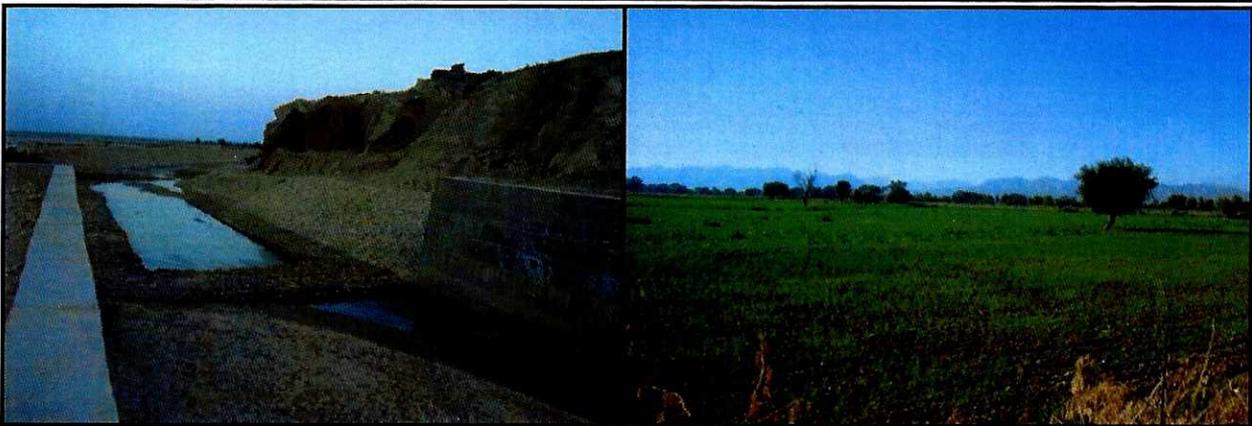




SOCIO ECONOMIC IMPACT / BENEFITS OF MHT PROJECT, IN CRBC AREA, STAGE III

(IMPACT ANALYSIS)



**CONSTRUCTION SUPERVISION, SOCIAL MOBILIZATION & DESIGN MANAGEMENT
OF HILL TORRENTS IN CRBC AREA STAGE-III, DERA GHAZI KHAN**

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MMP

MM Pakistan (Pvt) Ltd.

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1 PREMBLE.

Pakistan has already utilized major part of its conventional water resources; flood flows of hill torrents have potential prospects for development to meet growing demand of water for agriculture.

About 200 hill torrents, of which 13 are major, originate from Suleiman Range and flows through D.G. Khan and Rajanpur Districts towards the river Indus since centuries. The flood water gush towards river Indus without leaving behind any benefit, rather destroying the infrastructures and damaging the CRBC and Indus High way.

The unpredictable and erratic nature flood water from the hill torrents is used for Irrigation within the piedmont area through a network of diversion and dispersion structures.

The command area of the hill torrents extends over a length of 360 Km (200 miles) from RAMAK to KASHMORE, while in width it varies from 25 Km to 40 Km.

The fact is that the Flood flows of hill torrents have potential prospects for development to meet growing demand of water for agriculture in the long spread area.

The area between the foot hills of the Sulaiman Range, from Ramak to Kashmore and Chashma Right Bank, D.G Khan Canal system is locally known as 'PACHAD' area. According to the conservative practices, the farmers in PACHAD and sub mountainous areas used to utilize low flows of hill torrents by temporarily constructed small earthen bunds, called "Gandas" for sporadic agriculture.

These diversion bunds divert the water to the fields during low floods, but, high flows usually breach the manually constructed earthen diversion bunds, demolishing all the labor and inputs of the Zamindars, allowing the flood water to flow towards river Indus, through its natural courses. This centuries old system of Irrigation, called 'Kamara', authorizes the Irrigation sequence from upper to lower riparian's (Saroopa Paina System) under the established rule "Aam Zaam Bandi". Consequent upon the operation of CRBC, the inhabitants of Pachad area of western side of the CRB Canal lodged serious complaints about the flooding of their lands and the resultant damages.

They demanded an independent Project for flood management of the following three Hill Torrents flowing in Taunsa Tehsil of DG Khan District, through Grievance Redressal Committee (GRC) of CRBC.

1. Kaura Hill Torrent
2. Vehova Hill Torrent
3. Sanghar Hill Torrent

In this fragile part of Pakistan, where poverty is widespread and the floods of Hill Torrents are common, spate Irrigation systems have been providing a lifeline for the rural poor, albeit at a very basic subsistence level.

The DG Khan Provincial Irrigation Department, in view the requirements and logical demands of the people of the area and in realization of the potential of spate Irrigation system for improving rural livelihood initiated three major spate Irrigation development projects on Sanghar, Vehova and Kaura spate rivers. This massive government intervention has been highly welcomed by the local farmers.

The work at MHTP was initiated in early 2009; the physical progress of all the three packages at present is about 82%.

During the last flood season the flood water passed through 18 constructed off take channels at all the three hill torrents and irrigated the relative command area of different Mauzas. The Zamindars of this area are really happy and take it as a blessing of Almighty Allah as the area and yield per acre irrigated through constructed channels has been increased rather doubled in the command area irrigated through newly constructed off take channels.

The impact of the partially completed project is well reflected in the command areas where the local Zamindars irrigated their lands through partially completed off take channels during the last flood season and the flood water converted the barren land to lush green fields of wheat and gram. The Zamindars are expecting that during the current year their yield per Acre will increase from 5% to 50%.

According to an estimate, about 160,000 acres of barren land will come under Irrigation in the command area of all the three Major Hill Torrents in Tehsil Taunsa, and annual agricultural benefits are estimated to Rs. 84 million, after successful Completion of this project, while savings due to flood damages has been projected to Rs. 60.5 million annually.

The set objectives for the construction of the MHT Projects detailed below are being achieved even before the 100% completion of all the three packages. The life style of the localities can be well observed due to socio economic uplift in the area, while damages to the infrastructures are almost nil due to control of the flood water through construction of dispersion structures. On the other hand, the value of per acre land has been increased from Rs 10,000 to Rs 200,000 in this area. The command area is spread over 21 villages of six union councils, while total population to be benefitted of this area is 2, 33,000.

The economic analysis assessed at initial stage is depicted as under

Project Cost	=	2225.735 Million
Cost Benefit Ratio	=	1:1.467
Net Present Worth	=	1004.015
E.I.R.R	=	20.915

According to an initial estimation the E.I.R.R has been anticipated to be achieved in 21 Year, while the present amazing results reflects that the set economic objective will be met out within the next 4 to 5 Years.

