsar
5 Sujanpur
6 Tauni Devi

Number of Sub-Tehsils=1

Bijri

Number of C.D. Block-6

1 Bhota
2 Hamirpur
3 Nadaun
4 Tira Sujanpur

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

4.2 Land Utilization Pattern

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

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

4.3 Forest

The forest in the District has been classified into three categories;-

1 Lower of Siwalik, Chil pine forest
2 Northern dry mixed deciduous scrub forest
3 Broad leaved forest

Most of the area of Hamirpur District is occupied with Chil Forest. Under the second category of forest, Khair is the predominant species. The third category consist of broad leaved species but have got lot of bushy growth as well. There is no category of reserve forest in the District.The area under different types of forest cover in the District is as given below;-

Table-6 Area under different categories of forest in District Hamirpur

Sr.No.	Forest Category	Area in hects
1	Protected Forest	9558
2	Unprotected Forest	6083
3	Other type of forest	4417

4.4 Fauna

The species of animals and birds commonly found in the District are;-

- Leopard
- Hare

- Bild bore
- Jackal
- Barking Deer
- Monkey
- Sambar
- Chakor
- Birds
- Crow
- Red Jungle Fowl
- Black Partridge
- Grey Partridge
- **Woodpecker**

4.5 Agriculture

The land holdings 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 rotations followed in the District are;-

1 Maize-Toria-Wheat
2 Maize –Potato
3 Maize-Toria-Wheat-Baisakhi Moong
4 Paddy-Wheat
5 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 alsogrown.

In adition to this, following vegetables are also grown:-

- Peas
- Carrot
- Cabbage
- Lady's Finger
- Tomato

- Brinjal
- Capsicum
- Cauliflower
- Cucumber etc.

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

4.6 Horticulture

Following are important fruits grown in the District:-

- Plum
- Peach
- Apricot
- Pear
- Nuts and Dry Fruits
- Citrus fruits
- Sub tropical fruits like Mango, Guava, Lichi, Papaya etc.

4.7 Animal Husbandry

Following are important livestock in the District

- ***Cow***
- Buffalo
- Sheep
- Goat
- Ponies

4.8 Fisheries

Following are important fishes in the river Beas and its tributaries like Kunah Khad and Man Khad

- Tor Putitora (Mahaseer)
- Schizothorare Plagiostomus (Gulguli)
- Lebeo dero (Gid)
- Labeo ealbasu (Kalbans)
- Channa punctatus (sal)
- Mystus seenghala (singhara)
- Labeo dicheilus (Kunhi)

5.0 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.

