



# **Water Use Management Plan (WUMP)**

## **Tehsil Takht-e-Nasrati, District Karak - 2015**



# Water Use Management Plan (WUMP) Tehsil Takht-e-Nasrati, District Karak - 2015



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## Acronyms

ADWO	AL-Khidmat Development Welfare Organisation
ARS	Agriculture Research Station
BHUs	Basic Health Units
CBO	Community Based Organisation
CBT	Capacity Building and Training
CD	Community Development
CMDO	Community Motivation and Development Organisation
CO	Community Organisation
CSPM	Conflict Sensitive Programme Management
DAG	Disadvantaged Group
DC	Deputy Commissioner
DCC	District Coordination Committee
DDAC	District Development Advisory Committee
DDC	District Development Committee
DoI	Department of Irrigation
DRM	Disaster Risk Management
DRR	Disaster Risk Reduction
DWS	Drinking Water Supply
DWSS	Drinking Water Supply Schemes
FATA	Federally Administered Tribal Areas
FFSP	Farm Forestry Support Project
FO	Farmers Organisations
FPW	Flood Protection Works
GDC	Government Degree College
GGDC	Government Girls Degree College
GGHS	Government Girls High School
GGMS	Government Girls Middle School
GGPS	Government Girls Primary School
GHS	Government High School
GHSS	Girls Higher Secondary School
GIS	Geographical Information Systems
GLAs	Government Line Agencies
GLDs	Government Line Departments
GMS	Government Middle School
GoKPK	Government of Khyber Pakhtunkhwa
GoP	Government of Pakistan
GoE	Group of Elders
GPS	Government Primary School
GPS	Global Positioning System
GWR	Ground Water Resources
HHs	Households
HRBA	Human Rights Based Approach
HSS	Higher Secondary School
IC	Intercooperation Pakistan
INGO	International Non-Governmental Organisation

IWRM	Integrated Water Resource Management
KK	Khwendo Kor
KPK	Khyber Pakhtunkhwa
LFA	Logical Framework Analysis
LG	Local Government
LPH	Livelihoods Programme Hindukush
M&E	Monitoring & Evaluation
MH	Micro Hydrel
NCHD	National Commission for Human Development
NCS	National Conservation Strategy
NEQS	National Environmental Quality Standards
NGO	Non-Governmental Organisation
O&M	Operation & Maintenance
OFWM	On-Farm Water Management
P&DD	Planning & Development Department
PC	Private College
PCRWR	Pakistan Council of Research in Water Resources
PEPO	Pakistan Environmental Protection Ordinance
PHED	Public Health Engineering Department
PIDA	Provincial Irrigation and Drainage Authorities
PMD	Pakistan Meteorological Department
PRA	Participatory Rural Appraisal
PS	Primary Schools
PSC	Project Steering Committee
PSU	Project Support Unit
PWSP	Provincial Water Sector Policy
R&D	Research & Development
SCARP	Salinity Control and Reclamation Project
SDC	Swiss Agency for Development and Cooperation
SHs	Stakeholders
SO	Support Organisation
SPF	Service Provider for Social Facilitation
SPO	Strengthening Participatory Organisation
SPT	Service Provider for Technical Facilitation
SRSP	Sarhad Rural Support Programme
TC	Tehsil Council
THQ	Tehsil Headquarter
ToR	Terms of Reference
UC / UCs	Union Council / Union Councils
VC / VCs	Village Council / Village Councils
VDC	Village Development Committee
VDP	Village Development Plan
VO	Village Organisation
W4L	Water for Livelihoods
WAPDA and TNO	Water and Power Development Authority and Institute of Applied Geoscience, the Netherlands
WHO	World Health Organization
WRM	Water Resource Management
WUA	Water User Association
WUG	Water User Group
WUMP	Water Use Management Plan

## Foreword

The preparation of participatory Water Use Management Plan (WUMP) at a local level around a single agenda, water, is an important instrument of good governance. This, the first ever plan prepared by the Water for Livelihoods project, is a well thought-out document prepared as a result of intense discussions on existing water resources, issues, potentials and priorities. To top this off, it was all in consultation with all stakeholders including communities.

This plan provides a vision for addressing the water issues to ensure equitable access to water for drinking and production purposes. The WUMP is based on firsthand information collected from communities. The main theme in WUMP remains to be the community managed initiatives, improving liaison with respective Government Line Agencies, cost sharing, sharing of responsibilities especially of operation & maintenance with Water User Groups and enhancing the role of Water User Associations in dealing with water sector issues in tehsil/ valley and thenceforth bridging with GLAs.

The Swiss Agency for Development and Cooperation (SDC) is much appreciated for financing an initiative such as Water for Livelihoods project implemented by Intercooperation. It has lead on a path of assisting the district government in preparing this plan that will ultimately help in improving the delivery of clean drinking water and water for production through optimum use of technology and the participation of the locals. A high expectation is also placed on all the officers of the relevant government departments and other development actors to consider this plan while planning their financial targets and providing direly needed assistance in the district.

# Executive Summary

The Water Use Management Plan (WUMP) is for Tehsil Takht-e-Nasrati of District Karak. The overall purpose of WUMP is to make an inventory of various sources of water available in a particular geographical / administrative area, identify community's priority in order to achieve an effective, equitable and efficient use of water resources at local level. The preparation of this WUMP document has been technically and financially supported by Water for Livelihoods Project of Intercooperation Pakistan with financial assistance from Swiss Agency for Development and Cooperation (SDC) and prepared in collaboration with local institutions (Water User Associations / Water User Groups), district authority (administration), concerned technical departments of the Government of Pakistan, water sector projects and partner NGOs.

This WUMP is established on the Integrated Water Resources Management (IWRM) approach. IWRM is a process which promotes the coordinated development and management of water, land and related resources. IWRM is carried out in order to maximize the resultant economic and social welfare in an equitable manner without compromising the sustainability of vital ecosystems (Global Water Partnership, 2000). The geographical scope of WUMP is Tehsil Takht-e-Nasrati – which comprises 7 Union Councils (or 21 Village Councils or 85 Villages) in case of District Karak.

## The specific objectives of WUMP are

- Assess and determine water resource availability, existing uses and requirements.
- Determine water access and equity issues; and balance these rights through interactive dialogues.
- Participatory prioritization and planning of water resource development and multiple uses, considering climate change and disaster risks.
- Promote coordinated water resource development by different stakeholders (communities, government and non-government organisations).
- Promote conservation of water resources in preservation of environment.
- Strengthen local institutional capacity in participation of economically and socially disadvantaged groups and promote an interactive dialogue for changes in frame condition and water sector policy improvements in KPK.

The WUMP for Tehsil Takht-e-Nasrati is fully aligned with Integrated Development Vision (IDS) laid out by the Government of Khyber Pakhtunkhwa to integrate priorities in one framework. The Local Government Act 2013 also provides a regulatory framework for delegating responsibility at local level which is aligned for WUMP implementation.

The WUMP preparation process followed 4 phases and 17-sub steps in close coordination with concerned village communities (WUG / WUA), concerned Government Line Agencies (GLAs) and District authorities to ensure commitment and ownership of WUMP.

The main highlights of Takht-e-Nasrati WUMP are as following:

## Tehsil Takht-e-Nasrati

Tehsil Takht-e-Nasrati is divided into 85 revenue villages and 21 Village Councils (or 7 Unions Councils), recently delineated under the Khyber Pakhtunkhwa Local Government Act 2013. Administratively, Takht-e-Nasrati is the headquarter where important services such as legal courts, academic institutions, health care facilities etc. are located. The Tehsil Takht-e-Nasrati comprises of 41957 households, with total population 362050 people (42.03 % men, 42.95 % women, 13.43 % children & 1.59 % above 80).

## Water Issues

The major water related issues are as under:

- Water scarcity and inefficient water use.
- Inadequate storage capacity. Water storage efficiency is 9% (in Pakistan) as compared to 40% of the world average
- Extensive seepage losses due to poor operation & maintenance of irrigation system
- Excessive groundwater pumping
- Inadequate measures for rainfall harvesting
- Un-safe disposal of drainage effluent
- Lack of private sector participation
- Poor coordination among water, agriculture & rural development related research institutions

## Planning For WUMP

The analysed data and results are utilised for WUMP preparation process. Keeping in view the analysis / results as well as to achieve the project objective, some schemes have been identified and prioritised at village / VC levels. The details regarding these schemes are available in Chapter 5.11 and some particulars are summarized hereafter in Table ES-7.

In addition to the above stated projects, the government needs to pay attention to the required fund for the water resources assessment and investigation schemes in table below.

### Summary of Proposed Schemes , WUMP Tehsil Takht-e-Nasrati

Sr. No.	Scheme		No. of Schemes	Estimated Cost RS. (Million)
	Category	Sub-Category		
1.	Drinking Water Supply Schemes	Filtration Plants	3	25.5
		Ground / Overhead Water Tanks	12	21.5
		Pipeline for water distribution	54	61.95
		Pipeline for water distribution & Water Tank	11	19.1
		Machinery Repair	3	4.6
		Solar System for tube well operation	14	21.5
		Misc. (Mini Dam for DWSS, Tube well rehabilitation etc.)	10	11
		Water Tank	12	9.1
2.	Irrigation	Mini Dam , Channel , Pipeline, Storage Tank	26	55.69
3.	Sanitation	Street Pavement , Drainage Repair, Sewerage , Pit Latrines	15	9.5
4.	Disaster Risk Management	Spur , Protection Wall	51	73.66
<b>Total</b>			<b>211</b>	<b>313.1</b>

Data Source: Table (5.1-A)

### List of Proposed Water Resources Assessment / Investigation

Sr. No.	Name of Scheme	Remarks
1	Groundwater & Surface resources assessment in Tehsil Takht-e-Nasrati, District Karak	The estimated cost can only be determined after collecting primary / secondary data and the required analysis
2	Feasibility study for sub-surface dam & artificial groundwater recharging in Tehsil Takht-e-Nasrati , District Karak	
3	Assessment / study for heavy metals in water resources	
4	Assessment / study for Uranium concentration in water resources	
5	Environmental Pollution and Control	
6	Sewerage waste treatment and disposal	
7	Solid waste recycle and disposal	
8	Development and conservation of resources in poorly grazed, fuel wood and scrub potential lands	

Data Source: Table(5.1-B)

## Conclusion & Recommendations

The analysis shows that the most of residents are hardly maintaining their livelihoods (Table 2.11). The water is neither used efficiently nor is equitably accessible to all stakeholders as it should be e.g. 14.7% of HH buy water for domestic use and spend annually Rs. 82.119 (Million). An average distance of fetching point is 2 km. A detailed assessment for water resources evaluation is required, in order to meet the current and future water requirements.

The 211 schemes of different disciplines have been identified and prioritised as category: A = 42.2 %, B = 34.6%, C = 17.1% and D = 6.2 5 (Table ES-7).

It is necessary to take the essential measures as listed hereafter, before proceeding towards the implementation phase of WUMP schemes.

- Evaluate the detailed feasibility of each scheme
- Check for viability and economic design
- Determine groundwater potential, map groundwater quality, calculate recharge and discharge components & groundwater budget / balance
- Alternate water sources (subsurface / sand dams, artificially recharge groundwater, rainfall harvesting etc.) identification followed by feasibility study

The WUMP identified initiatives and studies would lead to a long term solution to the gravity in water related issues in Takht-e-Nasrati. Therefore, execution of schemes and other assessment activities need to be carried out side-by-side. The long term solutions can only be achieved after adopting assessment / research & development in the following sectors:

1. Water (Surface & Groundwater) Resources Assessment such as its quantity and quality study (especially for pollution / contamination aspect)
2. Water (Surface & Groundwater) Resources Management
3. Water Resources Conservation (e.g. subsurface dam , artificially recharge the groundwater)
4. Water Resource Monitoring & Evaluations (continuously or periodically as per technical requirement)
5. Agriculture Research & Development (i.e. for suitable crop type in Climate Change Scenario (CCS) ; saline water utilisation for crops and fruit gardening)
6. Environmental Monitoring & Control

Presently, all the water resources scenario are dealt by organisations such as PHED, Irrigation, Agriculture, Engineering Departments & private users and all of them are exploring the groundwater. There is no standard setup at any level, especially for groundwater investigation, evaluation, assessment and monitoring. That is one of the main causes for current water issues. There is a lack of integration amongst the government line agencies / departments, there exists no setup for integrated research and investigation-based resource development.

The organisational setup needs to be established at district level and should comprise of a professional team (Hydro geologist, Geophysicist, Hydrologist, GIS Professional and other allied staff). Consultants would provide necessary on-project training to newly appointed team. The capacity building objective can also be achieved for water resources assessment, management and development.