2 MHT Project Objectives.

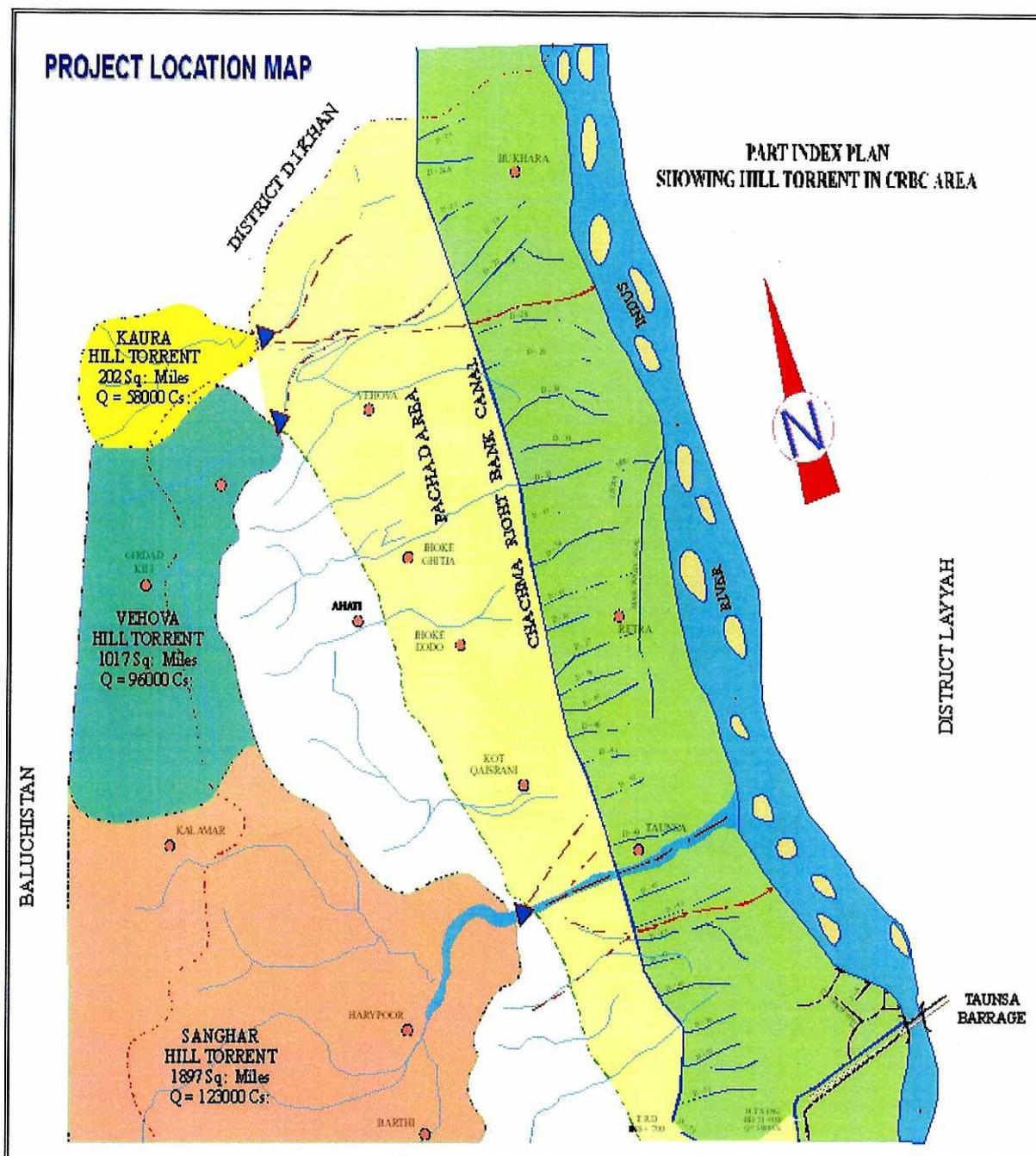
The MHTP was designed to achieve the following main objectives:

- Safety to CRBC through flood diversion.
- Eradication of Hill Torrent flood damages to the valuable Agricultural Lands, Public Properties, Villages, Abadies, Extensive Irrigation System and other infrastructure
- Protection of the cultivable lands by flood control measures to arrest erosion and harness the floods of Hill Torrent. and expansion in command area
- Make maximum use of flood water for Irrigation and enhanced irrigation supplies in "Pachad" area
- Improvement in the socio economic conditions of the people of the area and Rural Area Development
- Increased crop yield and cultivable area.
- Poverty alleviation of local inhabitants
- Awareness and social change among inhabitants
- Environmental hazards
- Improved cropping pattern
- Reduction in crop failure
- Enhanced green forestation
- Positive effects for livestock and dairy development
- Improvement in health environment.

3 Salient Features of Major Hill Torrents (D.G Khan District)

Sr. No.	Name of Hill Torrent.	40 years return period discharge (Cfs)	Peak discharge flood 2010 (Cfs)	Catchment area. (Sq. Miles)	Cultivable area. (Acres)
1	KAURA	61184	128500	202	48988
2	VEHOVA	87200	110500	1,017	75993
3	SANGHAR	139715	229000	1,897	34575
4	SORI LUND	50700	51460	193	38,696
5	VIDORE	83000	97109	298	32,983
6	SAKHI SARWAR	30800	32643	61	10,353
7	MITHAWAN	78000	61905	274	38,000
Total				3,942	279,588

4 Project Location MAP



5 Hydrological Peak Discharges of Three Torrents.

The historical peak discharge in cusecs of all the three Hill torrents pertaining to different return periods by unit Hydrograph SCS method is reflected in the below given chart, along with the peak discharges observed during August 2010.

TORRENT	10 YEAR	25 YEAR	40 YEAR	50 YEAR	August, 2010	June to Sept, 2012
KAURA	37320	53906	61184	64146	1,28,500	32,500
VEHOVA	55627	83058	87200	87027	1,10,500	33,541

SANGHAR	90636	135029	139715	143291	2,29,000	1,20,000
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6 Design Criteria OF MHTP

- Water rights of Various Wahs have been adhered to.
- Each Structure has been designed for 40-years Return Period Discharge.
- Structures have been designed as un-gated weir.

7 Project AT A Glance (Financial Profile)

Administrative Approval	Rs. 1605.655 Million, Dated: 16-04-2008
Technical Sanction	Rs. 1701.363 Million, Dated: 27-09-2008
Revised PC-I	Rs. 2225.735 Million
Revised Estimate	Approved by the competent Authority
Award of Work	Package – A = 20-12-2008 Package – B = 02-01-2009 Package – C = 20-12-2008
Funds Released 2012-13 Funds Released, 2013-14	Rs.240.00 Millions Rs. 100 Millions
Total Expenditure	Rs. 1806.859 Million.
Completion Period	53 Months
Overall Physical Progress	83%
Overall Financial Progress	81%
Balance Funds Required	Rs. 418.876 Million
Consultancy Services	MM Pakistan (Pvt.) Ltd. Lahore.

8 Detail of Structures

Sr. No.	Name of Hill Torrent	Main Weir	Head Regulator	Length of banks. (Miles)
1.	Kaura (Package – A)	3	12	9.50
2.	Vehova (Package – B)	2	5	4.00
3.	Sanghar (Package – C)	2	5	8.75
Total		7	22	22.25

9 Physical Progress

Name of Package	Component	Target	Name of Package	Component
Kaura Hill Torrent	Earthwork	38.134	35.00	92 %
	Stone work	7.682	7.00	91 %
	Concrete work	2.25	1.50	67 %
Vehova Hill torrent.	Earthwork	25.099	21.00	84 %
	Stone work	7.125	5.01	70 %
	Concrete work	1.965	0.773	39 %
Sanghar Hill Torrent.	Earthwork	26.259	25.00	95 %
	Stone work	12.038	10.01	83 %
	Concrete work	1.672	1.60	96 %

Package A = 80% Completed

Package B = 65% Completed

Package C = 90% Completed

10 Water Right Statistics

I. Kaura Hill Torrent

Sr. No.	Hill Torrent	Mauza	Off Take Channels Constructed at Kaura H T. for Irrigation Command Area	Area (Acres)		
				Total	Cultivated Area Prior to MHTP	Cultivated during the Current year.
1	Kaura	Kotani	Qaladar wah, Qamar Din, Chango and Khaji Wahs, (4 channels)	3100	260	2850
		Lakhani	Thalia wah, Phatil wah, Makhan wah and Lakhani Wahs.	8254	475	4500
		Bojh	Shakh Charum	716	82	700
		Daulat Wala	Thalia Wah, Main Kaura Hill Torrent.	3837	257	2600
		Jhangra Shumali & Janubi	Shakh Chaharum	26179	750	11500
		Shadi Wala	Shakh Chaharum	3581	205	1 850
TOTAL :-				45667	2029	24000

II. Vehova Hill Torrent

Sr. No.	Hill Torrent	Mauza	Off Take Channels Constructed at Vehova H T. for Irrigation Command Area	Total	Area (Acres)	
					Cultivated Area Prior to MHTP	Cultivated during the current year.
2	Vehova	Kotani	Palia wah + Kobhi Wah Qaisrani wah	3322	300	2900
		Vehova Shumali & Janubi	Dagar wali	45377	650	7250
		Kohar	Qaisrani Wah	5852	425	4800
		Qassrani Wala	Qaisrani Wah	1195	82	800
		Jallo Wali	Qaisrani Wah	7349	455	4800
		Mithe Wali	Kobhi wah + Qaisrani Wah	9798	530	5900
TOTAL :-				72893	2442	26450

III. Sanghar Hill Torrent

Sr. No.	Hill Torrent	Mauza	Off Take Channels Constructed at Sanghar H T. for Irrigation Command Area	Total	Area (Acres)	
					Cultivated Area Prior to MHTP	Cultivated during the current year.
3	Sanghar	Jat Gadi	Jat Wah	4410	295	3100
		Bughlani	Jat Wah Bughlani Wah	5022	315	3500
		Mundrani	Bhegwari Wah	2108	110	1035
		Sokar	Bhegwari Wah	3163	90	970
		Binda	Bhegwari Wah	570	28	315
		Pukhan	Jam Wah	7658	525	5400
		Koko Wah	Jam Wah	2489	170	1800
		Mangrotha	Buddhu Wah	8198	390	3800
TOTAL :-				33618	1923	19920

11 Interviews and Impressions of the Zamindars of command area.

Although the physical progress of all the three packages is about 83%, but the socio economic impact of partially constructed portions has started showing tremendously. According to opinions expressed by the command area people / Zamindars, cultivable area has increased, yield per acre has been increased manifold, the flood damages are almost negligible, crop failures are far less and the greener pastures have started in the area, which will increase our cattle breeding and social uplift of the people of the area. As soon as the completion of these three packages is achieved at 100 %, the set objectives, estimates of cultivable area, poverty reduction, and economic benefits will far exceed their original estimates.