6.0 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

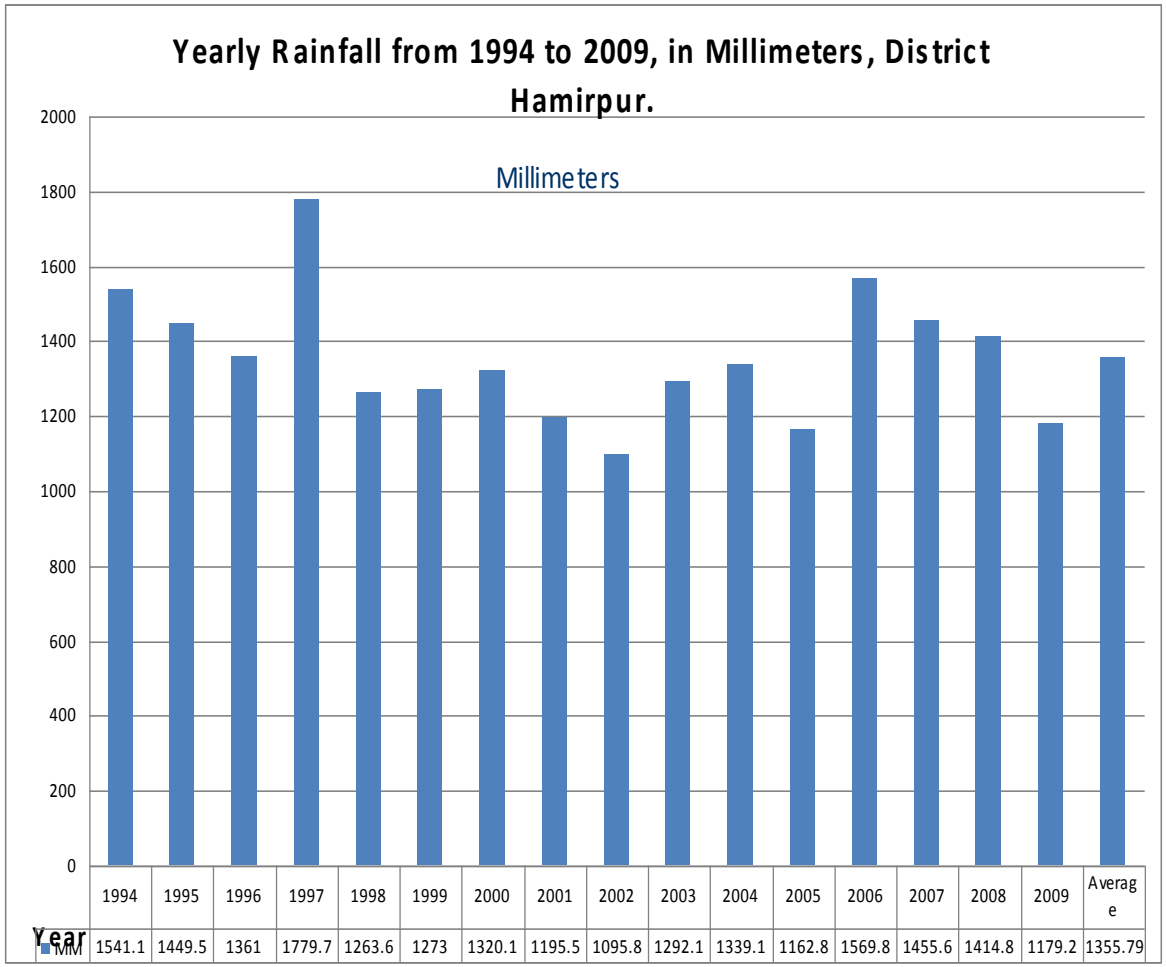


Figure 4. Showing yearwise rainfall from 1994 to 2009 in district Hamirpur

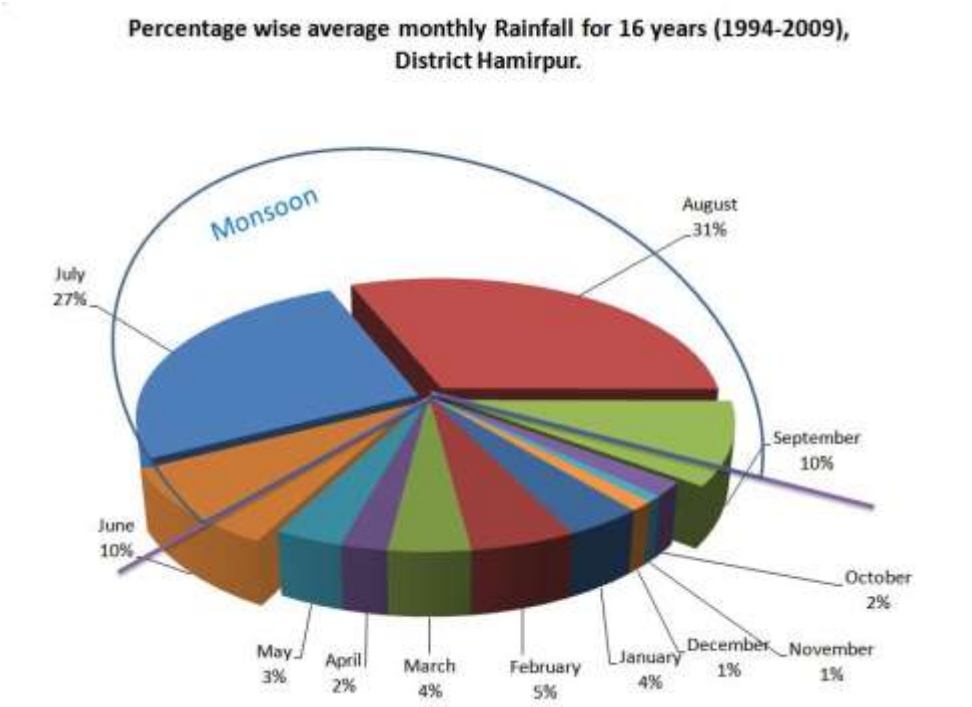


Figure-5 Pie diagram showing 5agewise average monthly rainfall for 16 years

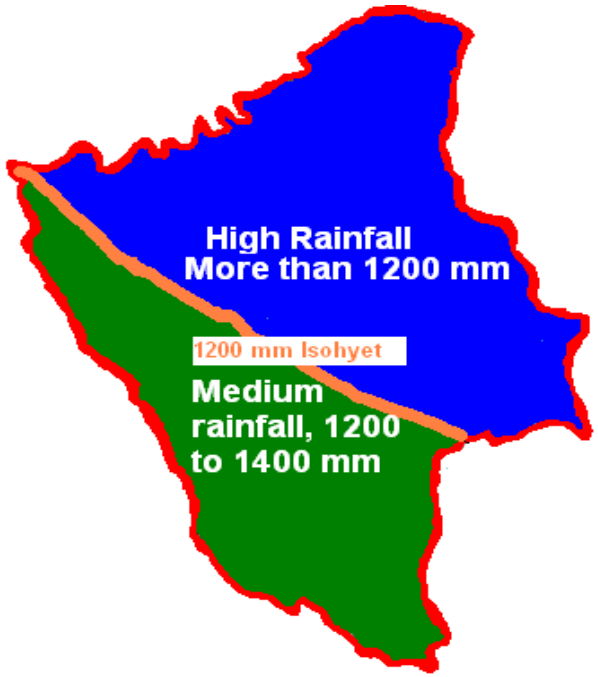


Figure-6. Showing areawise rainfall intensity in District Hamirpur

7.0 Geology

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.