## The Key Partners

The following key partners were engaged in Water Use Management Plan's preparation in Tehsil Takht-e-Nasrati of district Karak:

1. District Administration (Assistant Commissioner of concerned Tehsil) as a focal person
2. Public Health Engineering Department Karak
3. Irrigation Department Karak Division
4. On-Farm Water Management Department Karak
5. Soil Conservation Department Karak
6. Agriculture Department
7. Forest Division, Karak
8. Livestock Department
9. Social Welfare Department
10. Sarhad Rural Support Programme in Karak
11. Water User Association / Water User Groups Tehsil Takht-e-Nasrati
12. Water for Livelihoods Project

**Salient Features Based on Social & Technical Assessment Data,  
Tehsil Takht-e-Nasrati, District Karak**

Sr. No.	Parameters	Description
1.	No. of Unions (UC)	7
2.	No. of Village Councils (VC)	21
3.	No. of Villages	85
4.	Total HHs	41957
5.	Total Population	362050
a.	Male	152182
b.	Female	155509
c.	Children	48618
d.	Population (Above 80 years)	5741
6.	Total land (Acre)	1313080
7.	Cultivated land (Acre)	154460
8.	Irrigated land (Acre)	7119
9.	Barren / Forest land (Acre)	11405
10.	Major Crops	Wheat, Gram, Ground Nut, Maize , Peanut & Barley
13.	Major Crop Diseases	Smut ; Bazeer ; Kana ; Leaf Loss ; Rust; Fusarium Wilt
14.	Major Forest Trees	Keekar , Sheshum , Ber , Sanata , Jow , Shawa , Palosa
15.	Distance of Villages from nearest market (km)	0.1 km (Minimum) , 7 km (Maximum) , 1.9 km (Average)
16.	Educational Facilities	GPS:89 ; GGPS:95 ; GMS:25 ; GGMS:11 ; GHS: 24 ; GGHS : 17 ; Madrassah : Boys – 37 & Girls – 36 ; PS: 8 ; HSS:1 ; GHHS : 2 ; GDC: 2 ; GGDC: 2 & PC:1
17.	Detail of Health Facilities	Dispensaries: 7; BHU: 10 ; Clinics: 14 ; THQ : 2 & Hospitals : 2 ;
18.	Village Vote Casting ratio	44.8 %
19.	Water sources in villages (DWSS)	Total 2053 = Tube well: 181 ; Pressure Pump: 1801 ; Dug Well: 43 ; Hand Pump: 7 ; Water Pond: 15 ; Infiltration Galleries: 6 ; Small Dam: 1
20.	Water sources in villages (Irrigation)	Total 31 = Tube well: 19 ; Dug Wells: 8 ; Water Pond: 2 ; Infiltration Galleries: 1 ; Small Dam: 1
21.	Detail of Status / condition of sources	Functional : 1531 ; Non-Functional : 638 (Table 3.5)
22.	Total Direct Beneficiaries (HHs)	39647
23.	Direct Access to DW(HHs)	19934 (50.3 %)
24.	No. Direct Access to DW(HHs)	19713 (49.7 %)
25..	No. of HHs alternate ways of DW e.g. fetching	13884 (35.0 %)
26	No. of HHs alternate ways of DW e.g. Buying	5828 (14.7 %)
27.	Average Distance of Fetching Point (km)	0.2 km (Minimum) , 2 km (Maximum) , 0.6 km (Average)
28.	Sale Price(Rs) of water per Water tank / HH / Month	RS. 1174
29.	Average cost of HHs / Year selling DW (Rs.)	RS. 82.119 Million
30.	Total Direct Beneficiaries Livestock	111606
31.	Total Water Disputes in village	101

32.	Level of Dispute	Minor (67.3%) ; Average: 23.8%) ; Severe (8.9%)
33.	Causes of Dispute	Distribution , Sources (mostly with PHED) Access (Mostly with Community)
34.	Resolved Disputes	86
35.	Body of Mediators	GoE, WUG, VO
36.	Ratio (%) of knowledge about water rights, govt. laws and advocacy	27 %
37.	DW safe / Protection ratio (community view)	Safe : 89.0 % ; Unsafe : 2.5 % ; Unsafe (due to Taste / Color) : 8.5 %
38.	Established Irrigation Water Distribution Detail(Acre)	Flood Stream through :- Clay Channel : 6569 acres Bund : 510 acres Pipe Line : 125 acres From :- Tube well : 145 acres Dug Well : 45 acres Gallery : 25 acres
39.	Pit latrines exist at HHs	20915 (53%)
40.	Open Defecation %	18732 (43%)
41.	Storage tanks existence at HHs	26579 (67%)
42.	Drainage needing repair (m)	115800
43.	Detail of schemes initiated by third party / Organisation (Type of Scheme: No. of Schemes)	Pl. see Table 2.15 for detail
44.	Beneficiary HHs	2629
45.	Water-borne diseases	Dysentery , Cholera , Diarrhea
46.	Human Affected ratio against diseases	Men: 10 % Women: 20 % Children: 70 %
47.	Villages	45 out of 85 (53%) have Organisational setup 40 out of 85 (47 %) have no Organisational setup
48.	Formation Year	1996 , 1998 , 2005 ... 2013 (mostly in 2013)

Sr. No.	Parameters	Description	
	Village Organisation / Water User Group	%age of Total	
		(Yes=1)	(No=2)
49.	Registration	15.7 %	84.3 %
50.	Bank Account	9.6 %	90.4 %
51.	Saving system	31.6 %	64.8 %
52.	O&M Mechanism	18.1 %	81.9 %
53.	By-laws	34.9 %	65.1 %
54.	VDP Development	13.4 %	83.6 %
55.	Record Keeping	41.0 %	59.0 %
56.	Self-initiated Projects	6.2 %	93.8 %



# Chapter 1

## 1. Area Profile

### 1.1. Location, Elevation & Administration

The Tehsil Takht-e-Nasrati is a valley locally named “Thal”. It extends from the foothills of Shingar Range and on towards the west (Kashu Algad and Kurram River). The valley is surrounded by rough broken land in its east and north. The seven main streams “Lawaghar, Shawa, Shnawa, Zarki, Mianki, Machakki, and TarkhaAlgada” along with their tributaries form the drainage network and ultimately confluence into the Kurram River.

The Thal valley lies 32.80° - 33.14° N latitude & 71.00° - 71.48° East longitude with an area of about 570 km<sup>2</sup>. It is located about 22 km short of Karak city. Tehsil Takht-e-Nasrati has Tehsil Karak (in North ) and Tehsil Banda Daud Shah in the North of Tehsil Karak; District Mianwali and District Lakki Marwat on the South East, and the tribal areas adjoining District Bannu on the South West . The area is accessible from Peshawar through the Indus Highway. It mostly consists of rugged dry hills and semi-arid rangelands and rainfed agricultural land. The altitude in Tehsil Takht-e-Nasrati ranges from 375m to 1454m above sea level (Plate # 1 & 2).

Takht-e-Nasrati is a mostly double cropping zone as the local farmers cultivate gram and wheat;maize,millet and groundnut are also being grown in some areas.

The Tehsil is divided into 85 revenue villages and 21 Village Councils (VCs); Takht-e-NasratiBala,Takht-e-NasratiPayan, Bogara, SirajKhel, SerkiLawaghar, Chokara, Chokara Ahmad Abad, Gundi Kala, Warana Mir Hassan Khel, Warana Musakan, SaiKot, Surati Kala, Tatar Khel, Yaghi Musakan, Khojakki Kala, Jahengeri, Shaheedan Banda, Ganderi Khattak, Nara Banda, Shah Salim, and Kari Dhand. There are 7 Union Councils in Tehsil Takht-e-Nasrati namely Takht-e-Nasrati, Chokara, Shnawa GudiKhel, Siraj Khel, Mianki, Jahengeri, and Warana Ahmad Abad. The Village Councils have recently been delineated under the Khyber Pakhtunkhwa Local Government Act 2013. Administratively, Takht-e-Nasrati is the headquarter where important services like legal courts and colleges are also located. Local people use vehicular transport for travelling to Takht-e-Nasrati.

### 1.2. Climatic Conditions

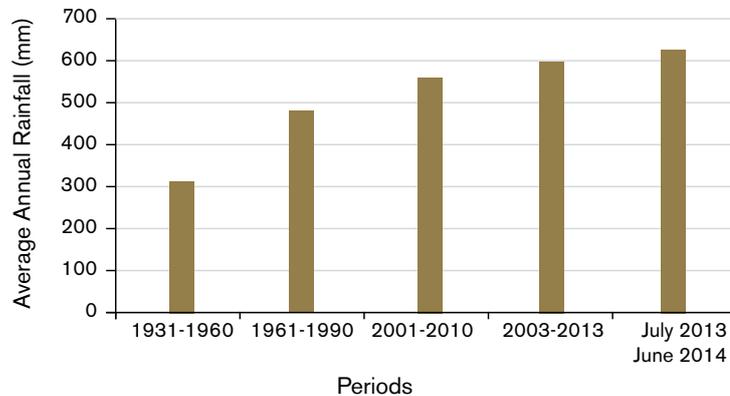
Tehsil Takht-e-Nasrati has precipitation and temperature seasonally varying with semi-arid conditions. Temperature rises in summer (39 °C) and drops in winter (4 °C). Average annual precipitation varies during different periods (Table: 1.1& Figure 1.1). The months of June to November gives 68% precipitation whereas 32% precipitation is in the months of December to May. Summer rains are

of high intensity with short time period whereas winter season has low intensity rains with long periods. Summer is hot with monsoon in the month of May to June while winter is too cold owing to the western wind. The meteorological data collected at Ahmad Wala, Tehsil Takht-e-Nasrati during year 2001-2010 is depicted in Table 1.2.

**Table 1.1: Average Annual Rainfall - Tehsil Takht-e-Nasrati**

Duration	Average Annual Rainfall (mm)
1931- 1960 *	327.54
1961-1990 *	492.39
2001-2010**	572.49
2003-2013**	604.30
July 2013 – June 2014 **	624.50
* Rainfall Calculated from Isohyetal Map.	
** Data Collected at Agricultural Research Station, Ahmed Wala, Dist. Karak.	

**Figure: 1.1 Rainfall Variation**

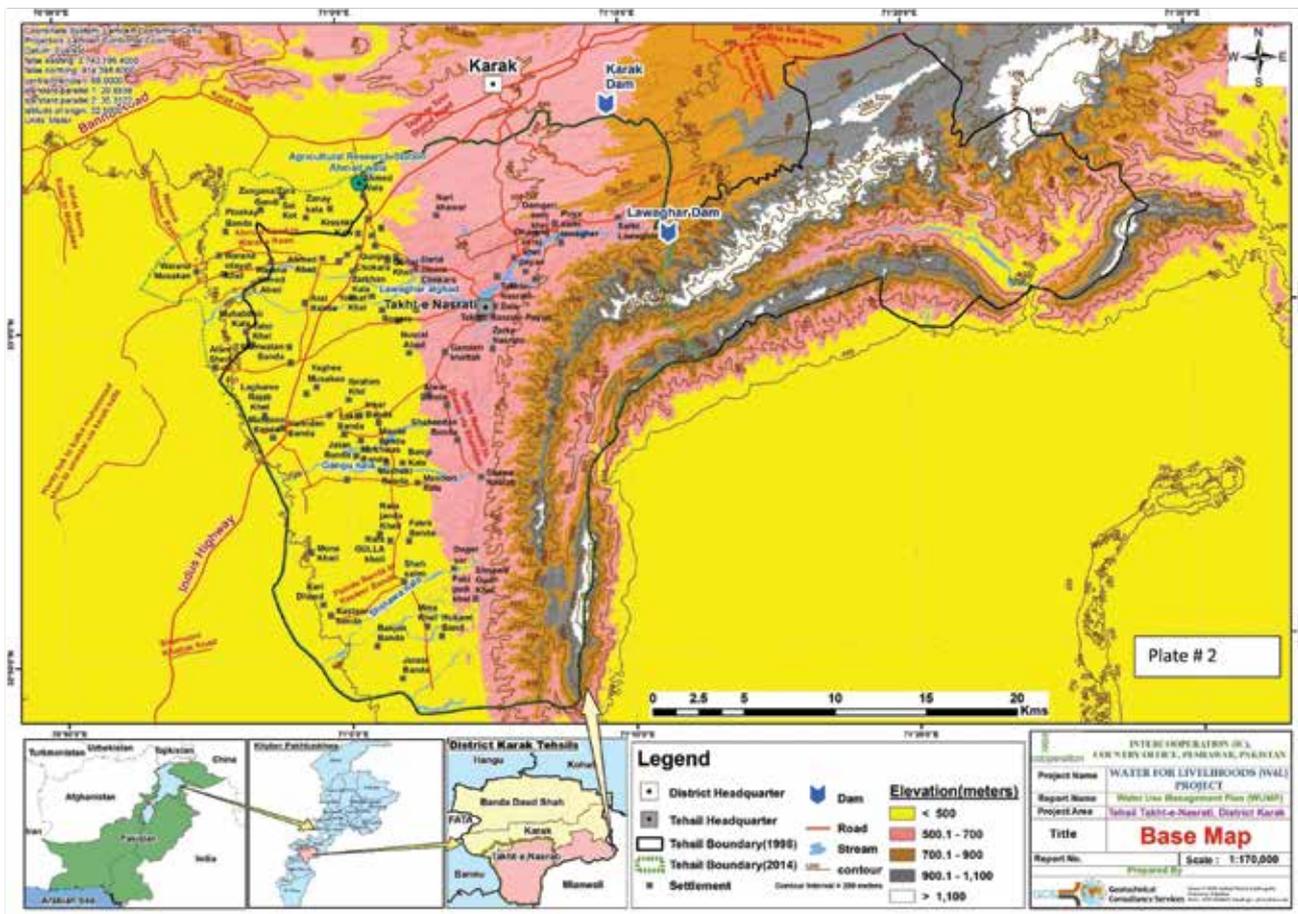
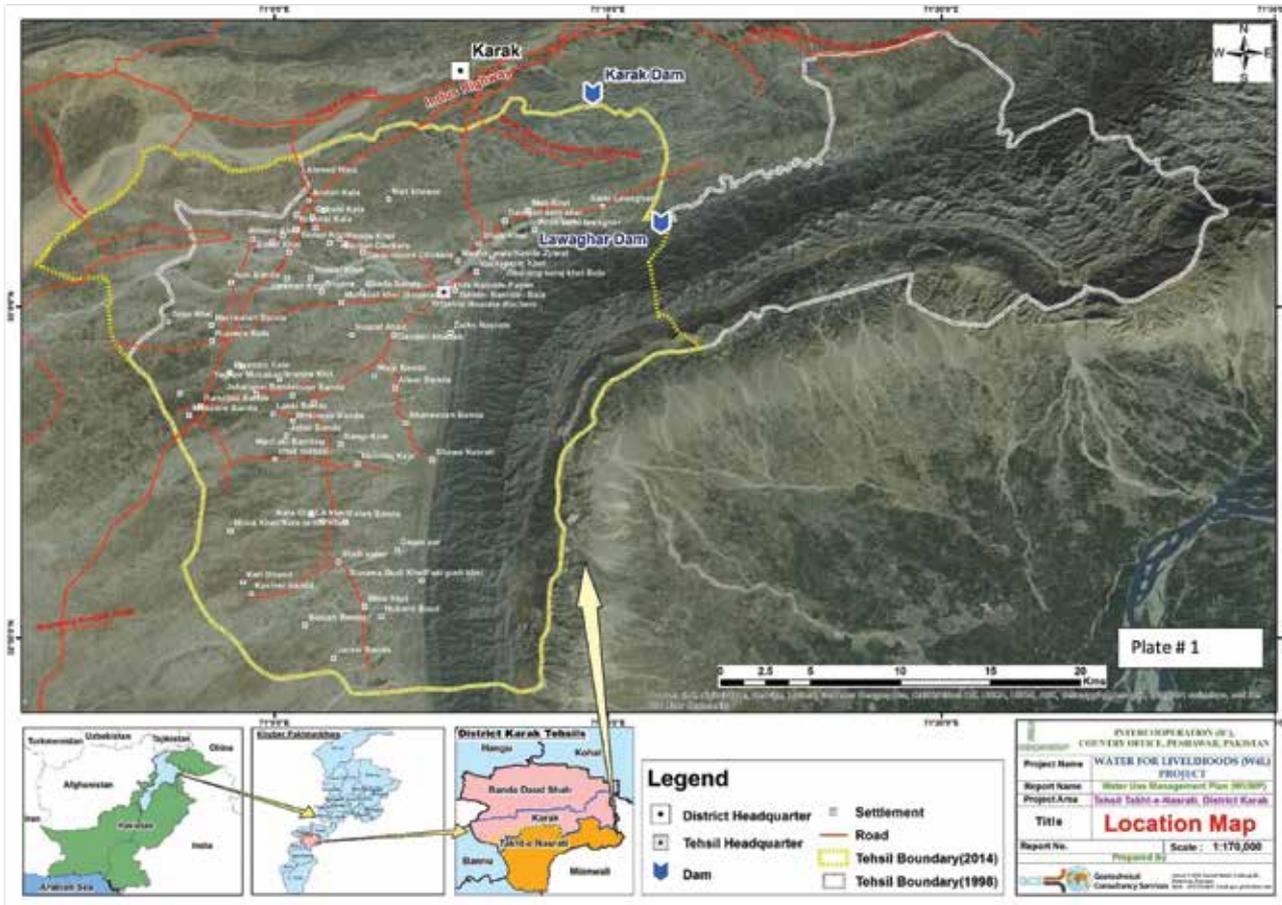