The chief Engineer interviewed some of the Zamindars at Shakh Charum Kaura Hill torrent during his visit on 18-12-2012.

Mr. Muhammad Ashfaq khan, Zamindar, Mr Aasif Khan zamindar and other notables of the area highly appreciated the construction of the dispersion structures at Kaura and Vehoa hill Torrents. They told that MHT project is a blessing for the people of this area as they were deprived of even drinking water, but now large part of the command has been converted to lush green fields of wheat and gram, while the sub soil hard water in the Hill Torrents Area is changing to sweet water.

However, people of the area demanded completion of the Projects before the next flood season; otherwise according to them present lush green fields will again converted to large barren area.

If these developmental schemes are spread over to all the hill torrents of the Suleman Range, these will give birth to a Green Revolution in the large area of about 1.3, Million Acres of land in the Barani area of Pachad in both the districts of D. G. khan and Rajanpur.

To asses the impact and benefits of the MHT project 20 prominent Zamindars of command area were interviewed. The collected data was analyzed. According to the evaluation of the collected data, 100% of the Zamindars were of the view that MHTP is the blessing of the Great God for this area. The collected data depicts that 60 % of the command area has been cultivated with hill torrent floods, while prior to this they could cultivate only 5- 10% of the land.

As far as yield per Acre is concerned the data shows that yield per acre prior to the construction of the Project was only 10-12 Monds, while now they are expecting 25-28 Monds of yield per Acre.

The Zamindars during the interviews informed that they had to work very hard to construct temporary Bunds for diversion of flood water, but most often the flood freshets smash away the Bunds and their lands remained barren like ever.

After the partial construction of the Project the collected data reflects that the value of the land in the command Area has been raised 10 times from the previous rates.

Copy of the Interviewing schedule is annexed at A.

Sr. No.	Description	Statistics Prior to Construction of MHTP	Statistics After Construction of MHTP
1.	Intensity of Irrigation	05 %	60 %
2.	Yield Per Acre	10-12 Munds	25-28 Munds
3.	Value of Land/Acre	Rs. 10,000/- to 20,000/- P. Acre.	Up to Rs 200,000/- P. Acre.

12 Impact Analysis chart

13 Discharge Statistics for off taking channels

I. Kaura Hill Torrent (Maximum Design Discharge 61184 Cs)

Sr. No.	Hill Torrent.	Mauza	Off Take Channels Constructed at Kaura H T. for Irrigation	Discharges (Cusecs)		
				Maximum Designed	Prior to the MHTP	During floods 2012 After Construction of MHTP
1	Kaura Maximum Discharge during 2013 =67160 Cs 02-08-2013	Kotani	Khaji Wah	1500	200	1250
			Qaladar wah	1500	190	1458
			Qamar Din Wah	1500	150	1458
			Chango Wah	1500	165	1458
			Kuppi 1	5450	600	Under Construction
			Kuppi 2	5450	625	
		Lakhani	Thalya Wah	1500	250	2025
			Phatel Wah	1500	40	410
			Makhan Wah	770	100	648
			Lakhani Wah	15000	285	2430
		Bojh	Chaharum Wah	5840	600	4073
Bojh Wah	17525		780	9503		
Net Discharge Crossing CRBC :-				4500 Cs		

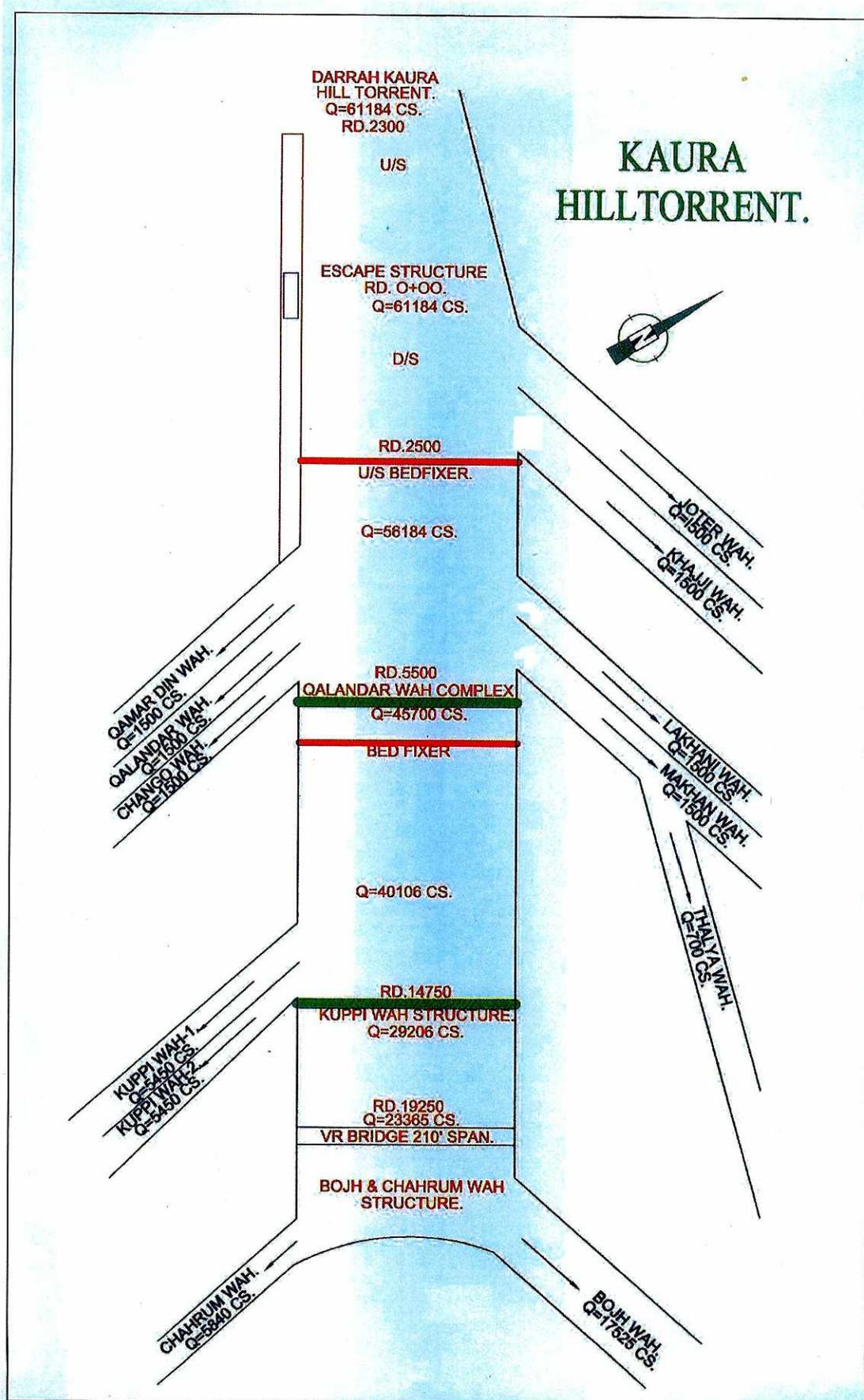
II. Vehova Hill Torrent (Maximum Design Discharge 87200 Cs)