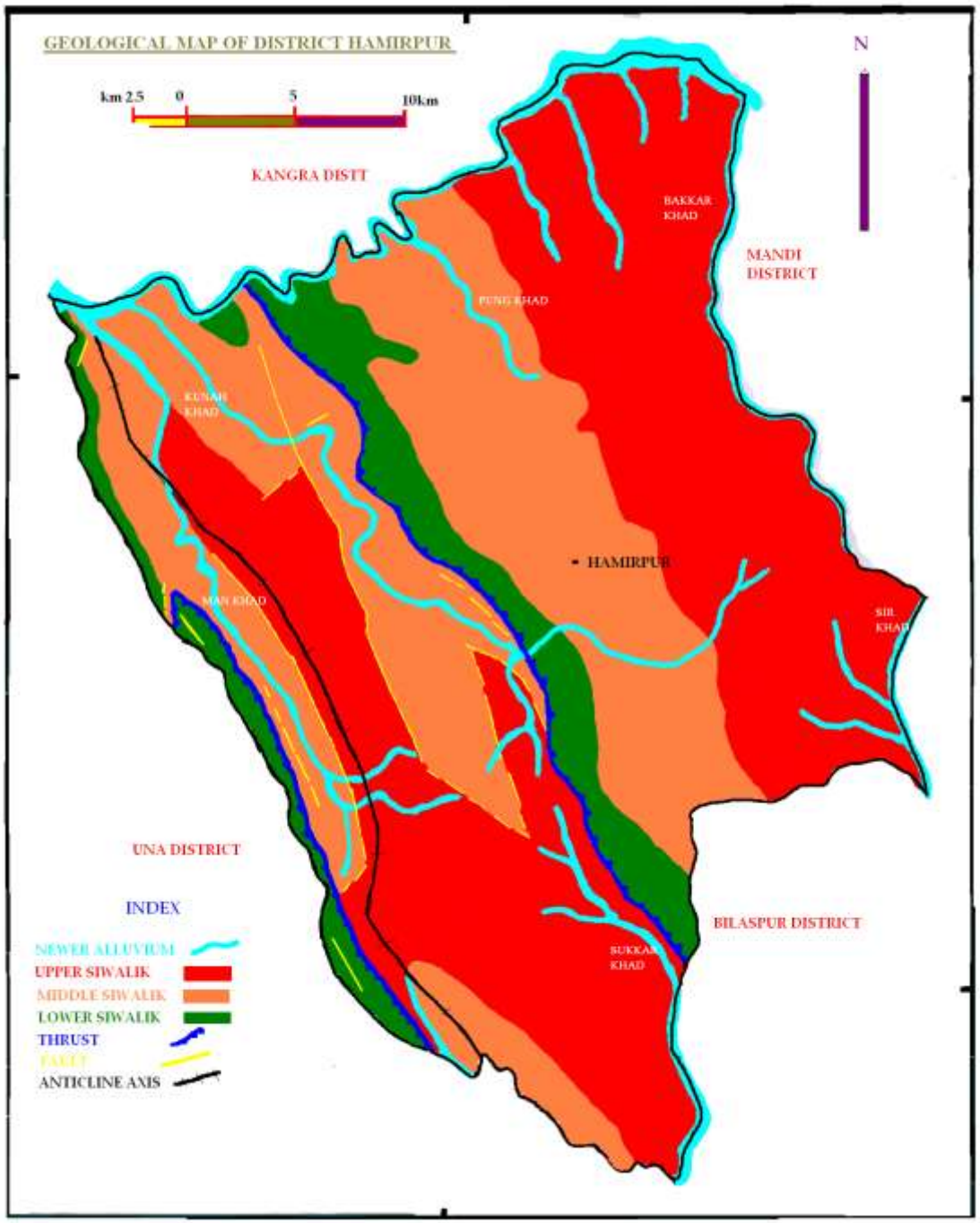
In Hamirpur all the three subgroups respectively the Lower, Middle and Upper are present on the basis of lithostratigraphy (Table 3, figure 14)

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


GEOLOGICAL MAP OF DISTRICT HAMIRPUR
km 2.5 0 5 10km
N
KANGRA DISTT
BAKKAR KHAD
MANDI DISTRICT
PUNG KHAD
KUNAH KHAD
HAMIRPUR
MAN KHAD
SIR KHAD
UNA DISTRICT
BILASPUR DISTRICT
SUKKAR KHAD
INDEX
NEWER ALLUVIUM
UPPER SIWALIK
MIDDLE SIWALIK
LOWER SIWALIK
THRUST
FAULT
ANTICLINE AXIS

8.0 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 rive 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.:-