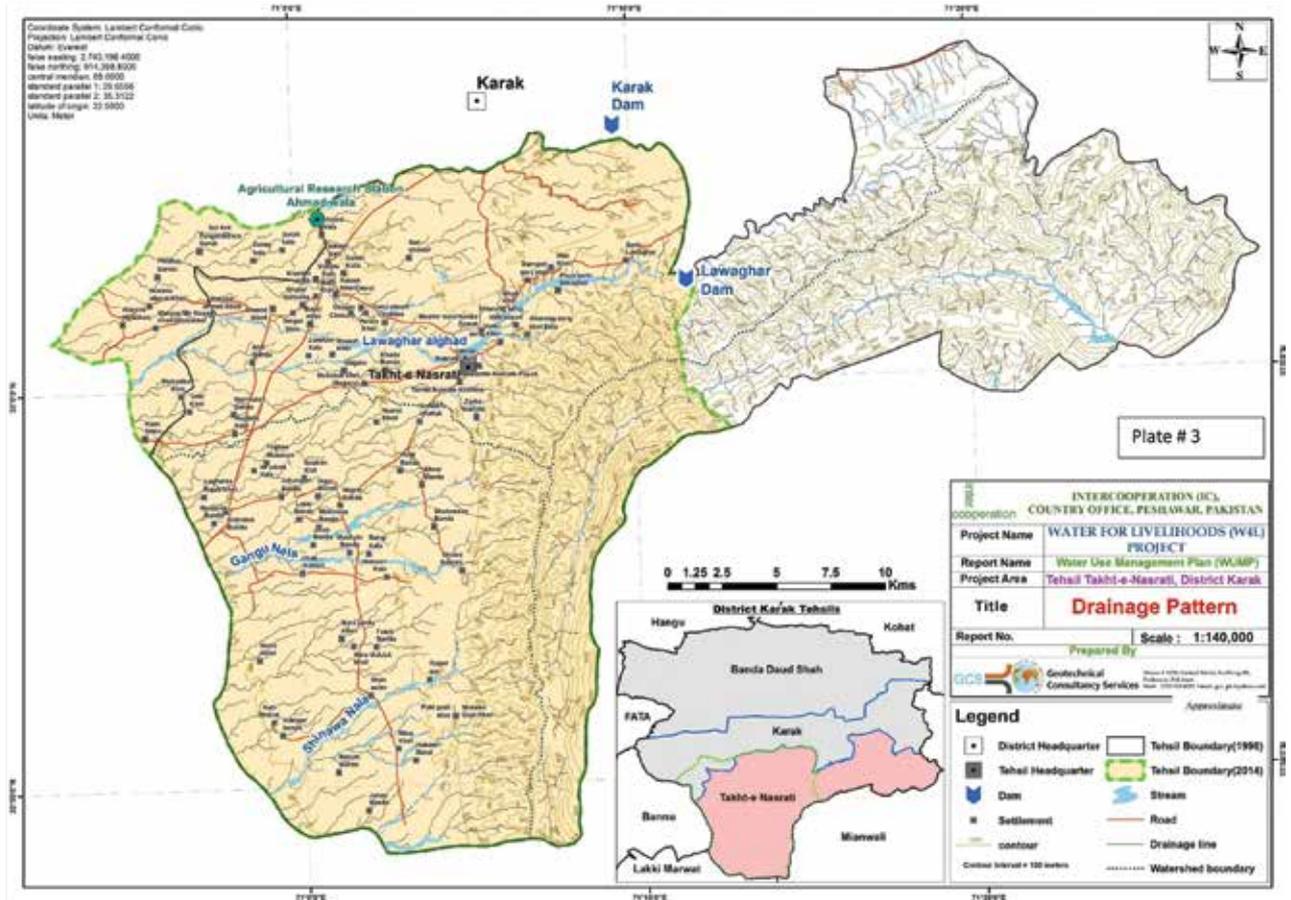
**Table 1.2: Meteorological Data –Ahmad Wala, Tehsil Takht -e -Nasrati (Year 2001-2010).**

Months	Temperature (°C)		Humidity (%)		Rainfall (mm)	Wind Speed (Km / hr.)	Soil Temperature (C°) Average
	Max.	Min.	Max.	Min.			
January	19.18	4.26	75.8	35.24	27.43	2.9	7.03
February	21.69	7.29	77.39	42.23	37.72	3.2	9.14
March	28.2	12.06	75.38	35.23	37.17	3.5	13.89
April	34.74	17.94	66.12	29.42	36.54	5.2	19.02
May	38.32	22.33	59.66	30.73	31.6	5.4	21.87
June	39.5	25.9	59.96	32.89	74.24	5.5	25.78
July	38.44	25.76	73.33	38.76	121.6	5.2	26.77
August	36.66	25.29	75.68	42.61	108.3	4.1	26.37
September	35.47	21.95	77.21	39.29	61.58	3.7	23.49
October	32.33	16.79	71.55	35.51	15.13	3.5	20.09
November	26.71	10.01	71.56	36.66	5.8	3.2	14.1
December	21.93	5.67	75.2	35.9	15.38	3.1	8.96
Monthly Mean	31.1	16.27	71.57	36.21	47.71	4.04	18.04

Data Source: Agriculture Research Station, Ahmad Wala, District Karak

The table shows mean max. air temperature (39.5°C) and wind speed (5.5 Km / h) as high in the month of June, maximum relative humidity (77.21%) occurring in September, rainfall (121.6 mm) and soil temperature (26.77°C) being high during July which indicates dry conditions in the project region.





### 1.3. Hydrology

There are seven seasonal flood stream flows in Tehsil Takht-e-Nasrati. These streams are only active during rains or monsoon season. The stream water is available during the monsoon period March-April and July-August in the Tehsil. During these months, the streams become active with an upstream to downstream flow. The estimated available water data is presented in §3.23& Table (3.1).

### 1.4. Climate Change Scenario (as Experienced in the Last Decade)

The climate change variations are more visible in marginal areas and such events have been observed more frequently. Decadal temperature scenarios for Karak District revealed that the annual maximum temperatures are at an increasing trend and annual minimum temperatures are at a decreasing trend. On average the increase in annual mean temperature is about 1.1°C per decade. Moreover annual rainfall in Tehsil Takht-e-Nasrati is showing an increasing trend (Figure: 1.1).

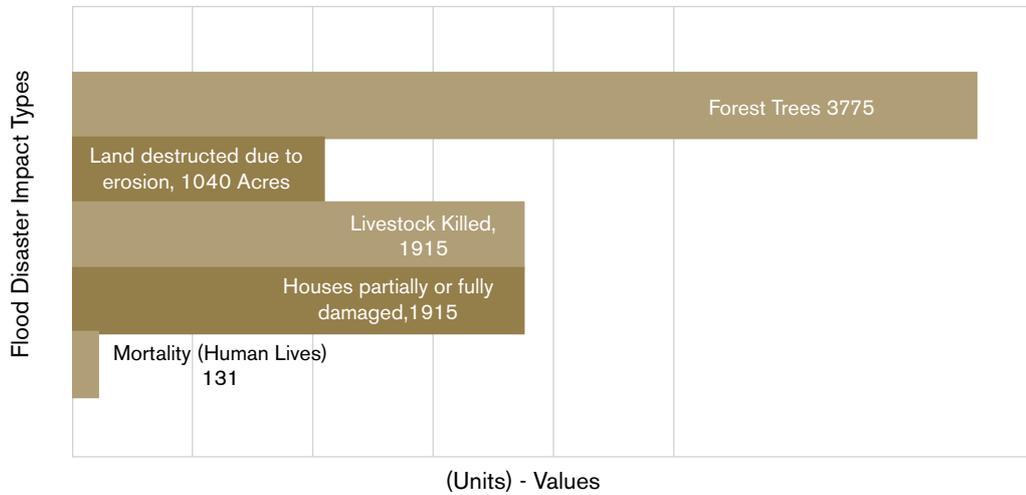
**Table 1.3: Post Impact of Flood Disaster**

S.No.	Year	Specific Location of flood arising	Affected UCs	Post Impact of Flood Disaster				
				Mortality Human Lives (Number)	Houses (Partially or fully destroyed)	Livestock Killed (Number)	Land Destroyed or Eroded (Acre)	Trees Destroyed (Number)
1.	1994.	Lawaghar seasonal flood stream	Takht-e-Nasrati, Chokara	2	20	25	15	70
2.	1996	Lawaghar seasonal flood stream	Takht-e-Nasrati, Jahengeri	5	30	85	25	160
3.	1996	Mianki flood stream	Mianki, Jahengeri	4	45	110	35	210
4.	1999	Shnawa flood stream	ShnawaGudiKhel	1	15	40	10	55
5.	2001	Shawa flood stream	Mianki	3	12	30	20	125
6.	2003	Lawaghar flood stream	Takht-e-Nasrati	7	70	220	45	230
7.	2005	Tarkha Algada	Warana Ahmad Abad	4	20	50	120	330
8.	2006	Shawa, Lawaghar, Mianki	Jahengeri, Mianki	15	140	350	145	500
9.	2008	Lawaghar, Shnawa	ShnawaGudiKhel, Takht-e-Nasrati	25	155	200	210	550
10.	2010	All flood streams in Thal valley	Entire Tehsil	65	450	760	400	1450
11.	2012	Mianki, Shawa, Zarki	Mianki, Takht-e-Nasrati	0	20	45	15	75
<b>Total</b>				<b>131</b>	<b>977</b>	<b>1915</b>	<b>1040</b>	<b>3755</b>

Events of climate change such as flash floods, heavy rains and (flash flood) variations have increased both in frequency and scale according to community perception confirmed through the WUMP exercise.

Over the last 20 years, 11 flood disasters struck Tehsil Takht-e-Nasrati which brought a lot of human and financial loss. The major cause of flood disaster is often uncertain and heavy rainfall often occurs in monsoon season. The whole Thal Valley possesses seven major seasonal streams and dozens of small seasonal streams. During the heavy rain, the water rises in large amounts, accumulates in the streams and takes the shape of a flood disaster that causes damage to the agricultural lands, forestry, livestock, housing, existing infrastructure, social institutions and loss of human lives in some cases. Other major reasons for flood disaster are the high ratio of vulnerability among local communities. The financial status of local people is too weak, therefore they are not able to cope; the lack of pre-disaster strategy is also a paralyzing factor. Disaster Risk Management (DRM) strategy for long term arrangements or mechanisms at government level is also in initial stages. The flood damage data collected during WUMP exercise at Tehsil Takht-e-Nasrati shows that the 2010 flood intensity was on top as it affected the entire Tehsil while floods in 2008 were the 2nd highest. Over the last 20 years, the 11 flood disasters brought 131 human casualties - including 40 women, 45 children, 30 elderly and 16 men. 977 houses were partially or fully damaged while 1915 livestock heads perished. About 1040 acre land was damaged or washed away due to soil erosion. Further 3755 number of trees were also swept away in these flood incidents.

**Figure 1.2 Post Flood Impact in Tehsil Takht-e-Nasrati 1994 - 2012**



Although, the temperatures / rainfall data are not being recorded at UCs level in Tehsil Takht-e-Nasrati, but changing scenarios of temperatures, precipitation and cropping zones is based on what the communities observed. However, the respective data are available at regional level which was utilised for further analyses.