Sr. No.	Hill Torrent.	Mauza	Off Take Channels Constructed at Vehova H T. for Irrigation	Discharges (Cusecs)		
				Maximum Designed	Prior to the MHTP	During floods 2012 After Construction of MHTP
1	Vehvoa Maximum Discharge during 2013 =55560 Cs 02-08-2013	Kotani	Palya Wah	1000	100	878
			Kobhi Wah	3500	350	2629
			Qaisrani Wah	10000	400	3651
		Kohar, Jallu Wali & Mithy Wali	Jallu Wah	4500	380	Under Construction
			Allah Nawaz Wah	2855	350	
Net Discharge Crossing CRBC :-				29000 Cs		

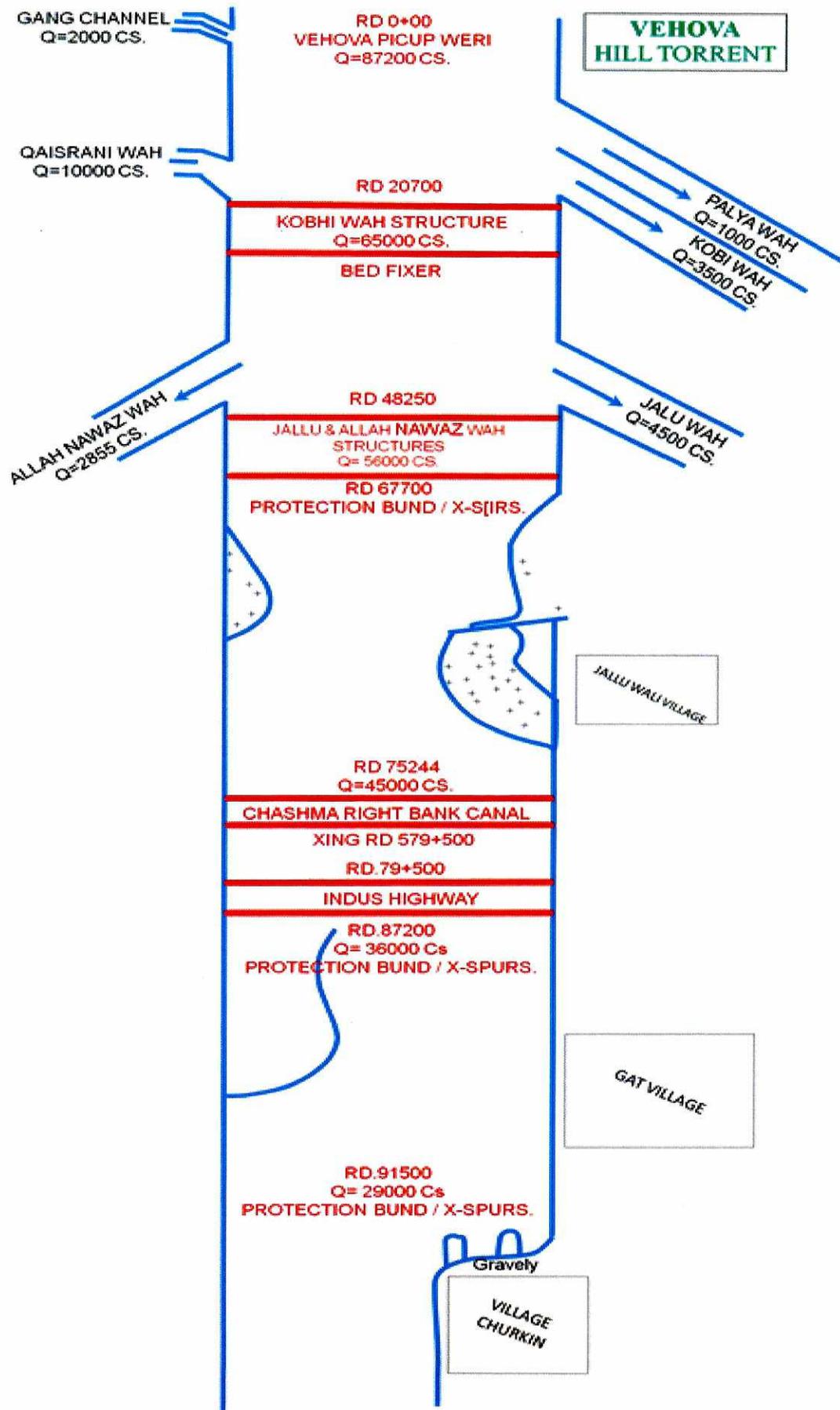
III. Sanghar Hill Torrent (Maximum Design Discharge 139715 Cs)

Sr. No.	Hill Torrent.	Mauza	Off Take Channels Constructed at Sanghar H T. for Irrigation	Discharges (Cusecs)		
				Maximum Designed	Prior to the MHTP	During floods 2012 After Construction of MHTP
1	Sanghar Maximum Discharge during 2013 =60901 Cs 01-08-2013	Jat Gadi & Bughlani	Jat Wah	15000	250	3500
		Pukhan & Koko	Jam Wah	15000	250	3400
		Bughlani	Bughlani Wah	10500	750	9750
		Mundrani, Sokar & Binda	Bhegwari Wah	10500	750	9850
		Mangrotha	Budhu Wah	21000	950	19440
Net Discharge Crossing CRBC				57700 Cs		

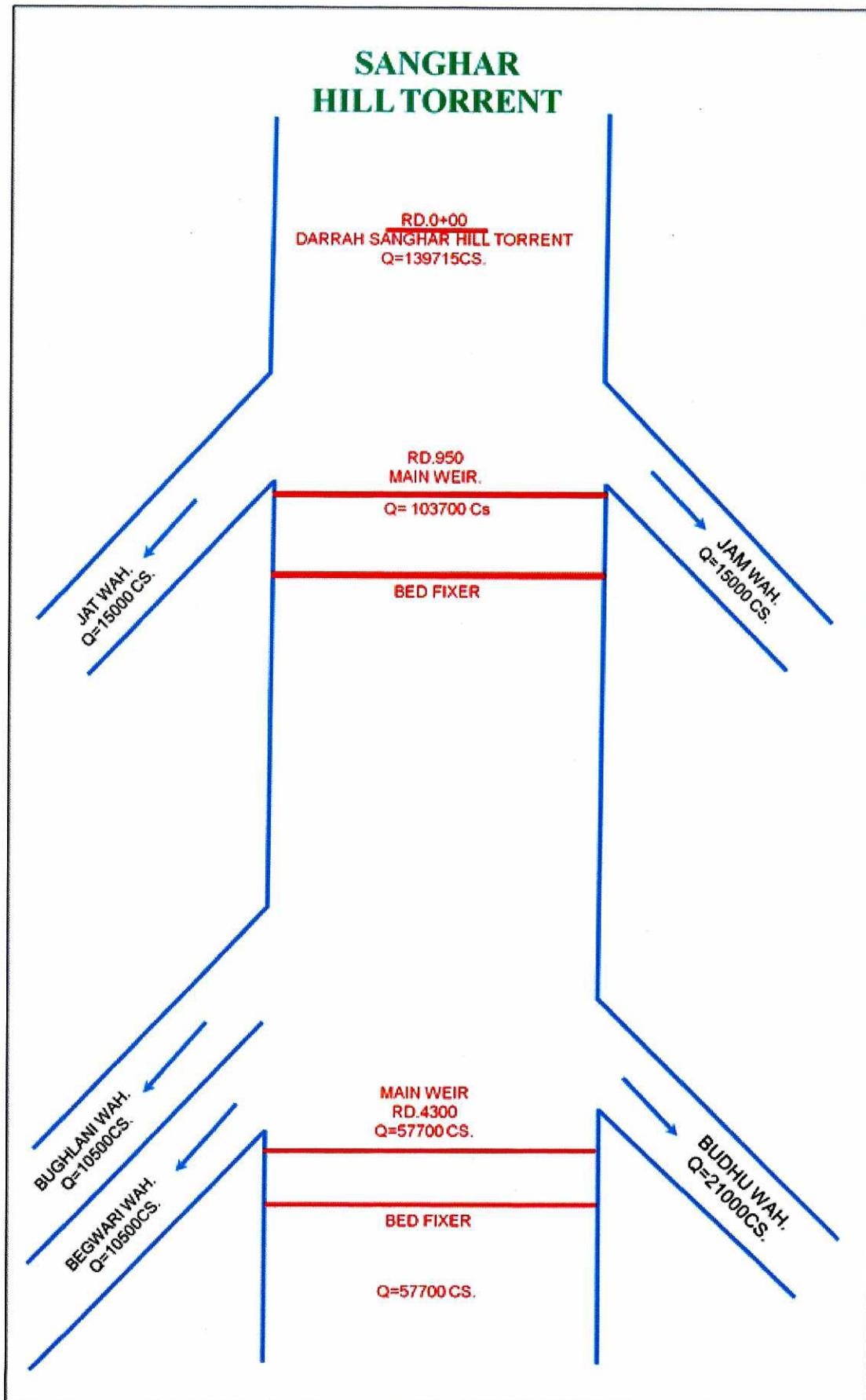
14 Line Diagram Indicating the Constructed Structures