INDIA
HIMACHAL PRADESH
DISTRICT HAMIRPUR
KILOMETRES
TIRA SUJANPUR
NADAUN
HAMIRPUR
BHORANJ
BHOTA
BARSAR
(DHATWAL)
BIJHRI
C.D. BLOCKS
HEADQUARTERS
A TIRA SUJANPUR
TIRA SUJANPUR
B NADAUN
NADAUN
C HAMIRPUR
HAMIRPUR
D BHORANJ
BHORANJ
E BIJHRI
BIJHRI

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

A 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

B 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)**

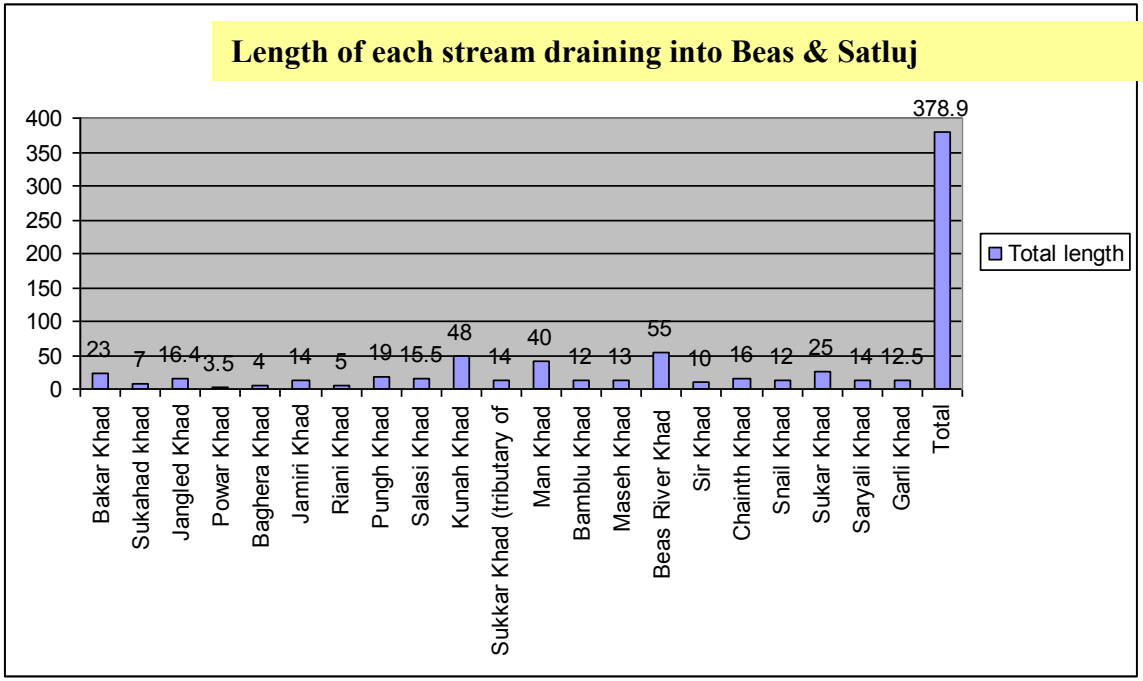


Figure -9 Graph Showing Length of each stream draining into Beas & Satluj

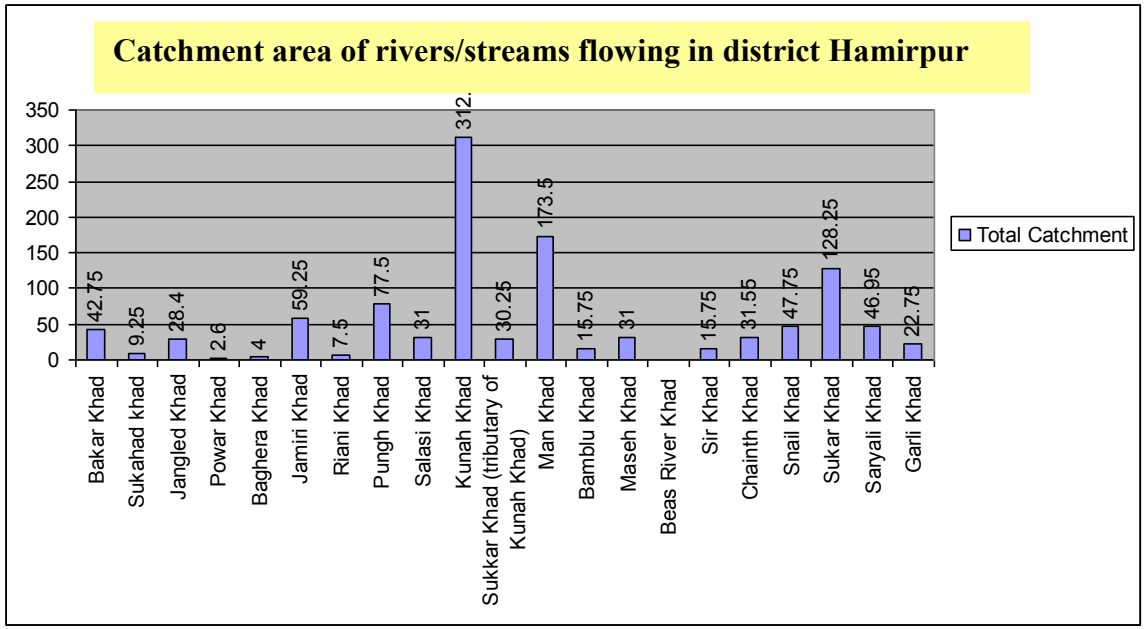


Figure-10- Graph showing Catchment area of rivers/streams flowing in district Hamirpur