According to community perception, climate change scenario could be clearly observed. The elderly in the local community observe summer heat to be on the increasing trend compared to 10-15 years ago, the temperature being pleasant even in June-July but now it being unbearable even in August-September. Likewise, they also suggest that there is a drastic change in rain occurrences. The rainfall duration has decreased in the last 5 years. It was also reported that previously rainfall occurred on time, with same intervals and were either without or with low intensity storm, benefitting crop production. It is quite different now as storms are more frequent and often bring a negative impact on crops and their production.

### 1.5. Institutional Arrangement and Capacity Building

#### VO / CBOs, Water Users Group, Water Users Association

Local Institutional Development process was started by the National Commission for Human Development in year 2000 in District Karak with the basic aim of improving education and health facilities and support to poor communities. NGOs such as Khwendo Kor (KK), Community Motivation and Development Organisation (CMDO), Strengthening Participatory Organisation (SPO) are active in different social sector issues. Moreover, Sarhad Rural Support Programme (SRSP) also supports community development processes which aids in the formation of village based organisations in the whole Tehsil. There are 45 Community Based Organisations (CBOs) that are registered with the Social Welfare Department. Under Water for Livelihood (W4L) project, one Water User Association was formed comprising representatives from 36 men and 28 women Water User Groups (WUGs). These WUGs are representing 41957 households. WUGs / WUAs work around one common interest – water – and ensure that other development potentials open up with interventions on water. The WUMP field teams and WUGs / WUAs jointly contributed in carrying out assessments, prioritisation and preparation of this particular WUMP.

#### District Coordination Committee (DCC)

Along with WUMP preparation in the field, an advisory committee i.e. the District Coordination Committee (DCC) was formed and notified by the Deputy Commissioner(DC) Karak. The purpose of the DCC is to steer the WUMP process and its implementation at district level. DCC also connects investments in water sector from GoP funds as well as inviting other invested partners on the basis of water sector vision as envisaged through WUMP in the specific VCs. The DCC holds meetings bi-annually or when specifically required. W4L Project keeps a close interaction with DCC to keep them updated about project interventions in the district and seeks support for timely provision of services by the concerned actors(PHED, Irrigation Division, OFWM,SCD and Forest Department). The DCC will also ensure ownership for the WUMP at District / Tehsil level.

#### Capacity Building of WUG / WUA and GLAs

In the beginning of Phase II, before initiating the process of WUMP preparation, training was conducted for all stakeholders in the district along with partner organisations to conceptualise the IWRM concept and understanding the WUMP preparation in the field. This inspires easy flow of information and previous incorporation of experiences in water sector as carried out by different GLAs and partner projects.



## Chapter 2

### 2. Socio Economic Factors

#### 2.1. Demography

The Tehsil Takht-e-Nasrati comprises of 41957 Households. The area's population is one of the decisive factors for the extent of facilities that are available and are required for planning in the future. The total population of the area is 362050 souls having 152182 males (42.03%) and 155509 females (42.95%). Out of the total population, there are 48616 children (13.43 %) and 5741 people above 80 years age (1.59 %) - Table 2.1.

**Table 2.1: Population Distribution**

Village Council	Population	Male	Female	Children	Above 80
Shaheedan Banda	19330	8136	8685	2316	193
Ganderi Khattak	12110	5086	5450	1453	121
Shah Salim	28010	12600	11760	3370	280
Kari Dhand	59450	26166	25552	7138	594
Nara Banda	21550	9265	9460	2590	235
Siraj Khel	16729	6847	7043	2505	334
Serki Lawahgar	5980	2537	2596	817	29
Warana Mir Hassan Khel	27000	11340	11880	3510	270
Warana Musakan	6500	2730	2860	845	65
Tatar Khel	19500	8190	8580	2535	195
Sai Kot	10800	4536	4752	1404	108
Surati Kala	8400	3528	3696	1092	84
Chokara	14505	6095	6380	1885	145
Chokara Ahmad Abad	18600	7068	7254	3348	930
Gundi Kala	22200	9102	9546	3108	444
Jahengeri	14666	5840	5986	2402	438
Yahgi Musakan	7400	3108	3256	962	74
Khojaki Banda	10400	4368	4576	1352	104
Takht-e-Nasrati Bala	8800	3520	3608	1408	264
Takht-e-Nasrati Payan	13300	5054	5187	2394	665
Bogara	16820	7066	7402	2184	169
Total	362050	152182	155509	48618	5741

Source: Takht-e-Nasrati WUMP Database 2014

As per the data base of Union Council, total housing stock in the Tehsil in the year 2014 is 41957. Out of total, 37% are katcha while about 63% pacca housing. Mud, cement and bricks are important materials used in construction of houses. The number and types of housing structures are given in the table (2.2).

**Table 2.2: Types of Housing Structures**

Village Council	Total HHs	Kacha Houses	Pacca Houses
Shaheedan Banda	2710	1215	1495
Ganderi Khattak	1580	450	1130
Shah Salim	1700	969	731
Kari Dhand	5990	3422	2568
Nara Banda	2340	1265	1075
Siraj Khel	2196	1008	1188
Serki Lawahgar	781	399	382
Warana Mir Hassan Khel	3500	1400	2100
Warana Musakan	850	360	490
Tatar Khel	2250	770	1480
Sai Kot	1300	390	910
Surati Kala	970	342	628
Chokara	1790	357	1433
Chokara Ahmad Abad	2110	420	1690
Gundi Kala	2910	464	2446
Jahengeri	1810	450	1360
Yahgi Musakan	760	217	543
Khojakki Banda	1400	266	1134
Takht-e-Nasrati Bala	1100	352	748
Takht-e-Nasrati Payan	1780	544	1236
Bogara	2130	483	1647
<b>Total</b>	<b>41957</b>	<b>15543</b>	<b>26414</b>

Source: Takht-e-Nasrati WUMP Database 2014

#### **Ethnic Distribution HHs wise**

There is no ethnic distribution of HHs in Tehsil Takht-e-Nasrati as 100% of population belongs to Khattak tribe with sub-tribe of Buraq Khattak settled in entire District. All of the population is Sunni Muslim.

## 2.2. Education Facilities

Education is an important determinant of development and there are 298 government schools, 55 private schools, and 36 madrassahs. Distribution of educational institutions is appended below in Table 2.3.

**Table 2.3: Educational Institutions (Village council-wise, Category)**

Village Council	Primary		Middle		High		Madrassah	
	Girls	Boys	Girls	Boys	Girls	Boys	Boys	Girls
Shaheedan Banda	4	7	1	1	1	2	3	2
Ganderi Khattak	3	4	1	1	0	1	1	1
Shah Salim	7	3	0	2	1	1	1	1
Kari Dhand	8	4	0	3	0	1	0	0
Nara Banda	6	6	0	3	1	1	1	1
Siraj Khel	4	4	0	1	1	1	2	2
Serki Lawaghar	4	6	1	0	0	1	2	1
Warana Mir Hassan Khel	9	11	1	2	2	2	3	3
Warana Musakan	2	4	0	1	1	1	2	2
Tater khel	4	3	1	1	1	1	3	2
Sai Kot	2	1	0	1	1	1	1	1
Surati Kala	1	1	0	0	0	1	1	1
Chokara	2	4	0	1	1	1	2	4
Chokara Ahmad Abad	4	6	1	2	1	2	1	1
Gundi Kala	4	4	2	1	1	1	2	2
Jahengeri	6	4	1	2	1	1	3	3
Yahgi Musakan	2	2	0	1	0	1	2	1
Khojakki Banda	8	7	0	0	1	1	1	0
Takht-e-Nasrati Bala	2	2	0	0	1	1	2	3
Takht-e-Nasrati Payan	2	3	1	1	0	1	2	3
Bogara	11	3	1	1	2	1	2	2
<b>Total</b>	<b>95</b>	<b>89</b>	<b>11</b>	<b>25</b>	<b>17</b>	<b>24</b>	<b>37</b>	<b>36</b>

Source: Takht-e-Nasrati WUMP Database 2014

Total number of enrolled students in educational institutions is 40235 which accounts for 83% of total number of children (48618). Among whom 21826 (54%) are enrolled in Government Schools out of whom 13875 (63%) are boys and 7951 (37%) are girls. The remaining students (i.e. 13460) are enrolled in private schools which is 34% of total. Among whom 8771 (65%) are boys and 4689 (35%) are girls. While 4949 (12% of total enrolled) are in Madrassahs. Out of whom 2458 (49%) are boys and 2491 (51%) are girls. Moreover 62% of total enrolled students are boys and 38% are girls. Overall distribution of students in different educational institutions is tabulated in Table (2.4).

**Table 2.4: Village Council-wise Enrolled Students**

Village Council	Government			Private			Madrassah		
	Total	Boys	Girls	Total	Boys	Girls	Total	Boys	Girls
Shaheedan Banda	1260	624	636	630	336	294	210	116	94
Ganderi Khattak	738	434	304	360	222	138	120	70	50
Shah Salim	1960	1330	630	425	328	97	420	180	240
Kari Dhand	4098	3480	618	1083	820	263	570	240	330
Nara Banda	1374	754	620	401	340	61	200	90	110
Siraj Khel	1450	826	624	342	240	102	158	41	117
Serki Lawaghar	356	222	134	188	80	108	72	36	36
Warana Mir Hassan Khel	1382	702	680	894	600	294	384	135	249
Warana Musakan	252	124	128	306	141	165	42	24	18
Tater Khel	819	600	219	1071	760	311	210	170	40
Sai Kot	450	300	150	450	300	150	100	70	30
Surati Kala	376	216	160	360	210	150	64	40	24
Chokara	660	438	222	720	574	146	150	80	70
Chokara Ahmad Abad	1448	994	454	1120	847	273	196	100	96
Gundi Kala	1064	580	484	1248	552	696	286	166	120
Jahengeri	1505	1095	410	1400	1190	210	595	330	265
Yahgi Musakan	368	213	155	254	156	98	86	65	21
Khojakki Banda	660	246	414	275	136	139	125	60	65
Takht-e-Nasrati Bala	528	235	293	385	186	199	187	100	87
Takht-e-Nasrati Payan	648	258	390	630	312	318	522	235	287
Bogara	430	204	226	918	441	477	252	110	142
<b>Total</b>	<b>21826</b>	<b>13875</b>	<b>7951</b>	<b>13460</b>	<b>8771</b>	<b>4689</b>	<b>4949</b>	<b>2458</b>	<b>2491</b>

Source: Takht-e-Nasrati WUMP Database 2014

Literacy rate is 43%, out of which 53% men and 47% women are literate in Tehsil Takht-e-Nasrati. Distribution of educated men and women is tabulated below:

**Table 2.5: Village Council-wise Educated Men and Women**

Village Council	Women				Men			
	Primary	Middle	Matric	Above Matric	Primary	Middle	Matric	Above Matric
Shaheedan Banda	1296	864	378	162	2550	765	765	1020
Ganderi Khattak	1677	858	1131	234	1215	594	567	324
Shah Salim	2050	1250	950	750	4312	1936	1320	1232
Kari Dhand	3268	2280	1520	532	2730	2821	2730	819
Nara Banda	1050	750	900	300	1056	990	1089	165
Siraj Khel	880	400	288	32	1450	600	250	200
Serki Lawahgar	348	280	104	32	400	272	96	48
Warana Mir Hassan Khel	2050	1250	1250	450	2145	1224	1224	561
Warana Musakan	342	306	198	54	360	288	181	63
Tatar Khel	1518	1472	1380	230	2280	1596	1140	684
Sai Kot	750	650	675	175	832	780	728	260
Surati Kala	592	496	400	144	596	425	510	170
Chokara	2610	900	540	450	2208	920	920	552
Chokara Ahmad Abad	2430	1080	1296	594	2279	1113	1060	848
Gundi Kala	1763	1333	860	344	1892	1276	792	440
Jahengeri	1584	900	720	396	1702	777	333	333
Yahgi Musakan	646	527	425	153	779	608	380	152
Khojakki Banda	1015	870	754	261	1080	960	600	360
Takht-e-Nasrati Bala	738	594	378	90	1008	483	420	189
Takht-e-Nasrati Payan	1815	660	495	330	1476	1152	540	432
Bogara	2352	1568	1680	560	2508	1596	855	741
<b>Total</b>	<b>30774</b>	<b>19288</b>	<b>16322</b>	<b>6273</b>	<b>34858</b>	<b>21176</b>	<b>16500</b>	<b>9593</b>

Source: Takht-e-Nasrati WUMP Database 2014

### 2.3. Access to other Infrastructures

The level of prosperity of any area can be judged from the availability of utility services. Takht-e-Nasrati is devoid of important services such as banks, agricultural services and electricity. Available services are post offices in 7 VCs, veterinary service centers in 3 VCs and police stations in 3 VCs. Moreover dispensaries are in all VCs and Basic Health Units (BHUs) exist in 7 VCs that provide health facilities. Access roads are available in most of the villages which are unpaved and in dilapidated conditions including 35 km main road passing through Tehsil. This situation further casts its effects on communities to access these services, a major limiting factor to improving the living conditions in the Tehsil.