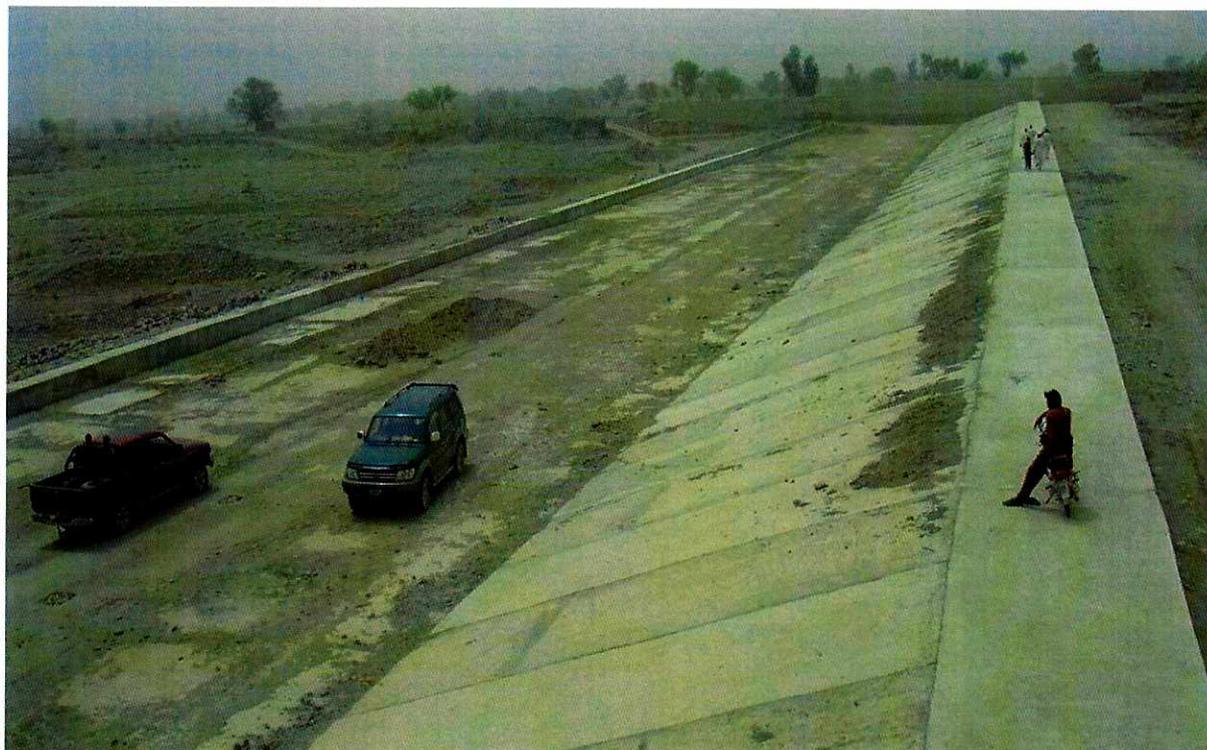
15 Line Diagram indicating the constructed structures



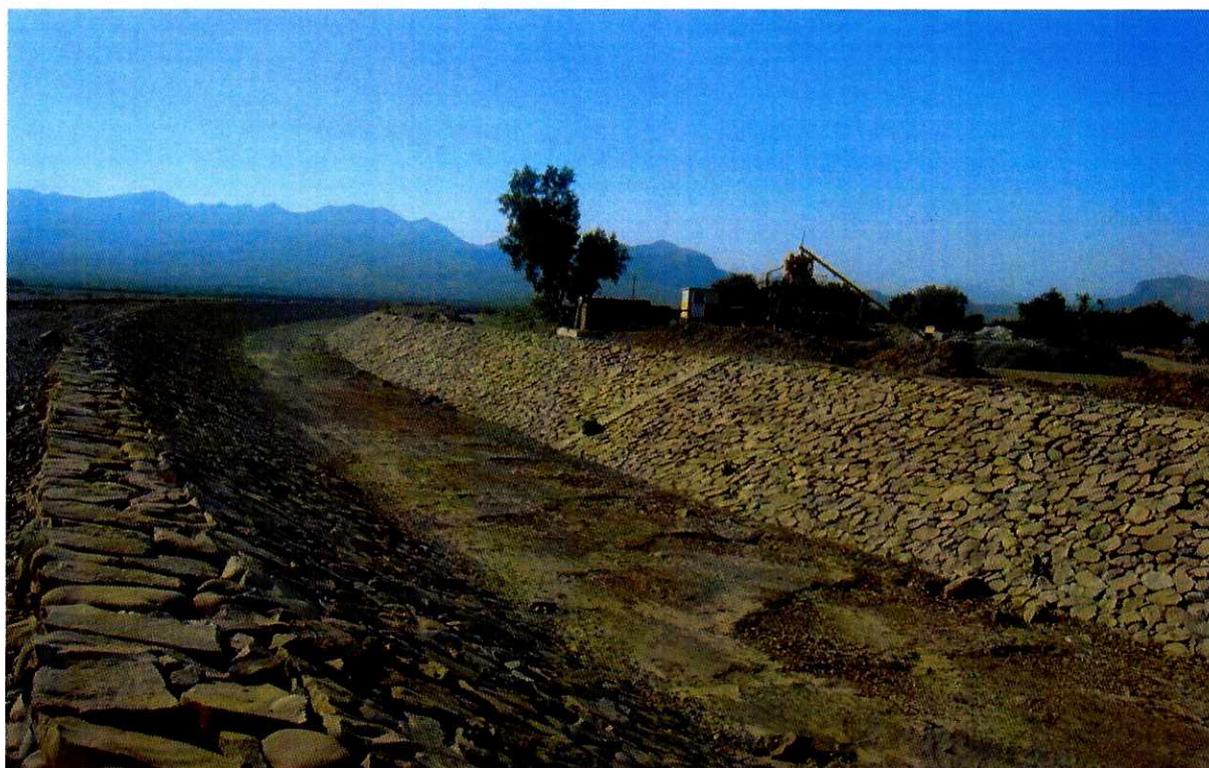
16 Line Diagram Indicating the Constructed Structures



17 Pictorial Profile Kaura Hill Torrent



A view of Completed Main Weir Qalandar Wah Complex, Kaura Hill Torrent (Package A)



Khaji Wah off Take Channel at Kaura Hill Torrent, Irrigation Source for Mauza Lakhani



Local Zamindars requesting Chief Engineer for completion of incomplete MHTP works.