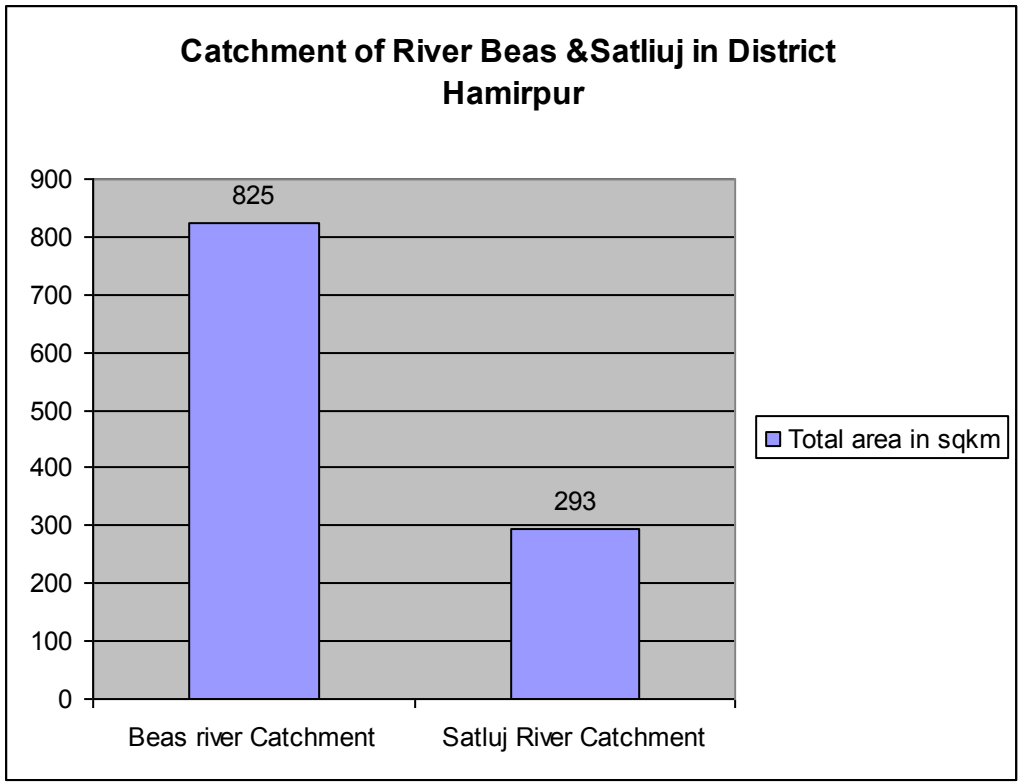


Figure-11 The catchment area of River Beas and River Satluj

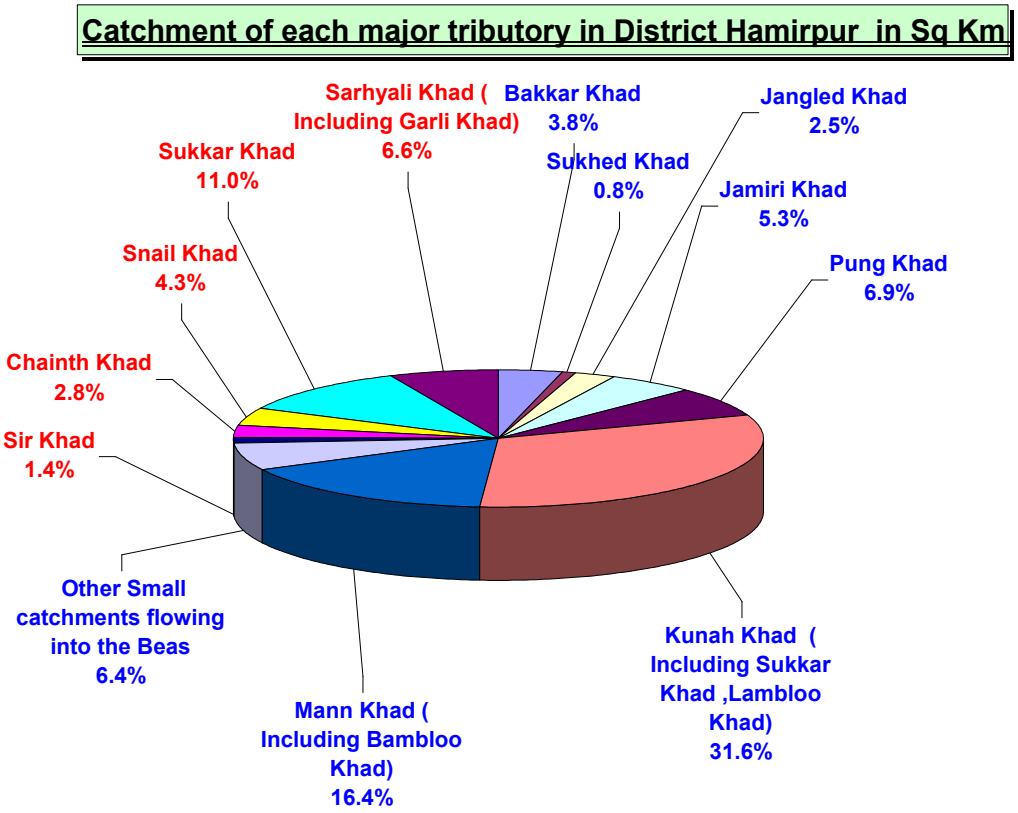


Figure-12- showing catchment of each major tributary in district Hamirpur in (Sqkm)

Calculation of Mineral Deposits and Annual Deposition in the Stream Beds

As already explained, the 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. The alluvium in river bed is deposited containing a mixture of different constituents of various particle sizes. 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
64 mm---	Pebble		Pebble gravel Pebble conglomerate

4 mm---	Granule	Granule gravel
2 mm--	Sand	Sand sandstone
1/16 mm---	Silt	Silt Siltstone
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 1 metre is 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 and as such the excavated area is replenished with new harvest of mineral.

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. 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 causing 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 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.

10. Description of Important Rivers and Streams

10.1 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 Wah Devi at an altitude of 1235 mtrs. The stream is seasonal in nature and water flows only during rainy season. From Wah 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 sqKms 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

Figure- 14 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	Area (in Hects.)	Average AnnualProduction in metric tonnes
Through Auction			
	Shri Bikesh Kumar Chambial Annual bid 80,00000/= Wef	4-03-85	As per Mining Plan

Minor Mineral Potential in the River Bed

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 each mineral constituent like boulder, river borne bajri, sand upto a depth of one metre leaving the clay and silt as waste. The annual deposition of minor mineral in the river bed has been calculated by taking into consideration the annual deposition of about 6 Cms. As seen in photographs the banks comprise of boulder beds are steep and stable in nature.

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 in Hamirpur side. 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. It is therefore recommended that mineral concession can be granted in the river bed of Bakar khad from village Matlahna to confluence with river Beas. No mineral concesion may be granted from Wah Devi to Matlahna and in small tributaries such as streams originating from Tauni Devi and from other locations for proper replenishment of river bed

10.2 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 10^0 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 nbank

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 metric tonnes	River borne deposite in metric tonnes	Sand in metric tonnes	Total in metric 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 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. It is therefore recommended that mineral concession can be accorded from Ghian village to confluence with the river Beas, however from Bagru village to Ghian village no concession may be granted

10.3. 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^{0}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 15-12-2009 to 14-3-2010 for an annual bid of Rs 1,20,000/- . 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 18,2000/=	**5-44-00**	As per Mining Plan

	Wef		