**Table 2.6: Key Service Availability**

Village Council	Agricultural Service Centers	Veterinary Service Centers	Telephone	Electricity	Post office	Bank	Police Station	Health Facilities
Shaheedan Banda								
Ganderi Khattak								
Shah Salim								
Kari Dhand								
Nara Banda								
Siraj Khel								
Serki Lawaghar								
Warana Mir Hassan Khel								
Warana Musakan								
Tater khel								
Sai Kot								
Surati Kala								
Chokara								
Chokara Ahmad Abad								
Gundi Kala								
Jahengeri								
Yahgi Musakan								
Khojakki Banda								
Takht-e-Nasrati Bala								
Takht-e-Nasrati Payan								
Bogara								
	For Non Availability							
	For Availability							

Source: Takht-e-Nasrati WUMP Data Base 2014

## 2.4. Off-farm Income Sources

Local people are using multiple strategies, including both farm and off-farm sources, to generate household income. Moreover rural economy is mostly based on natural resources but communities are adopting more off-source incomes because of decreasing natural resource base. Major off-sources of income are services, skills, businesses, foreign remittances, labour and farming. Highest number of people (34%), are being paid for offering services in private and government sectors. 24% people work as labour, 21% are skillful people who receive income through applying gainful skills. 18% are engaged in small and large businesses. Roughly 3% are working in services industry or as labour abroad particularly in Arab countries. Total number of people engaged in off-sources of income is:

**Table 2.7: Off Sources of Income**

Village Council	Total HHs	Services	Skills	Business	Remittances (Abroad)	Labour / Farming / Other
Shaheedan Banda	2710	1080	348	172	157	950
Ganderi Khattak	1580	760	450	100	30	240
Shah Salim	1700	560	340	157	43	600
Kari Dhand	5990	1000	1980	890	170	1950
Nara Banda	2340	750	630	570	40	350
Siraj Khel	2196	570	240	480	80	826
Serki Lawahgar	781	270	190	130	50	141
Warana Mir Hassan Khel	3500	940	890	780	58	832
Warana Musakan	850	250	190	200	60	150
Tatar Khel	2250	980	500	380	40	350
Sai Kot	1300	500	280	270	47	203
Surati Kala	970	376	89	170	35	300
Chokara	1790	690	310	300	70	420
Chokara Ahmad Abad	2110	898	380	500	60	272
Gundi Kala	2910	1000	450	400	160	900
Jahengeri	1810	900	450	190	50	220
Yahgi Musakan	760	290	180	190	34	66
Khojakki Banda	1400	500	190	200	30	480
Takht-e-Nasrati Bala	1100	400	150	400	40	110
Takht-e-Nasrati Payan	1780	590	320	200	30	640
Bogara	2130	890	290	480	60	410
<b>TOTAL</b>	<b>41957</b>	<b>14194</b>	<b>8847</b>	<b>7159</b>	<b>1344</b>	<b>10410</b>

Source: Takht-e-Nasrati WUMP Database 2014

Tehsil Database shows that driving, woodworking, masonry and tailoring are major employable skills for men in the Takht-e-Nasrati and total number of skillful men are:

**Table 2.8: Number of Skilful Men**

Village Council	Drivers	Carpenters	Masons	Tailors	Other
Shaheedan Banda	52	40	62	19	2
Ganderi Khattak	49	41	70	17	3
Shah Salim	27	34	48	14	8
Kari Dhand	19	11	32	11	7
Nara Banda	30	45	45	60	40
Siraj Khel	49	20	35	40	35
Serki Lawahgar	57	20	45	30	20
Warana Mir Hassan Khel	49	14	32	19	26
Warana Musakan	51	16	72	16	30
Tatar Khel	45	11	29	27	26
Sai Kot	39	12	38	14	27
Surati Kala	36	17	28	23	22
Chokara	26	32	45	28	21
Chokara Ahmad Abad	26	24	34	31	20
Gundi Kala	28	32	41	23	14
Jahengeri	34	27	38	42	30
Yahgi Musakan	45	18	29	32	41
Khojakki Banda	32	21	34	28	30
Takht-e-Nasrati Bala	55	41	43	29	21
Takht-e-Nasrati Payan	48	34	52	58	31
Bogara	31	34	45	26	26
<b>Total</b>	<b>828</b>	<b>544</b>	<b>897</b>	<b>587</b>	<b>480</b>

Source: Takht-e-Nasrati WUMP Database 2014

For women, tailoring and handicrafts are major skills which they use for income generation. Total number of skillful women is as follows:

**Table 2.9: Skilful Women (Village Council-wise, Category)**

Village Council	Seamstress	Handicrafts	Others
Shaheedan Banda	79	74	39
Ganderi Khattak	60	78	28
Shah Salim	47	78	41
Kari Dhand	35	67	43
Nara Banda	69	44	23
Siraj Khel	55	78	34
Serki Lawahgar	32	54	22
Warana Mir Hassan Khel	56	55	19
Warana Musakan	61	43	33
Tatar Khel	43	36	21
Sai Kot	37	26	19
Surati Kala	41	37	27
Chokara	37	27	15
Chokara Ahmad Abad	48	31	28
Gundi Kala	39	28	19
Jahengeri	38	31	27
Yahgi Musakan	26	22	21
Khojakki Banda	37	41	28
Takht-e-Nasrati Bala	39	51	14
Takht-e-Nasrati Payan	47	51	21
Bogara	39	29	31
<b>Total</b>	<b>965</b>	<b>981</b>	<b>553</b>

Source: Takht-e-Nasrati WUMP Database 2014

## 2.5. Land Use

Land use in Tehsil Takht-e-Nasrati is broadly classified into four major types i.e. cultivated land (where any crop variety is being cultivated and is mostly dependent on rain water), direct irrigating land where water is regularly available, forest / barren land (non-cultivable or only used for forestry). Out of the area, 154460 acres (69%) is covered by cultivated, 11405 acres (21%) by forests, while 7119 acres (8.6%) lands are direct irrigated. Total land in Tehsil is 172984 acres. Total land, under cultivation, in the Tehsil is appended below:

**Table 2.10: Irrigated Land Distribution**

Village Council	Cultivated land (acres)	Direct Irrigated land (acres)	Barren / forest or non-cultivated land (acres)	Total Land area (acres)
Shaheedan Banda	4060	250	350	4660
Ganderi Khattak	3550	235	290	4075
Shah Salim	36120	350	820	37290
Kari Dhand	43730	835	1460	46025
Nara Banda	7600	414	730	8744
Siraj Khel	7600	315	355	8270
Serki Lawahgar	3300	150	90	3540
Warana Mir Hassan Khel	4270	220	130	4620
Warana Musakan	2500	180	320	3000
Tatar Khel	4050	210	380	4640
Sai Kot	2400	210	390	3000
Surati Kala	2400	170	430	3000
Chokara	3250	400	510	4160
Chokara Ahmad Abad	3200	440	640	4280
Gundi Kala	1830	220	270	2320
Jahengeri	3250	480	760	4490
Yahgi Musakan	3170	290	470	3930
Khojakki Banda	4300	310	590	5200
Takht-e-Nasrati Bala	4200	670	1030	5900
Takht-e-Nasrati Payan	4700	550	750	6000
Bogara	4980	220	640	5840
<b>Total</b>	<b>154460</b>	<b>7119</b>	<b>11405</b>	<b>172984</b>

Source: Takht-e-Nasrati WUMP Database 2014

## 2.6. Agriculture & Livestock Status

### 2.6.1. Landholding Pattern

Average landholding size in the Tehsil is 4.66 acres per individual and per HHs 16.6 acres. Mean maximum land holding size is 2 acres and mean minimum is 1 acre. Out of the total population, 388 households do not hold any land for farming and 60% of households manage their own farm land. The ownership of land is transferred mainly to the male-members of a family whereas in female-headed houses the ownership stays with women who also deal in farm cultivation. Land owner distribution in the Tehsil is given below:

**Table 2.11: Land owner distribution**

Village Council	No. of Big Owners (>2 acres)	No. of Small Owners (2-0.6 acres)	No. of Subsistence (<0.6 acres)	No. of Labour / Tenant
Shaheedan Banda	225	338	187	750
Ganderi Khattak	50	130	60	240
Shah Salim	110	240	150	550
Kari Dhand	580	840	230	1650
Nara Banda	80	120	120	320
Siraj Khel	280	320	146	746
Serki Lawaghar	30	100	100	230
Warana Mir Hassan Khel	150	430	180	760
Warana Musakan	90	110	60	260
Tatar Khel	65	160	120	345
Sai Kot	45	140	45	230
Surati Kala	80	135	60	275
Chokara	125	195	46	366
Chokara Ahmad Abad	10	145	125	280
Gundi Kala	120	470	250	840
Jahengeri	50	160	110	320
Yaghi Musakan	30	40	20	90
Khojakki Kala	95	240	145	480
Takht-e-Nasrati Bala	50	60	40	150
Takht-e-Nasrati Payan	90	360	70	520
Bogara	70	230	80	380
<b>Total</b>	<b>2425</b>	<b>4963</b>	<b>2344</b>	<b>9782</b>

Source: Takht-e-Nasrati WUMP Database 2014

Database shows that 60% of the households are owners of their land who neither rent out nor rent land from others while 40% have ownership on share base. Mostly landless people practice agriculture on sharing basis where owners provide land and other party contributes labour and inputs. The crop produce is equally distributed between the owner and landless farmer.

**Table 2.12: Land Owner Distribution**

Village Council	Own	Shared
Shaheedan Banda	450	300
Ganderi Khattak	144	96
Shah Salim	350	200
Kari Dhand	990	660
Nara Banda	192	128
Siraj Khel	448	298
Serki Lawaghar	138	92
Warana Mir Hassan Khel	480	280
WaranaMusakan	156	104
Tatar Khel	207	138
Sai Kot	138	92
Surati Kala	165	110
Chokara	220	146
Chokara Ahmad Abad	168	112
Gundi Kala	504	336
Jahengeri	192	128
Yaghi Musakan	54	36
Khojakki Kala	288	192
Takht-e-Nasrati Bala	90	60
Takht-e-Nasrati Payan	312	208
Bogara	228	152
Total	5914	3868

Source: Takht-e-Nasrati WUMP Database 2014

### 2.6.2. Farming Practices

Most of the communities, in the Tehsil, are agro-pastoralist which includes subsistence arable cropping, fruit and livestock production. Owing to small size of landholdings, local communities utilise their agricultural production for their own household consumption. Wheat, maize and gram are food crops while alfalfa and other grasses are fodder as grown in the Tehsil. Different diseases such as root rot, rust, leaf curl, pest attack, powdery mildew, dieback, scabs etc. infect agricultural crops in the area.

The entire Tehsil falls into the double cropping pattern zone. Details of the seasonal calendar are as under.

**Table 2.13: Seasonal calendar**

Month-wise cropping pattern / Livelihoods Calendar, Tehsil Takht-e-Nasrati, District Karak							
Crops		1	2	3	4	5	6
		Wheat	Maize	Bajra / Sorghum	Melon	Guar	Gram
Months	Wks						
JULY	1st	Ploughing on the top layer of the soil to turn it over	Waiting for rains to sow the crop	(Similar to Maize), in first week of July the farmers wait for rain to sow the crop	Harvesting of Melon & marketing	The farmers prepare the soil for the sowing	-
	2nd	-	If dry conditions persist, then some of the farmers still sow the crop so as to not remain maize-less	Same as Maize Crop	Harvesting of Melon & marketing	-	-
	3rd	-	If the land is fertile, seeds germinate and seedlings emerge within 4 or 5 days	If the land is fertile, seeds germinate and seedlings emerge within 4 or 5 days	-	-	-
	4th	-	When the land is totally dependent on rainfall the seedlings emerge within 6 or 7 days.	If the land is totally irrigated, the farmer never waits for rain, and sows Barley	-	The farmers start sowing of Guar seeds	-
AUGUST	1st	Ploughing and tilling the top layer of the soil	In the first week the tillers of Maize crops emerge from the surface of the soil.	Same as Maize crop	-	On irrigated land the seedlings emerge within 4 or 5 days.	Application of flood water for irrigating fields
	2nd	-	-	-	-	If the land is totally rainfall-dependent, the seeds emerge within 6 or 7 days. Sometimes the seeds never germinate	Application of flood water for irrigating fields
	3rd	-	-	-	-	-	Application of flood water for irrigating fields
	4th	-	-	-	-	-	Waiting for fields to reach moist conditions (wattar)

SEPTEMBER	1st	-	When the rains are timely in arrival, the Maize plants cover the surface of the fields	Same as Maize crops	-	In first week of September the Guar plants show progress day by day.	Waiting for fields to reach moist conditions (wattar)
	2nd	-	Farmers carry out weeding	-	-	Farmers carry out weeding	Waiting for fields to reach moist conditions (wattar)
	3rd	-	-	-	-	-	Waiting for fields to reach moist conditions (wattar)
	4th	-	-	At this stage the farmers harvest the green roughage for livestock	-	-	Start ploughing fields for sowing of Gram
OCTOBER	1st	The farmers start ploughing fields to prepare soil for sowing	At this stage sometimes different diseases break in	In first week of October the plants prepare for fruit	-	At this stage the plants start fruiting.	-
	2nd	-	-	Start Flowering	-	At this stage the farmer sprays fertilizers such as urea on the Guar plants.	-
	3rd	-	At this stage some weeds emerge which the farmers remove	-	-	Prepare for harvesting	-
	4th	-	Do	Prepare for harvesting	-	Prepare for harvesting	-
NOVEMBER	1st	In first week of November the farmers start sowing Wheat. Especially if the rainfalls are on time.	At this stage the maize plants start fruiting	Prepare for harvesting	The farmers start sowing	Start harvesting	-
	2nd	Do	The fruits progress day by day, and advance towards harvesting	-	Do	Threshing and clearing	-
	3rd	When the land is fertile the seeds emerge within 5 or 6 days.	Start harvesting	Start harvesting	The seeds emerge from the surface within 4 or 5 days	Farmers save some quantity of seeds for next sowing	-
	4th	-	Threshing and clearing	Threshing and clearing	The farmers clear the stumps from the land	While some quantity is used for income generation	-

DECEMBER	1st	When the rainfall are on time, the wheat plants progress day by day.	The farmer uses some quantity for his own use	-	Prepare crop for consumption	-	The farmers start sowing
	2nd	The farmer clears stumps from the land	Some quantity is used for income generation	-	Green roughage for livestock	-	Do
	3rd	Do	do	-	Crop used for income generation as well	-	Within three or four days the seedlings emerge
	4th	Do	do	-	do	-	Do
JANUARY	1st	Farmers harvest the upper leafy part of wheat plants for livestock	-	-	Used for own consumption	-	The farmers harvest green roughage for their own and livestock's consumption
	2nd	do	-	-	do	-	Do
	3rd	do	-	-	Used for income generation	-	Do
	4th	do	-	-	do	-	Weeding carried out
FEBRUARY	1st	Refrain from harvesting the green roughage	-	-	do	-	Refrain from upper part harvest
	2nd	Do	-	-	do	-	Do
	3rd	Starts flowering stage	-	-	do	-	Starts flowering stage
	4th	do	-	-	do	-	Do
MARCH	1st	Start fruiting stage	-	-	do	-	Start fruiting stage
	2nd	Matures day by day	-	-	do	-	Matures day by day
	3rd	Do	-	-	do	-	Do
	4th	Do	-	-	do	-	Harvesting begins

APRIL	1st	Prepare for Harvesting	-	-	do	-	Harvesting begins
	2nd	do	-	-	do	-	Threshing begins
	3rd	Harvesting begins	-	-	do	-	Do
	4th	do	-	-	do	-	Do
MAY	1st	Harvesting	-	-	The farmer takes crop to market for income generation	-	Threshing and clearing
	2nd	Threshing of wheat	-	-	do	-	Do
	3rd	Threshing of wheat	-	-	And also used for own consumption.	-	Do
	4th	do	-	-	Do	-	Do
JUNE	1st	Farmers stores some for next sowing	Prepares the soil for sowing	Prepares the soil for sowing	-	Prepares the soil for sowing	Farmers store some for next sowing
	2nd	do	Do	do	-	do	Use some for income generation
	3rd	do	Sowing begins if the rainfalls are on time	Start sowing, if the rainfalls are on time	-	do	Use some for their own consumption
	4th	do	If the land is irrigated or fertile the farmers never wait for rains.	If the land is irrigated or fertile the farmers never wait for rains.	-	Start sowing	Do

Both men and women share farmland labour but women are mostly engaged in weeding and thinning whereas watering, harvesting and plowing are mostly done by men. Local farmers use both mechanized (tractors) and traditional methods of farming depending on the availability and access road.