Green Field Of Wheat in the Command Area of Lakhani Wah, Kaura Hill Torrent



Barren area of Mauza Daulat Wala Converted to green fields by Irrigation of Makhan & Paliya Wah



Wheat fields are ready for harvesting at MHTP command area

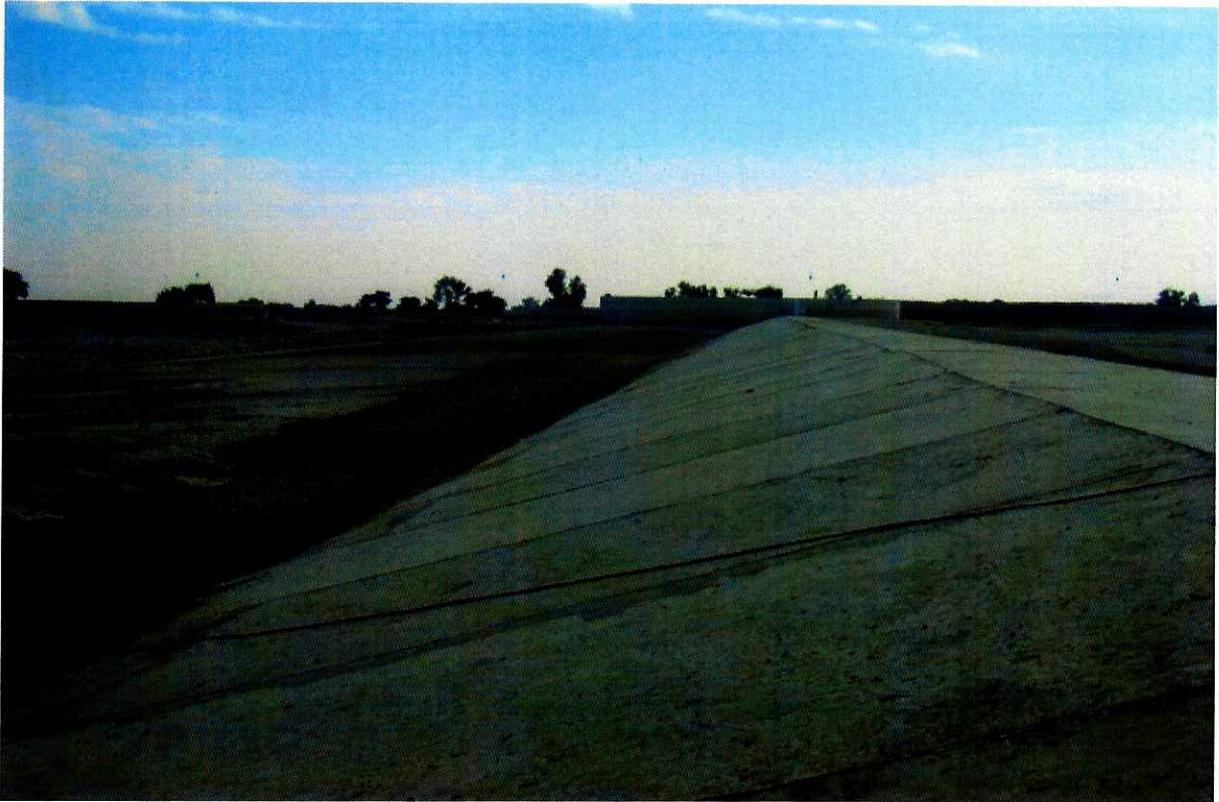


Barren Land Converted into Green Fields, Mauza Lakhani.



Wheat Field is the outcome of MHTP

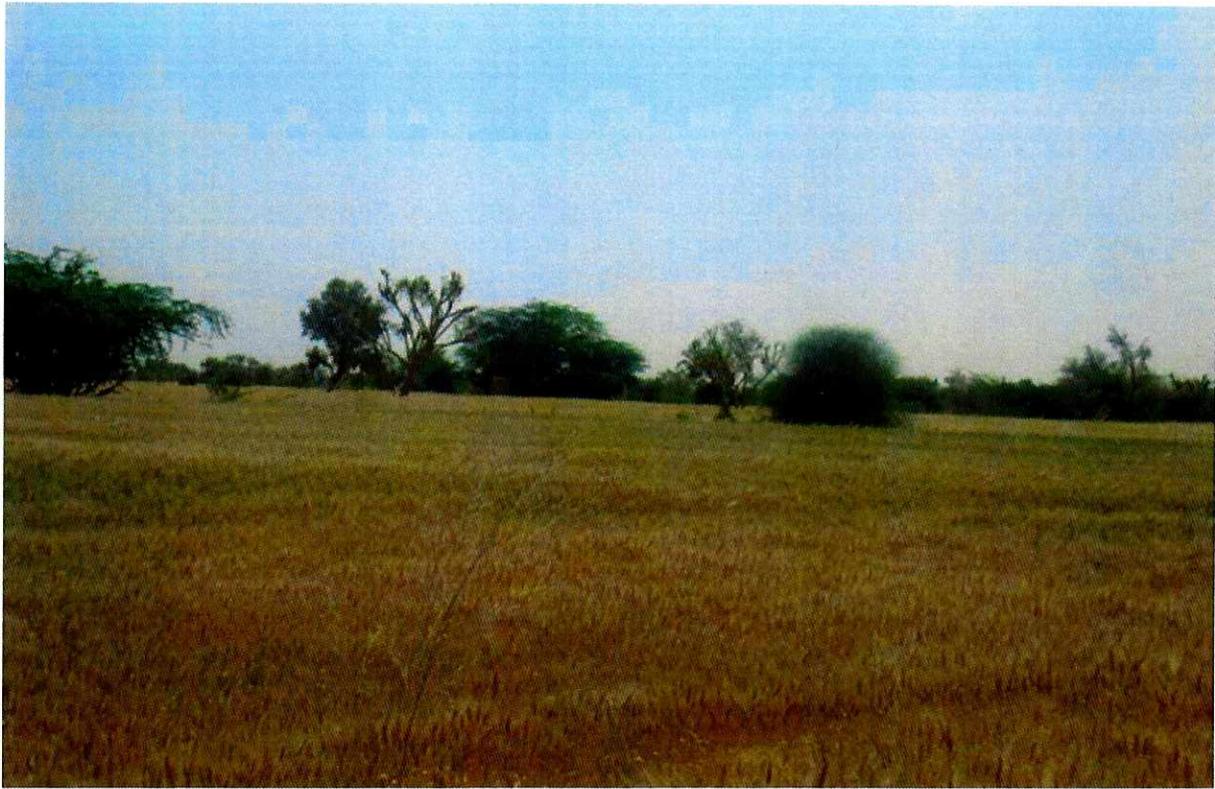
18 Pictorial Profile Vehova Hill Torrent



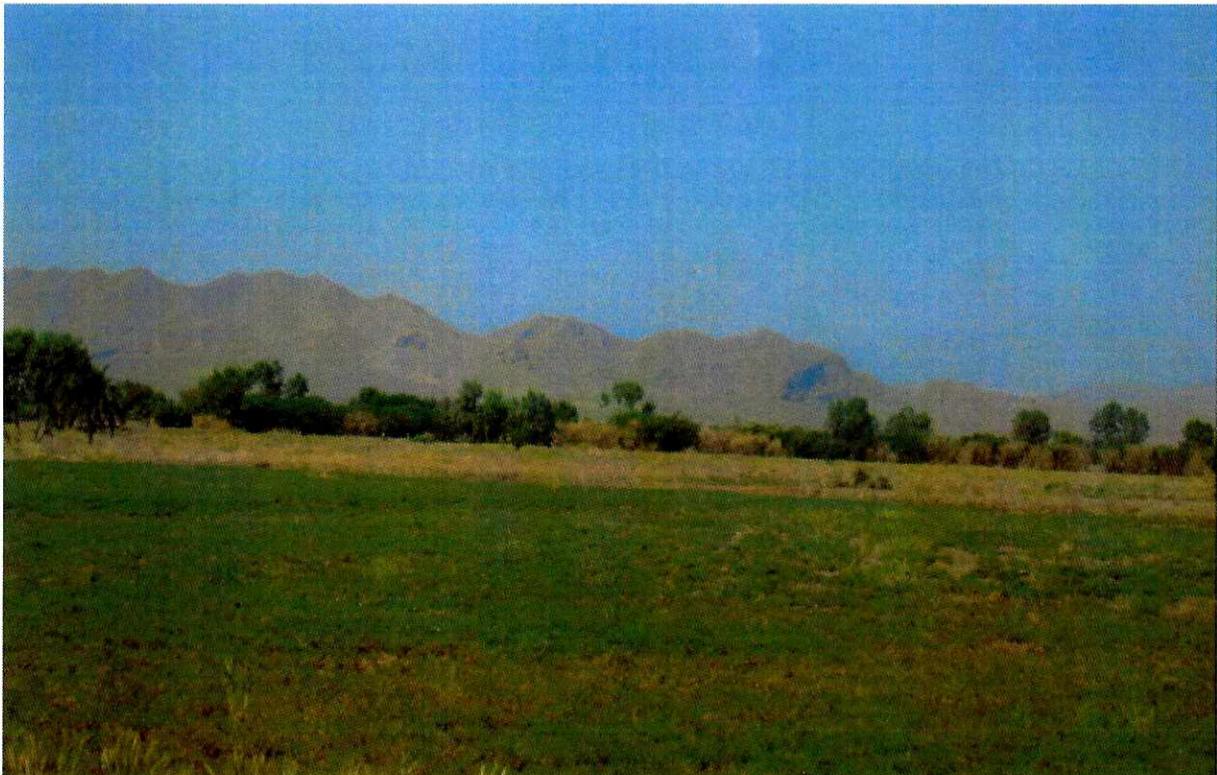
Kobhi Wah Complex Constructed at Vehova Hill Torrent