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 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. It is therefore recommended that mineral concessions can be granted from village Bohru water supply scheme to confluence with river Beas. From village Bhamnol to Bohru village no mineral concession may be granted.

10.4. POWAR KHAD

The powar khad is the tributary of river Beas and it flows roughly in N35o 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

Gelogical 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

10.5 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:

Figure 19 View of stream bed

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

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.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.

10.6 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. 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 annaual production of mineral is around 8000 MT. as such mineral concession can be granted in this stream from village Jhor Nambri to confluence with river Beas, No mineral concession may be granted from village Chauri to Jhor Numbari village as the stream stretch is narrow including Mahili Sub tributary for proper replenishment of river bed.

10. 7 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. The annual deposition is about 57000 MT However, the stream course is very narrow as such no mineral concession may be granted in this stream bed.

10.8 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	4-19-23	Stone	14000

	Kumar,Prop. M/s Mahavir Stone Crusher Village, Mulana P.O. Bohani, Tehsil & District Hamirpur.		Crusher	

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 in the river bed of Pung . 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.No mineral concession may be granted in this stream bed from Guwararu to 1 Km upstream of Kasiri village and in Drug Khad for proper replenishment of the river bed.

10.9 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. 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.

10.10 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

Figure-27-View of Kunah Khad

Figure- 28- 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	Status of Land	Average Annaul Production (in Metric Tons)
1.	Sh Vijay Chopra, M/S Jagdambey Stone Crusher,	1-74-85	Stone Crusher	Govt	12960

	village Massiana, Hamirpur, District hamirpur				
2	Sh. Ashok Thakur Prop. Maheshwar stones crushing & washing unit V. Kuthera P.O Jalari, Tehsil- Nadaun Distt. Hamirpur.	4-03-97	Stone Crusher	Private	30800 MT
3	Shri Vijender Jain,S/O Shri Sudershn Jain, Village-Seri P. O. & Tehsil-Nadaun, Distt. Hamirpur.	3-47-58	Stone Crusher	Private	30555 MT
Through Auction :					
Sr. No.	**Name of the Khad**	**Area in Hectares**	**Name of the Party**	**Bid Amount**	**Production**
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	32,25000/-	

			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)	34,00000/-	
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)	35,25000/-	
04.	Kunah Khad Part-IV	14-94-32	Sh. Raj Kumar, S/o	13,50000/-	

			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)	8,75000/-	

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. 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. No mineral concession may be granted from village Sangroh to Kanjian village in the main Khad and in other streams like Hathli, Gasoti, Rain, Bhota, and Kangu Khad for proper replenishment.