### 2.6.3. Livestock Holding

In Takht-e-Nasrati, livestock resources are important component of rural economy and largely comprise cattle, goats and sheep, and also some donkeys as pack animals. Domestic poultry is also kept for their own consumption. These animals are basically reared for meat, milk, wool, manure and transportation of things. For many people, livestock is also used as a source of cash income at the time of urgent need. Local communities revealed that cattle and goats are the most favoured animals. Overall distribution of livestock in the Tehsil area is:

**Table 2.14: Number of Livestock**

Village Council	Total Livestock	No. Goats	No. Sheep	No. Cattle	No. Donkeys	No. Poultry
Shaheedan Banda	5615	2500	800	600	55	1660
Ganderi Khattak	3394	1700	650	380	64	600
Shah Salim	3032	1400	400	310	120	802
Kari Dhand	12041	6000	1900	1300	240	2601
Nara Banda	4790	2600	830	650	190	520
Siraj Khel	6493	3700	950	630	170	1043
Serki Lawaghar	2932	1300	400	320	70	842
Warana Mir Hassan Khel	14164	7000	2200	770	185	4009
Warana Musakan	1050	400	150	80	30	390
Tatar Khel	5050	2400	700	480	90	1380
Sai Kot	4600	1900	770	680	115	1135
Surati Kala	1390	600	130	220	55	385
Chokara	5285	2500	970	730	60	1025
Chokara Ahmad Abad	7700	3600	1150	920	210	1820
Gundi Kala	6080	2900	1300	670	75	1135
Jahengeri	13380	6500	2230	930	270	3450
Yaghi Musakan	2050	850	410	380	70	340
Khojakki Kala	2910	1300	600	420	35	555
Takht-e-Nasrati Bala	3000	1400	530	410	40	620
Takht-e-Nasrati Payan	1820	780	460	310	45	225
Bogara	4830	2300	1100	770	130	530
<b>Total</b>	<b>111606</b>	<b>53630</b>	<b>18630</b>	<b>11960</b>	<b>2319</b>	<b>25067</b>

Source: Takht-e-Nasrati WUMP Database 2014

Diseases like Black Quarter, Foot and Mouth diseases, Foul Poxetc, are common in the area. For the treatment, reliance is both on veterinary and traditional methods. Women and children are responsible for livestock rearing with exception amongst Gujurs (a gypsy tribe) where men are tasked for tending livestock. Streams and water channels are mostly used as drinking water source for animals.

## 2.7. Mapping of Stake Holders, Local NGOs & Government Line Departments

ADWO, SRSP, KK, SPO, CMDO, NCHD are the major Non-Governmental Organisations (NGOs) working in the Tehsil. These organisations have implemented a wide range of development activities to improve living conditions of the locals. In total 83 projects have been carried out in irrigation, building (or repairing) of Flood Protection Wall (FPW) and for supply of drinking water. ADWO is the pioneer organisation that initiated community based projects in the Tehsil. It completed 37 small scale community infrastructure projects through the support of Intercooperation (IC) financed by Swiss Agency for Development and Cooperation. Among Government Line Agencies, Public Health Engineering Department (PHED), Irrigation Department and On-Farm Water Management 120 DWSS, 45 irrigation channels improvement schemes are implemented in the whole Tehsil. Key development organisations in the Tehsil are:

**Table 2.15: Key Development Organisations**

Name of Organisation	Type of Organisation	Number of projects Implemented	Key Areas of Interventions
W4L / LPH-IC	INGO	37	Irrigation, FPW, DWSS and Small ponds for Livestock
SRSP	NGO	2	DWSS and Irrigation
KK	NGO	0	Social Mobilisation
NCHD	NGO	0	Education
PHED	Government	120	DWSS
Irrigation Department	Government	20	Irrigation
On-Farm Water Management	Government	24	Improvement in Irrigation Schemes
Soil Conservation Department	Government	24	FPW

Source: Takht-e-Nasrati WUMP Database 2014

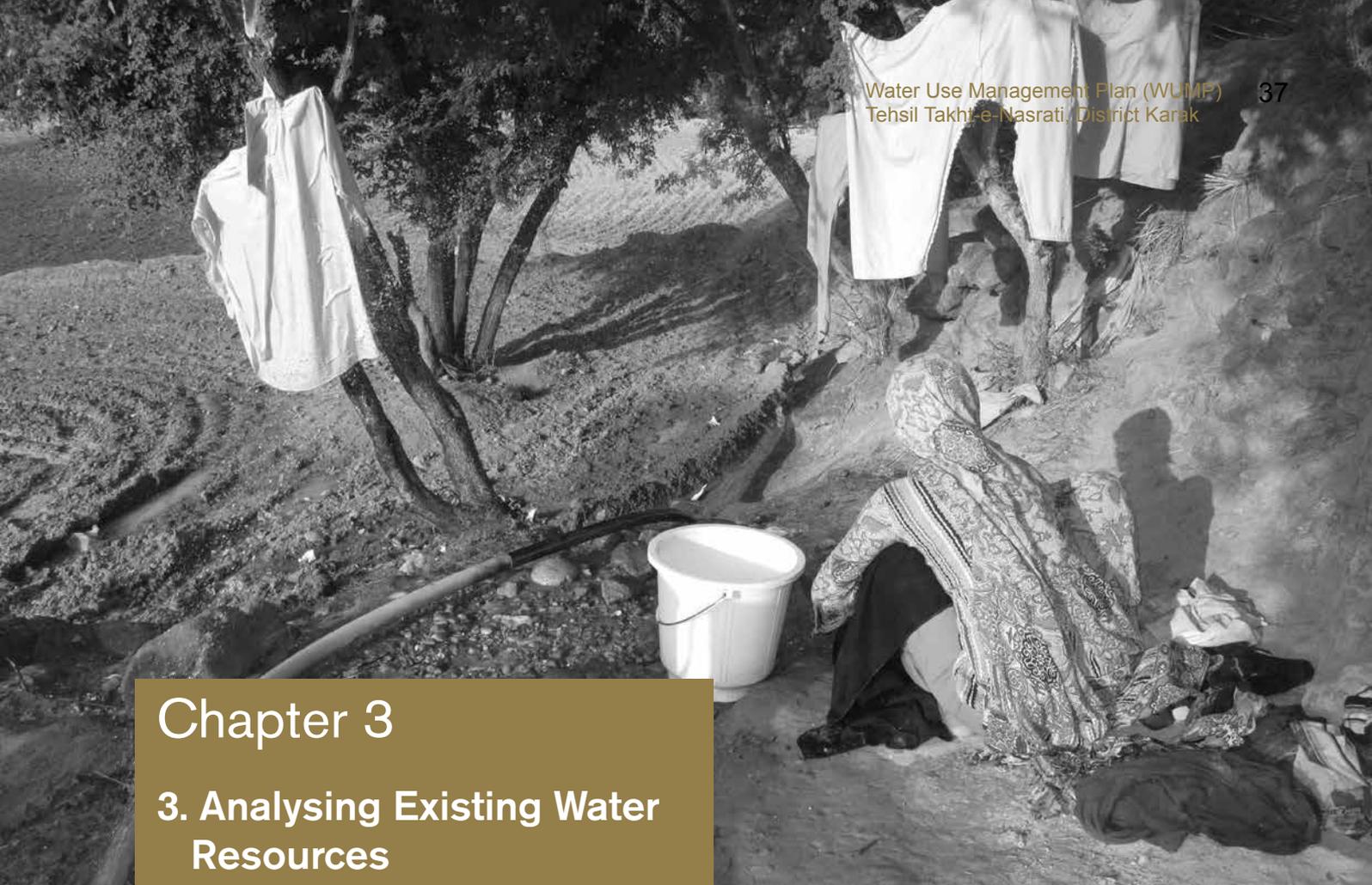
## 2.8. Water Sector Interventions

Most of the development interventions were carried out for improvement of water related infrastructures such as DWSS, Irrigation and FPW in Takht-e-Nasrati. In total, 45 irrigation channels and 120 drinking water supply schemes, 2 dams, 41 ponds, 24 FPWs were developed by Government agencies in Takht-e-Nasrati whereas the remaining were developed by NGOs and communities themselves. Drinking water held highest investment ratio in the Tehsil which is followed by irrigation channel, Flood Protection Walls and others as:

**Table 2.16: Water Sector Interventions**

Village Council	Tube Wells	Pressure Pumps	Hand Pumps	Dug Wells	TWs Irrigation	Small Water Ponds	Diversion irrigation structure	Flood Streams	Infiltration Gallery	Mini Dam
Shaheedan Banda	18	50		1	1	1	1	9		
Ganderi Khattak	10	7			2	1		8		1
Shah Salim	6			2		13		5		
Kari Dhand	13	10						2		
Nara Banda	10	22						5		
Siraj Khel	3	272	4	44				6	1	
Serki Lawaghar		60	3	4				3	2	1
Warana Mir Hassan Khel	13	119				1		3		
WaranaMusakan	1	135				1		2		
Tatar Khel	10	230			3			3		
Sai Kot	4	120						2		
Surati Kala	3	294						2		
Chokara	12	11			1			6		
Chokara Ahmad Abad	12	55						5		
Gundi Kala	11	78						7		
Jahengeri	11	117			5			7		
Yaghi Musakan	10	36			2			3		
Khojakkii Kala	15	92			3			3		
Takht-e-Nasrati Bala		75						2	1	
Takht-e-Nasrati Payan	3	7						2	1	
Bogara	16	11			2		1	4	1	
<b>Total</b>	<b>181</b>	<b>1801</b>	<b>7</b>	<b>51</b>	<b>19</b>	<b>17</b>	<b>2</b>	<b>89</b>	<b>6</b>	<b>2</b>

Source: Takht-e-Nasrati WUMP Database 2014



## Chapter 3

### 3. Analysing Existing Water Resources

#### 3.1 General Water Resources

In Tehsil Takht-e-Nasrati, the primary source of water resources is rain. The project area seasonally possesses semi-arid characteristics. Rainfall in the area is scarce, erratic and concentrated during a short rainy season with the remaining period being relatively or absolutely dry. High temperatures and rain intensity result in much of the rainfall being lost due to evaporation and runoff, respectively. The months of June to November gives 68% precipitation whereas 32% precipitation comes in the months of December to May. Summer rains are of high intensity with short time period whereas winter season has low intensity rains with long periods. Summer is hot with monsoon in the month of May to June while winter is too cold owing to the western winds.

#### 3.2 Water Sources and Classification

In Tehsil Takht-e-Nasrati, the classifications of water sources are 'Precipitation, Surface water (flowing in the streams / river; stored in dams / ponds etc) & Groundwater'. Groundwater is the most important source. Surface water is fairly split between ephemeral and perennial sources that are in circulation through the natural drainage system. Precipitation plays a key role in hydrological cycle of the area. Rainfall in the southern region varies as one moves from the southwest with respect to Peshawar and is less as compared with that in other parts of KPK. The available annual rainfall in the study area is depicted in Tables (1.1 & 1.2) & Figures (1.1).

The level of livelihood / agricultural production is directly related to the availability and effective use of water as a major input. The demand for water is increasing rapidly, while the available water resources are limited. The area receives an average seasonal rainfall of 432 mm\* and 173 mm\* in the Kharif and Rabi seasons respectively. (\* Based on rainfall data).