Barren Land of Mouza Kotani Converted to Green Fields

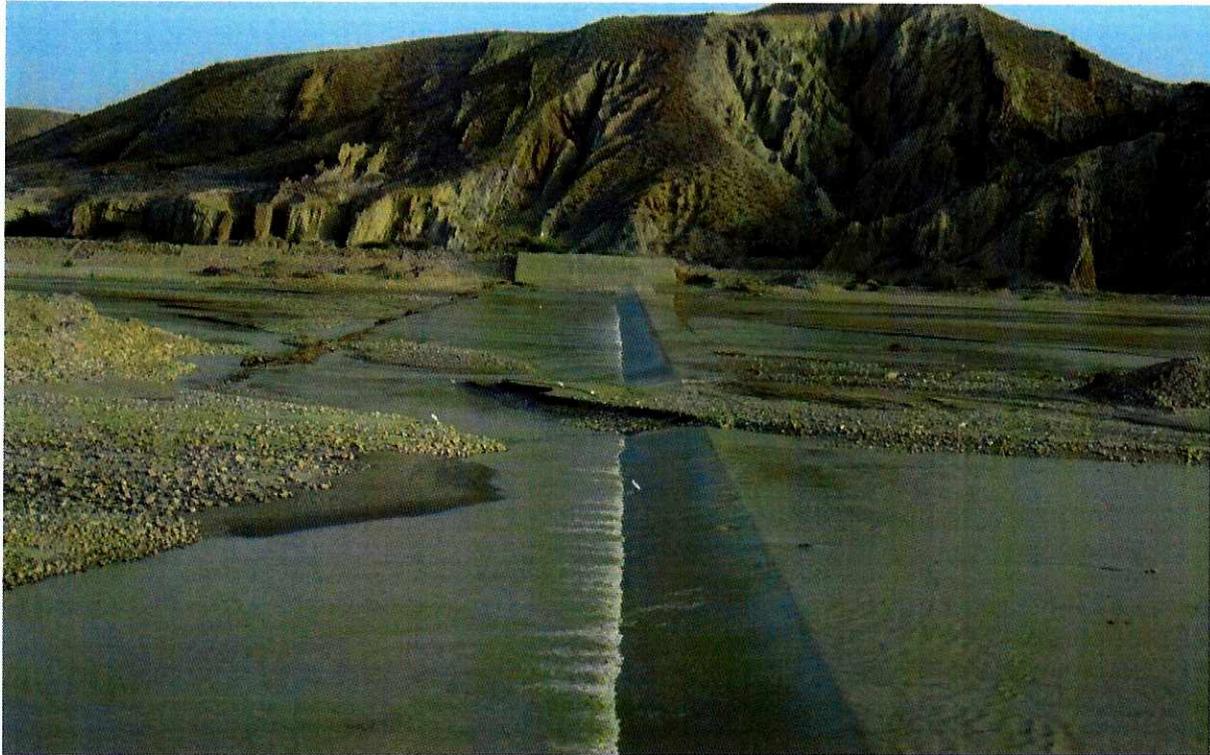


Wheat fields are ready for harvesting at MHTP command area

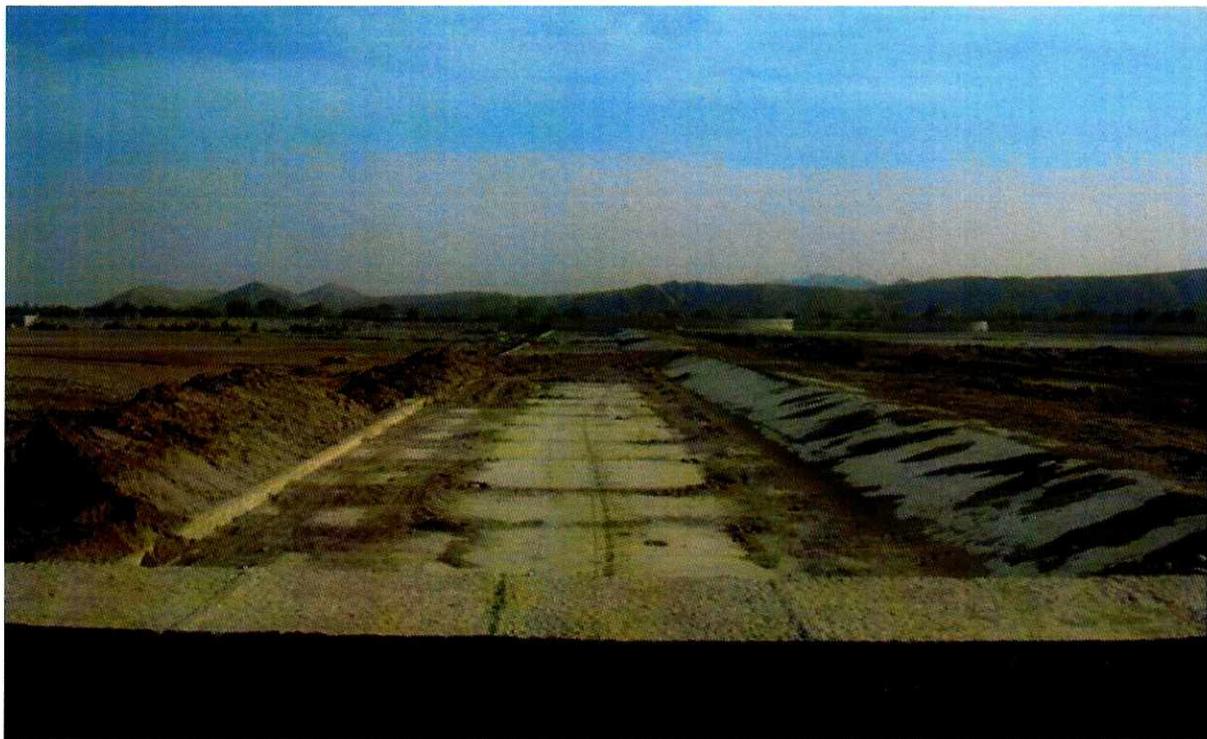


Wheat & Gram Fields are the blessing of Allah. Barren Area Irrigated through Kobhi Wah off Take Channel

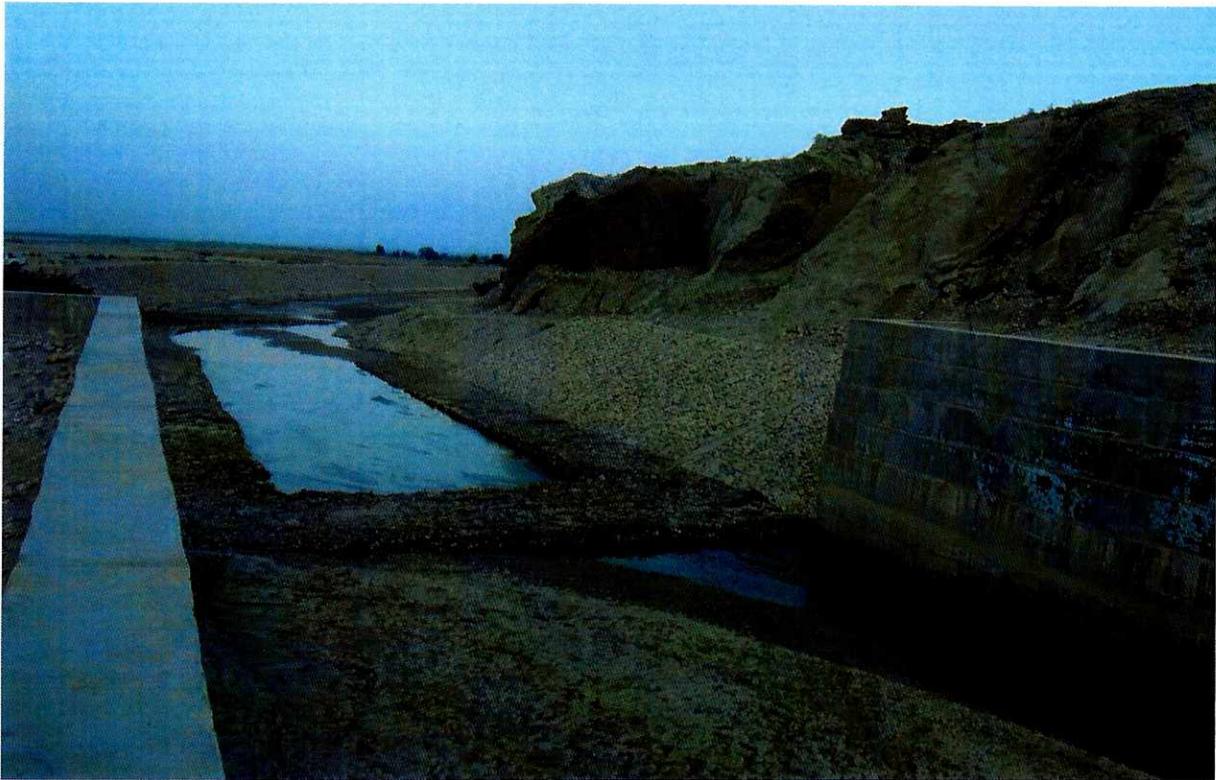
19 Pictorial Profile Sanghar Hill Torrent