10.11 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.

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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. 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. No mineral concession may be granted from Panjyariri to Galoh village.

10.12 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-29-View of Man Khad

Figure-30-View of Man Khad

Figure - 31- 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	Average Annaul Production (in Metric Tons)
1	Sh. Lekh Raj S/o Sh. Jaishi Ram Village Badhera PO. Batran, Tehsil Nadaun District Hamirpur Prop. Sheetal Stone Crusher	6-29-34	Stone crusher	25500
2	Sh. Bharat Bhushan Kapil S/o Sh, Rabinder Nath Kapil, VPO Dhaneta, Tehsil Nadaun Hamirpur.	1-65-75	Open sale	35280
3	Sh Satish Kumar S/o Sh. Bidhi Chand, Vill. Baloh PO Jhalan, Tehsil Nadaun District Hamirpur	1-73-37	Open sale	15820
4.	Smt. Neelam Sharma W/o Sh. Lekh Raj Village Badhera PO. Bathran, Tehsil Nadaun District Hamirpur	4-79-80	Open sale	59500
5.	Sh Ayodhya Lal Sharma S/oSh. Bardoo Ram vill-Dadhoon P.O.Pansai Tehsil-Nadaun, Distt. Hamirpur	4-38-81	Open sale	27560

	Through Auction				
Sr. No	**Name of the strem/Khad**	**Area in Hectares**		**Name of the Party**	**Annual Bid Amount**

01.	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)	10,25,000/-
02.	Maan Khad Part-III	8-48-12	Sh. Prakash Chand, S/o Sh.Sunder	15,00000/-

			Ram, V.P.O-Chamned,Teh & Distt-Hamirpur (H.P)	

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 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

10.13 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-32- 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.

Present Status of Mining

Sr. No.	Name of party	Area in Hectare	Purpose of lease	Status of land	Average Annaul Production (in Metric Tons)
1.	Sh Rajat Katna S/o Sh.S.P. Katna Hamirpur District Hamirpur	1-57-50	Stone crusher	Private land	Not Working

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 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 .

10.14 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-33-View of Maseh Khad

Figure -34-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	*14-58-14*	Stone crusher	Private	109125

	Crusher, VPO Bharmoti, District Hamirpur.				

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. 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

15 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-35-View of Beas River

Figure-36-View of Beas River

Figure 37&38 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	Status of land	Average Annaul Production (in Metric Tons)
1.	Sh Rajat ThakurS/o Sh. Mahinder Singh Vill. Chanjiar, P.O. Dhawali, Tehsil Sarkaghat, Distt. Mandi	4-61-54	Stone Crusher	Private	46100
Through Auction					
Sr. No.	Name of River/ Stream	**Area in Hectare**	Name of the Party	Annual Bid Amount	Average Annaul Production (in Metric Tons)
01.	Beas River Sujanpur-III	22-93-07	Sh. Rahul Pathania S/o Sh. Ranjit Singh, Vill-Thapkor, P.O-Bhadroya, Teh-	51,00000/-	As calculated in Mining Plan

			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)	46,00000/-	
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	6,75,000/-	

			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)	25,00800/-	

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 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.

10.16 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-39- View of Sir Khad

Figure -40- 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.

List of mining leases granted in Sir Khad

Sr. No.	Name of party	Area in Hectare	Purpose of lease	Status of land	Average Annaul Production (in Metric Tons)
1	*M/s Sanjay Chouhan stones crusher-2 , Jahu Tehsil. Bhoranj Distt. Hamirpur.*	*30-80-76*	*Stone Crusher*	*Govt. Land*	36540
2	*M/s Sanjay Chouhan stones crusher- ,Jahu Tehsil. Bhoranj, Distt.- Hamirpur.*	*1-50-46*	*Stone Crusher*	*Private Land*	12425 MT

3	*Sh Amardeep S/0 Sh. Bram Chand V.P.O Bhambala Distt. Mandi (H.P)*	*1-07-69*	*Stone Crusher*		***8930***
4.	*Sh Amardeep S/o Sh. Bram Chand V.P.O Bhambala Distt. Mandi (H.P)*	*1-04-58*	*Stone Crusher*	*Private Land*	11250
5.	Sh. Santosh Kumar Negi S/O Sh. Tulsi Ram Negi. M/s Negi Stone Crusher, V.P.O. Nawahi, Tehsil-Sarkaghat, Distt. Mandi	*1-85-45*	*Stone Crusher*	*Private Land*	16500 MT

10.17 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.