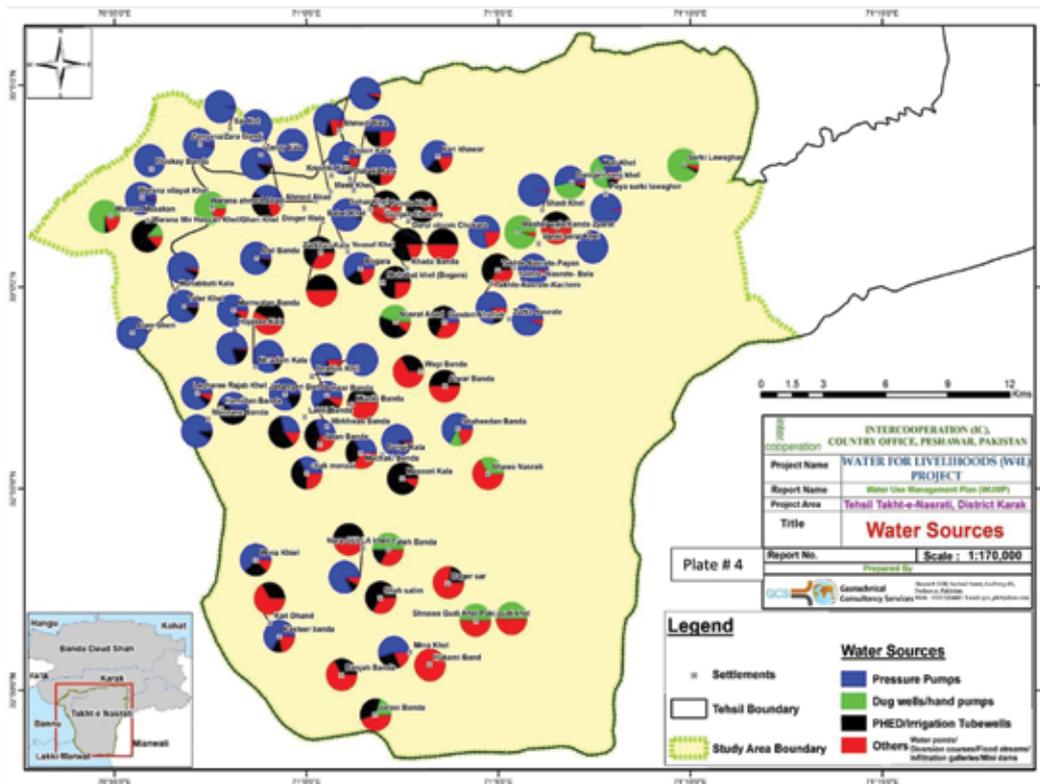
##### 3.2.1 Water Resource Location

Surface water in the drainage system mostly flows during flood season, except at a few locations where there is perennial flow of variable capacity. Similarly, groundwater situation is not mapped as is needed.

The drainage pattern of Tehsil Takht-e-Nasrati and other surface water sources are shown in Plate # 3. Presently surface sources (99 Flood Streams / Streams, Delay Action Dam / Small Dam) have developed and are in use. The intensity of groundwater extraction location (VC area-wise) is depicted in Plate # 4. The groundwater is being extracted from different (2059 in number) locations through tube wells / pressure pumps / Dug wells etc. The village-wise water source distribution is presented in Plate # 4.

##### 3.2.2 Water Resource Investigation

A. The south-western part of Tehsil Takht-e-Nasrati (i.e. ~ 60% of its area) was investigated for groundwater resources assessment by WAPDA – TNO 1994; as part of Groundwater Resources in Domail Plain, Bannu & Karak Districts. The investigation comprised of hydro geological, geophysical (electrical resistivity and geophysical logging) studies and groundwater chemical



analysis, drilling of some test / tube wells. The respective report was published in December 1983. The study area is bounded by the villages namely Chukara, Takht-e-Nasrati, Zarkai, Shahidan, Jarsi Bandi, toward the west (i.e. Kashu Algad & Kurum River).

B. The area (Tehsil Karak & Takht-e-Nasrati) was studied with the following objectives, in 2009.

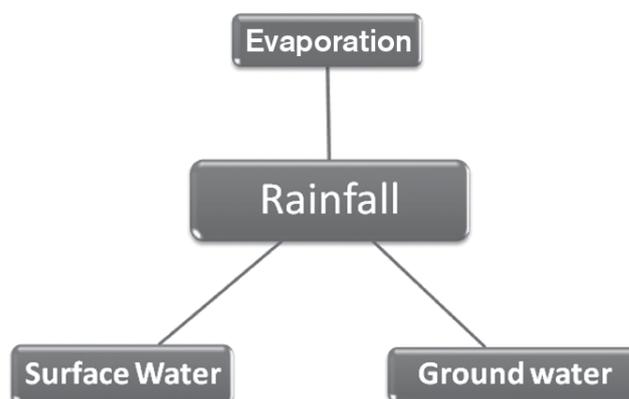
- To find the rate of depletion or recharge of groundwater level in the project area.
- To assess the impact of small dams on recharge of groundwater.
- To find the discharge and water quality of sampled tube wells in the target area.
- To assess the yield of major crops in the project area under irrigated and rainfed conditions.

### 3.2.3 Water Resource Quantity

Water scarcity is becoming a wide spread issue in the area as the growing population largely depends on ground water pumping for agriculture and daily routines. Deep water table, variable rainfall and rising needs in hot weather create an acute short supply of water. Particularly in an area that falls in semi-arid to arid zone, people depend on rainwater sources and groundwater pumping through tube-wells and water pumps.

The streams and other hill torrents have cut deep valleys, but they are of little use for irrigation. Agriculture and potable water needs are thus almost entirely dependent on the rainfall and on the small dams built in the catchment areas of the streams or bund / spur to mostly diverge flood water toward the fields.

The quantitative analysis of water resources is hereafter described and is based on average annual rainfall data. The source of rainfall data is Isohyetal Map of Pakistan, published by PMD; Climatic data of Bannu, Kohat, D. I. Khan Stations and Agriculture Research Station (ARS), Ahmad Wala, District Karak. The respective details are available in Chapter 1, 1.1 as well as summarized in Table (3.1).



**A. Surface Water Resource**

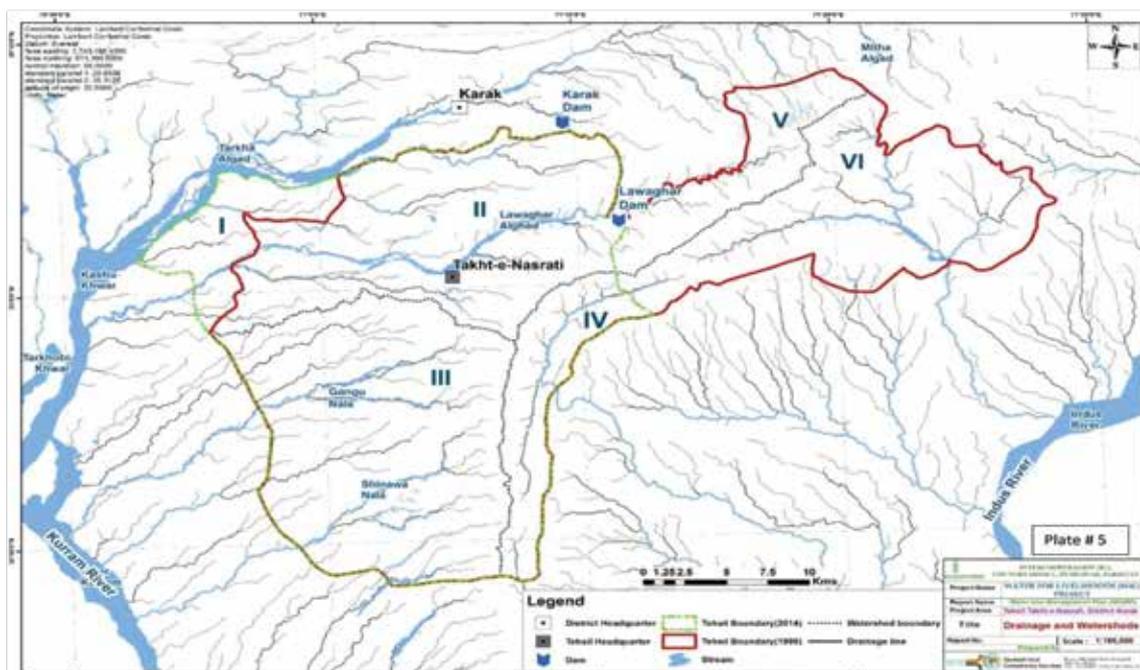
Surface water resource entirely depends on the precipitation in Tehsil Takht-e-Nasrati (WUMP area). The water flows through the drainage system, stores in the dams / ponds and is diverted for irrigation / domestic purposes are all from rainfall. The annual rainfall water circulating in the regions / watershed areas is shown in Table (3.1).

**Table 3.1 : Rainfall Water , Runoff , Groundwater Recharge & Evaporation Data , Tehsil Takht-e-Nasrati , District Karak**

	Precipitation * (Annual Average - mm)	606				
	Region Code	Sub-Watershed Area (Km <sup>2</sup> )	Annual Volume of			
			Rainfall Water (Mm <sup>3</sup> )	Runoff (Mm <sup>3</sup> ) **	Ground Water Recharge (Mm <sup>3</sup> ) ***	Estimated Evaporation (Mm <sup>3</sup> ) ****
Region Wise Data	I	54.02	32.737	19.66	6.567	6.547
	II	234.60	142.166	85.38	28.519	28.433
	III	282.34	171.100	102.75	34.323	34.220
	IV	71.65	43.418	26.08	8.710	8.684
Total (Regions Group)	(I , II & III)	570.96	346.003	207.791	69.408	69.201
	(I , II , III & IV)	642.61	389.421	233.867	78.118	77.884
	*	Annual Average Precipitation ( 2003 – 2013, Data Source ARS)				
	**	Runoff - Rational Method				
	***	Based on Chaturvedi Formula				
	****	Evaporation is approximately considered as 20% of Rainfall Water				

- \* Annual Average Precipitation (2003 – 2013, Data Source ARS)
- \*\* Runoff - Rational Method
- \*\*\* Based on Chaturvedi Formula
- \*\*\*\* Evaporation is approximately considered as 20% of Rainfall Water

The estimated runoff is 207.791 Mm<sup>3</sup> / annum from the study area (Region I, II & III). The flow direction of runoff is towards West and ultimately confluences into Kashu Algad (Stream) and Kurrum River. The estimated groundwater recharge is 69.408 Mm<sup>3</sup> / yr. from annual precipitation of 606 mm.



**B. Ground Water Resources**

Ground Water Resource (GWR) is totally dependent on the precipitation in the area. GWR recharge is estimated at 69.408 Mm<sup>3</sup> / yr. on the basis of Chaturvedi Formula. GWR is used for drinking water supply and irrigation.

**B-I. Ground Water Resource Assessment**

The detailed Ground Water Resources assessment was carried out about 33 years ago (i.e. during 1981 – 1983) by WAPDA-TNO. In 2009, groundwater study was also conducted with different objectives. The outline of their results are as follows:

**Study Data (1981 - 1983)**

Ground Water Resource was assessed by WAPDA-TNO, Peshawar and the report was published in December 1983; under the title “Technical Report on Groundwater Potential in Domail Plain, District Bannu and Karak”. Takht-e-Nasrati Tehsil area was partially included in the afore-stated studies.

- a) The average annual recharge of fresh groundwater in the alluvial fill roughly amounts to 8 x 10<sup>6</sup> m<sup>3</sup> or 6,500 acre feet in the area south-east of the Kashu Algard.
- b) Storage of extractable fresh groundwater in the alluvial fill up to a depth of 250 metres is estimated at 6,900 x 10<sup>6</sup> m<sup>3</sup> or 5,700,000 acre feet in the area south-east of the Kashu Algard. These volumes are equal to 150 and 860 times the average annual recharge in the valleys.
- c) The possibilities for groundwater exploitation - from the area South of the Kashu Algard, is not suitable for groundwater exploitation on a large scale because of the low recharge and large depths to the groundwater table. Only groundwater extraction for domestic use is advisable.

**Study Data (November 2009)**

The main objectives of the study were to assess the changes in groundwater table depths, time of operation of tube wells per day, discharge from the wells, groundwater quality and also to find the effect of small dams on recharge of ground water aquifers. Data related to water table depths from the ground surface, discharge of the wells and a few water quality parameters were also determined.

As reported by the respondents, in most of the area in Tehsil Takht-e-Nasrati the water table is showing a slightly rising trend, except Sur Dog, Nari Khura and high areas of Sarki Lawaghar, where the water table is declining rapidly (0.54 m / year). On other hand, the number of tube wells extracting ground water are increasing rapidly.

However, the current study data (2009) & (2014) do not provide the information regarding the groundwater potential, groundwater balance / budget and recharge & discharge components analysis etc.

Any further groundwater exploration must not be explored, until the groundwater resource potential is investigated in Tehsil Takht-e-Nasrati.

**B-II Ground Water Resource Developed**

The groundwater resource is explored / developed through the installation of Tube wells / pressure pump / Dug well / Hand pump / Water Ponds / Infiltration galleries. The water sources, being utilised for drinking and irrigation are discussed hereafter.

**WUMP Study Data (2014)**

Groundwater is being extracted through the tube wells (total 200), Pressure Pipes (total 1801), Dug well (total 51), Hand pump (total 7), Water Ponds (total 17) & Infiltration galleries (total 6). The water is being used for drinking water supply schemes and irrigation. The respective data is presented in the Table (3.2).

**Table 3.2: Water Sources Inventory Data, Tehsil Takht-e-Nasrati, District Karak**

Sr. No.	Water Supply From / For	Type & No. of Water Source						
		Tube well	Pressure Pump	Dug Well	Hand Pump	Water Pond	Infiltration Gallery	Dam (mini / small)
1	Drinking	181	1801	43	7	15	5	1
2	Irrigation	19	-	8	-	2	1	1
	Total	200	1801	51	7	17	6	2

Source: Technical Assessment For WUMP, Tehsil Takht-e-Nasrati, District Karak-2015

**B-III. Water Resource Supply and Demand**

The estimated withdrawal is approximately 14.934 Mm<sup>3</sup> / year from wells for irrigation and domestic use in Tehsil Takht-e-Nasrati, using water source inventory data collected for WUMP.