Jam- jat Wah Complex (Dispersion Structure) Constructed At Sanghar Hill Torrent



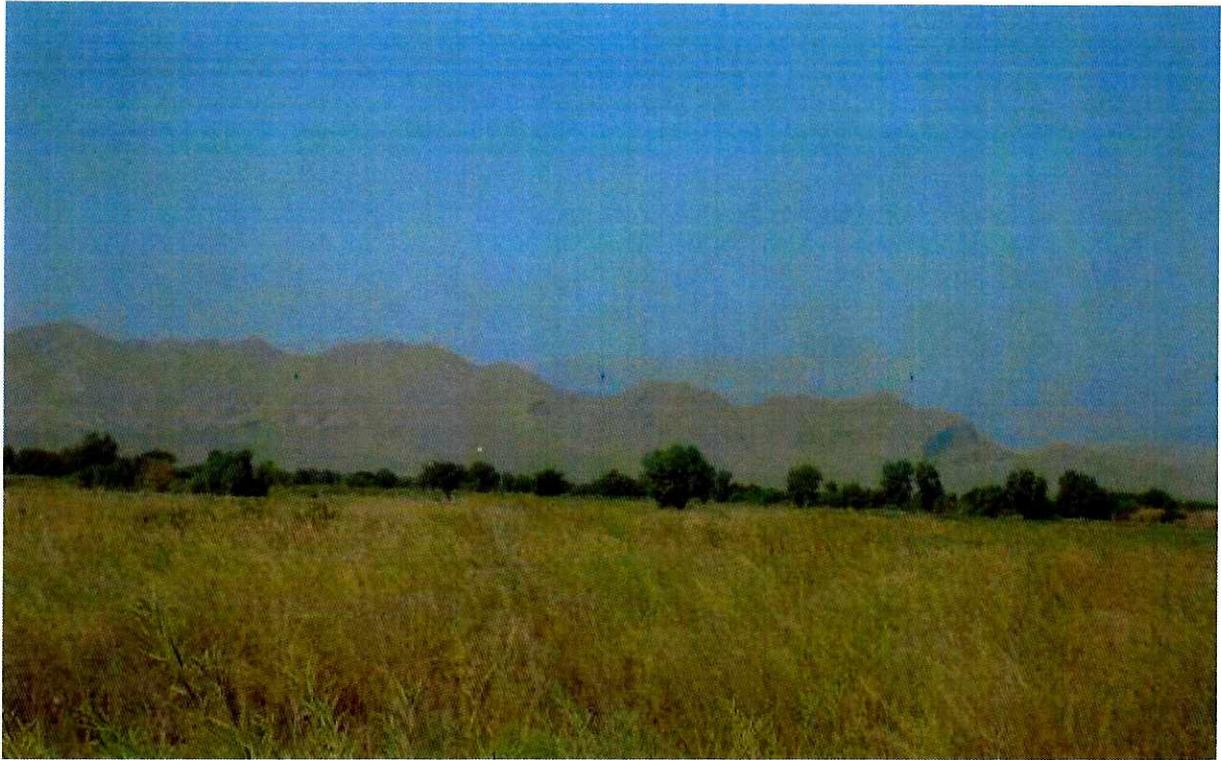
A View of completed Main Weir Budhu Wah complex at Sanghar Hill Torrent



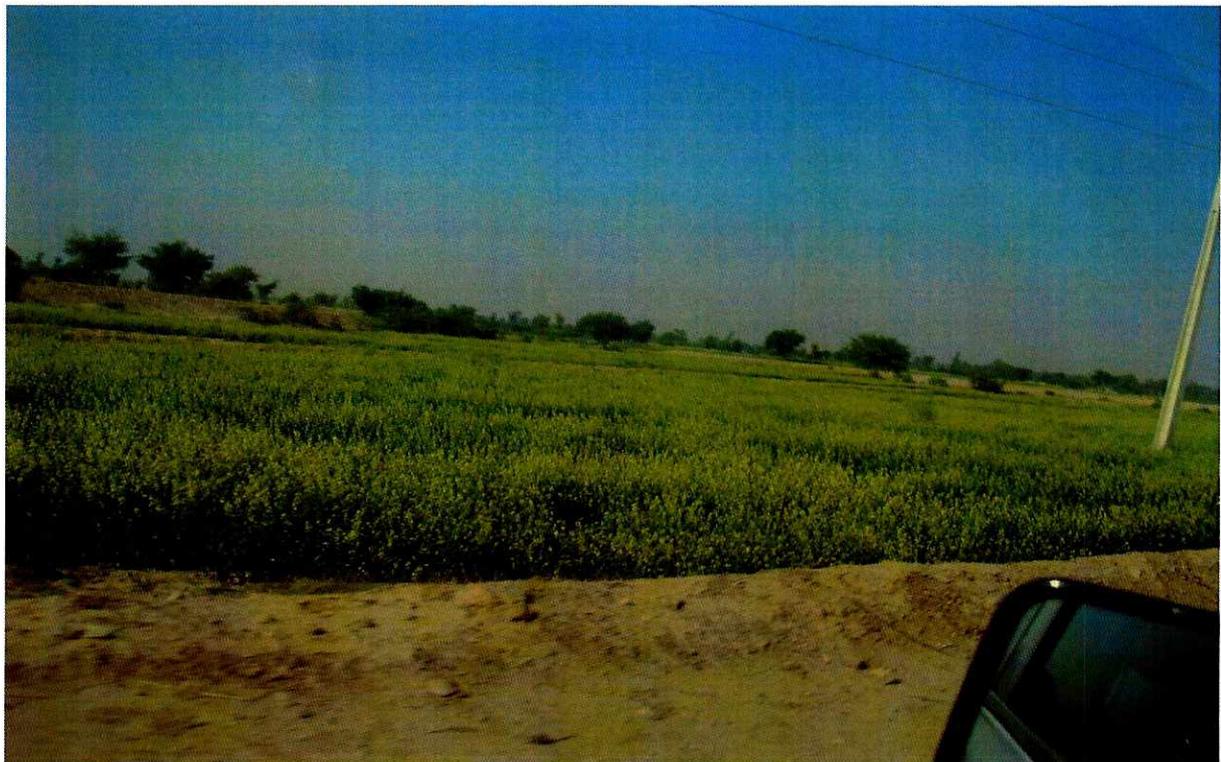
A view of completed Jat Wah off take channel at Sanghar Hill Torrent



Green Fields Irrigated through Jat wah off take channel, Sanghar Hill Torrent



Griculture land at foot of Hills is the outcome of MHTP



Lush Green Fields are the outcome of Bughlani Wah at Sanghar Hill Torrent



Worthy Secretary Irrigation Capt, Zahid Saeed & Chief Engineer Ch. M Shafiq, listening to the grievances/ demands of local Zamindars at Shakh Chahrum Kaura Hill Torrent.



Mr. Tariq Mehmood Commissioner D.G Khan Division being briefed about MHTP by A S Sheikh, Mr. Majeed Bhatti S.E. is also present at site.