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.

figure -41- View of Chainth khad

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. 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.

10.18 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 -42 View of Snail Khad

Figure -43- 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	Average Annaul Production (in Metric Tons)
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	48025
2.	Sh. Sanjay Chauhan Manoh District Hamirpur,	7-02-05	Stone Crusher	Govt. Land	26600
3.	Sh. Sanjay Chauhan Manoh District Hamirpur,	17-30-76	Stone Crusher	Govt. Land	33800

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. 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.

10.19 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.

Figure-44-View of Sukar Khad

Figure-45 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	Average Annaul Production (in Metric Tons)
1.	Sh Raj Kumar S/o Sh. Joginder Singh VPO Samthana, Tehsil Barsar District HamirpurProp. M/s Jai Bhole Stone Crusher	4-96-62	Stone Crusher	Private	Not Working
2.	Smt. Saroti Devi, M/s Jai Baba Stone Crusher, VPO Dhangota, Tehsil Barsar District Hamirpur	4-44-00	Stone Crusher	Private land	28000
3.	Sh. Subhash Chand S/o Sh. Mukand Singh, Vill Kalwal PO Lohasi Tehsil Barsar Distt Hamirpur	19-34-61	Stone Crusher	Govt. land	99290
4.	Sh. Ajay Kumar, S/o Shri Kuldeep Singh Rana, VPO-Dhangota, Tehsil-Barsar, District-Hamirpur	3-83-26	Open sale/Suspended	Private land	Not Working

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. 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

10.20 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 46 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. 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

10.21 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. 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 Khad	7.00	85-50-00	51-30-00	954	540	9.25	From 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	3.5	21-60-60	13-00-00	906	530	2.6	No	

	Khad							concession	
5	Baghera 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 JhorNumbri 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	No concession from Behlan PF boundary to Kitpal PF boundary

								with Beas river	
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**					

GENERAL CONDITIONS

The part of river/stream beds recommended for grant of mineral concessions in this report are based on reconnaissaince survey conducted for whole of district Hamirpur, however before grant of any mineral concession in a particular river/stream bed, the guidelines contained in River/Stream bed mining policy are to be followed in addition to site specific conditions as specified bv the Joint Inspection Committee and recommendation thereof. In the ibid Policy Guidelines, following general conditions are mentioned

1 No River/Stream bed mining shall be allowed without the recommendations of the Sub-Divisional Level Committee.
2 .No River/Stream bed mining shall be allowed without getting clearance under Forest Conservation Act, 1980 if the area attracts the provisions of FCA. 1980.
3 No River/Stream bed mining shall be allowed within 75 meters from the periphery of soil conservation works, nursery plantation, check dams or within the distance as recommended by the Sub-Divisional Committee, which ever is more.
4 No River/Stream bed mining shall be allowed within $1/5^{th}$ of its span or 5 meters from the bank or as specified by the Sub-Divisional Committee which ever is more.
5 No River/Stream bed mining shall be allowed within 200 meters U/S and D/S of Water Supply Scheme or the distance as specified by the Sub- Divisional Committee which ever is more.
6 No River/Stream bed mining shall be allowed within 200 meters U/S and 200 to 500 mts D/S of bridges depending upon the site-specific conditions.

7 No approach road from PWD road shall be allowed to River/Stream beds mining, unless lessee/contractor obtains written permission from XEN PWD for making road leading to all intake places from the PWD Roads.
8 No mechanical mining through mechanical excavator including any other earth moving machines like JCB, Bouldozer,Pocklain,Loders etc shall be carried out in river or stream Bed by the lease holder or permit holder or contractor as the case may be.
9 No boulder/cobbles/hand broken road ballast shall be allowed to be transported outside the State from River/Stream beds, so as to reduce pressure on the River/Stream beds.
10 No digging of more than 3 feet shall be allowed in River/Stream beds.
11 Every leaseholder shall supply in advance, the Registration Nos of vehicle engaged in transportation of mineral from mining area to his industrial unit. This would ensure checking of illegal vehicles carrying minerals.
12 Every lessee/contractor shall ensure that his labou/r does not involve in fish poaching.

13. No blasting shall be allowed in river/stream beds.

GENERAL RECOMENDATIONS

1 Some of the rivers/streams or portion of rivers/streams have been prohibitited for grant of mineral concession. In such portions if any person applies for open sale of mineral the mining lease for open sale may be granted in private lands to meet out the local demands or any exigency subject to the approval from the joint Inspection Committee.

2 In certain stretches of river/streams, islands are developed which are undesirable and causes cutting of banks. In such places i.e. central islands etc. can be done more than one meter in rare and exceptional circumstances after a detailed study.

3 The possibility for conducting the auction of river/stream bed as one unit where the same are forming inter District boundary should be explored for the rivers flowing through the boundary of two districts.

4 The auction shall be done as per the recommendation /approval of the Sub-Divisional Level Committee