**Table 3.3: Estimated Water Extracted for Drinking and Irrigation Tehsil Takht-e-Nasrati , District Karak**

	No. of Water source	Discharge (gal / hr.)	Daily Operation (hrs.)	Yearly Operation (Days)	Volume of Water (Mm <sup>3</sup> / yr.)
<b>For Drinking Water Supply</b>					
Tube well	181	3000	6	320	4.740
Pressure Pump	1801	528	6	320	8.300
Dug well	43	50	6	320	0.019
Hand Pump	7	10	6	365	0.001
Infiltration	5	3800	24	365	0.757
<b>Total water used for drinking water supply (Mm<sup>3</sup>)</b>					<b>13.816</b>
<b>For Irrigation Water Supply</b>					
Tube well	19	10000	6	200	1.037
Water Ponds	17	-	-	-	0.500
Dam	1	-	-	-	29.160
<b>Total water used for irrigation water supply (Mm<sup>3</sup>)</b>					<b>30.697</b>

**C. Estimated Water Demand**

The water demand for domestic use, industrial consumption and irrigation is estimated on the basis of standard water consumption per capita per day and is presented in the Table (3.4).

**Table 3.4: Water Demand For Domestic, Industrial and Irrigation, Tehsil Takht-e-Nasrati, District Karak**

Water Demand For	Water Consumption (gal / capita / day)	Population	Estimated Volume of Water (Mm <sup>3</sup> / year)
Domestic Use / consumption	40	362050	24.0300
Industrial	20	362050	12.0152
Livestock	7	111606	1.2663
<b>Sub-Total</b>			<b>37.342</b>
Irrigation	Cultivated Land	44014 acres (178 km <sup>2</sup> )	236.26
<b>Sub-Total</b>			<b>236.26</b>
<b>G. Total</b>			<b>273.602</b>

### 3.2.4 Water Resource Quality

Apart from geological origin, quality of water is also related to population density, extent of availability, human activities, industrial growth, and agricultural practices. The greater the population density, the more is water quality prone to degradation and deterioration. The quality of the water resources varies from fresh to saline in the area. The water quality has been analysed by various agencies during different periods. The respective analysis is discussed hereafter.

1. The electrical conductivity (ECW), pH and SAR of groundwater ranges 410 -1310  $\mu\text{S/cm}$ , 5.0 - 8.4 and 0.7- 12.8 respectively (Data Source: WAPDA-TNO Report 1983).
2. The electrical conductivity (ECW) of the ground water (66% of 174 samples ) in Tehsil Takht-e-Nasrati is less than 600  $\mu\text{S/cm}$ . Whereas ECW of groundwater (24% of 174 samples) in Warana, Surati Kala and Sur Dog were found  $\sim 3750 \mu\text{S/cm}$  ,  $\sim 2400 \mu\text{S/cm}$  and  $\sim 4750 \mu\text{S/cm}$  respectively.

Most of the ground water samples (82%) can be categorised safe for irrigation on the basis of SAR (i.e.  $< 10 \text{ m g / L}$  ). Only 8% of samples were found unsafe for irrigation purposes as the SAR value exceeded  $18 \text{ m g / L}$ . Na, Ca and Mg level of all the collected water samples were found within the useable range as per WAPDA, 1974 classification. (Data Source: Evaluation of groundwater resources in District Karak – 2009)

3. In the study, 24 groundwater samples were obtained from shallow and deep wells / tube wells in district Karak. The concentration of chemical ions was analysed in the laboratory. The analysis shows that suitability of groundwater samples are summarized on the basis of selected parameters that as follows:

Sr. No.	Analysis Parameters	Results
1	Sodium Absorption Ratio (SAR )	100% samples are suitable
2	Soluble Sodium Percentage (SSP)	70.82% samples are suitable
3	Residual Sodium Carbonate (RSC)	58.33% samples are of good category
4	Permeability Index (PI)	50% samples are suitable
5	Magnesium absorption ratio (MAR)	91.76% samples are suitable
6	Kelly's Ratio (KR,)	83.33% samples are suitable

(Data Source: Investigation of Groundwater Quality for Irrigation in Karak District Technical Journal, University of Engineering and Technology Taxila, Vol. 19 No. I - 2014)

4. A total of 30 drinking water samples were collected from Tehsil Takht-e-Nasrati, district Karak, for the estimation of uranium concentration with Neutron Induced Fission Technique. Out of these, 19 samples were taken from tube wells, 8 samples from pressure pumps and 3 samples from open well. The concentrations of uranium in 23 samples were examined within the safe limit of  $15 \mu\text{g l}^{-1}$  as set by WHO for drinking water. Only 7 samples have uranium concentration above the maximum permissible limit of WHO. The drinking water of UC Jahangeri (1 sample), Gudi Khel (2 Sample), UC Takht-e-Nasrati (2 samples), UC Siraj Khel (1 sample) and UC Chokara (1 sample) has a higher than prescribed (by WHO) value of uranium.

### Conclusion

From the current study it can be concluded that well drilled uranium-rich bedrocks have high concentration of uranium than the safe limits of WHO for human consumption. Abundance of uranium in the drinking water samples from Tehsil Takht-e-Nasrati district Karak, particularly in Shanawa Gudi Khel and its vicinity samples may be considered unsafe for drinking purposes. The high concentration of uranium may be potentially due to being one of Asia's richest mineral deposits of uranium in UC Shanawa Gudi Khel (Karak, Pakistan) within the monitoring area. It exists as carnotite (oxidized form) and pitchblende (reduced form) in the study area. Higher incidence of bone marrow cancer in the monitoring area may be due to the chemical toxicity of uranium. However a more detailed radiopidemiological study is required on the affective as well as in surrounding area where the scientists from different disciplines including medical sciences should work together in mutual collaboration to find the solution for this serious problem.

(Data Source: Estimation of Uranium Concentration in Drinking Water Sources of Tehsil Takht-e-Nasrati, District Karak, Khyber Pakhtunkhwa, Pakistan Using Fission Track Technique - J.Chem.Soc.Pak.,Vol. 35, No.3, 2013 PP 999 – 1003)

The detailed water quality assessment of the area would be carried out as per standard parameter studies (Physicochemical parameters measurement, Water Chemical Analysis and other).

### 3.3 Local Water Management / Governance Systems

Water holds a central role in sustainable development. Every area has their own certain local systems which govern water management. Just as in other southern regions, the practice in Tehsil Takht-e-Nasrati (regarding water rights) is that if a person is living in their own home or at any other place, he has a right over water for their home and agriculture land.

Drinking Water Supply (DWS) is mainly managed by PHED and partially by villagers. The sources of DWS are tube wells, pressure pumps, dug wells, hand pumps, water pond and infiltration galleries. Whereas the Irrigation Water Supply (IWS) is based on the rainfall as well as flood water that are either diverted for irrigation or stored for future use. IWS is mainly managed by Irrigation Department and partially by farmers. The union council-wise data regarding the existing water sources and their status is depicted in (Table: 3.5).

**Table 3.5 : Water Source Status Data (Union Council -Wise), Tehsil Takht-e-Nasrati , District Karak**

UC Name	Mianki		Shnawa Gudi Khel		Seraj khel		Warana Ahmed Abad		Chokara		Jahangeri		Takht-e- Nasrati		Tehsil Takht-e-Nasrati									
	Status	Total	Functional	Non Functional	Total	Functional	Non Functional	Total	Functional	Non Functional	Total	Functional	Non Functional	Total	Functional	Non Functional								
Tube wells (Drinking Water Supply)	28	25	3	29	20	9	3	3	31	19	12	35	28	7	36	25	11	19	15	4	181	132	49	566
Pressure Pumps	57	26	31	32	26	6	332	236	96	898	555	343	144	129	15	245	178	67	93	85	8	1801	1235	566
Dug Wells	1	1	-	2	2	-	48	29	19	-	-	-	-	-	-	-	-	-	-	-	-	51	32	19
Hand Pumps	-	-	-	-	-	-	7	7	-	-	-	-	-	-	-	-	-	-	-	-	-	7	7	-
Irrigation Tube wells	3	3	-	-	-	-	-	-	3	3	-	1	1	-	-	10	10	-	2	2	-	19	19	-
Small Water Ponds	2	2	-	13	10	3	-	-	2	1	1	-	-	-	-	-	-	-	-	-	-	17	13	4
Diversions (clay-made Irrigation Structures)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	-	2	2	-
Flood Streams	17	17	-	12	12	-	9	9	-	12	-	18	18	-	13	13	-	8	8	-	89	89	-	
Mini dam / Delay Action Dam	1	1	-	-	-	-	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	2	2	-
Perennial Gallery	-	-	-	-	-	-	3	3	-	-	-	-	-	-	-	-	-	-	3	3	-	6	6	-

### 3.4 Irrigation Systems, Water Rights and Issues

The Tehsil's Irrigation system is mainly rainfed (barani) and flood. At a few locations, land is also being irrigated from small dams through water course networks.

#### Water Rights

There exists uncertainty in water rights rather water allocation based on availability or sharing the shortages. The FOs and their members can face an uncertain future regarding the service on to which they base their investments. The essential elements in relation to water rights are as under:

- Water rights should be reliable and clearly spelled out for the transfer to succeed – and in fact, done so before the transfer so that farmers know what they will receive.
- Water rights programmes should be administered by one agency which is separate from water resource development agencies.
- Effective water rights programmes are necessary for sound management of water resources to keep basin water supplies from being over-appropriated, to eliminate the vulnerability of FOs from increased demands of more powerful users, and to allow conjunctive management of surface water and groundwater resources.
- Effective water rights programmes reduce the opportunity for political pressure to override bureaucracies.
- Effective water rights programmes provide FOs reliable water supplies and thus the confidence to make the investments to maintain their systems.

#### Water Issues

The major water issues are as under:

- Water scarcity and inefficient water use.
- Inadequate storage capacity. Water storage efficiency is 9% (in Pakistan) as compared to 40% of the world average.
- Extensive seepage losses due to poor operation & maintenance of irrigation systems.
- Excessive groundwater pumping
- Inadequate measures for rainfall harvesting.
- Un-safe disposal of drainage effluent.
- Lack of private sector participation.
- Poor coordination amongst water, agriculture & rural development related research institutions.

(Data Source; Water Resources Development – Chapter 11)

#### 3.4.1 Water Related Disputes and Local Resolution Mechanisms

The water related disputes (Minor, Average, Severe) have been identified on the basis of social assessment data. The causes of such disputes are either water distribution or water source or access to water. These disputes are being mostly resolved by the organisations established at village / village council level or traditional mediation system "Jirgah". The disputes (86 out of 101) in Tehsil Takht-e-Nasrati (Table: 3.6) have been resolved by the organisations such as Village Organisation (VO), Water Use group (WUG), Water Use Association (WUA), (GoE) as listed in Table (2.12).

**Table 3.6 : Water Disputes Data (Union Council -Wise), Takht-e-Nasrati , District Karak**

Sr. No.	No. of Union Council (UC)	No. of Village	No. of Village Council (VC)	Total No of Water Dispute	Level of Dispute			Causes of Dispute	Resolved Dispute	Mediators
					Minor	Average	Severe			
1.	Mianki	9	2	13	11	2	-	Distribution ; Sources	13	GoE, WUG, VO
2.	ShnawaGudi Khel	15	3	18	4	6	8	Distribution ; Sources ; Access	15	GoE, WUG, VO
3.	Seraj khel	9	2	11	5	6	-	Distribution ; Access	8	GoE, VO
4.	Warana Ahmed Abad	13	5	9	9	0	-	Distribution, Source	7	VO ; GoE
5.	Chokara	18	3	12	7	5	-	Distribution	12	VO ; WUG ; GoE
6.	Jahangeri	14	3	15	9	5	1	Distribution , Access	15	VO ; WUG ; GoE
7.	Takht-e- Nasrati	7	3	23	23	-	-	Distribution , Source	16	VO ; GoE
	7	85	21	101	68	24	9		86	

Data Source : Social Assessment For WUMP – 2013-14 , Takht-e-Nasrati , District Karak

The community based organisations exist in 44 villages (out of 85) in Tehsil Takht-e-Nasrati and are listed hereafter (Table: 3.7).

**Table 3.7: Community Based Organisations in Tehsil Takht-e-Nasrati**

S. No.	Village Name	VO / WUG / WUA / GoE / Jirgah Name	S. No.	Village Name	VO / WUG / WUA / GoE / Jirgah Name
1.	Shaheedan Banda	Shaheedan WUG	41.	Tater Khel	Nil
2.	Shawa Nasrati	Formal Group of Women( LPH)	42.	Alam Sheri	Nil
3.	Mianki Banda	Roshnas WUG (Male) Zeenat WUG (Female)	43.	Sai Kot	Sai Kot Islahi Committee
4.	Bangi Kala	Shaheen WUG,	44.	Zangana / Zara Gandi	Nil
5.	Alwar Banda	VO Alwar Banda	45.	Suratikala	Nil
6.	Masoori Kala	Shaheen WUG, TAAWON WUG	46.	Zanaykala	Nil
7.	Ganderikhattak	Ghandheri WUG	47.	Narikhawar	Nil
8.	Nusrat Abad	Vo Nusrat Abad, Anqelab WUG	48.	Gohar Khel	PDWO
9.	Wagi Banda	VO Khalid Welfare Organisation	49.	DaruloloomChokara	PDWO
10.	Paki gudikhel	Nil	50.	Ameen Khel / Dawal	Nil
11.	Dagersar	Nil	51.	Gunjan Chokara	Nil
12.	Shah salim	Karwan water user group	52.	Penda Khel	Nil
13.	ShnawaGudi Khel	Mountan WUG	53.	Zarkhan Kala	Vo
14.	Hukami Band	Informal GoE	54.	Yousaf Khel	Nil
15.	Kari Dhand	VO	55.	Babel Khel	VO
16.	Mina Khel	Nil	56.	Ghafar Koroona	Nil
17.	Kasteerbanda	Nil	57.	Aral Banda	Nil
18.	Jarasi Banda	Nil	58.	Ahmed Wala	Vo
19.	Banjah Banda	Alkhair Welfare Organisation	59.	Ambiri Kala	Parwana Welfare organisation 2: Formation of WUG
20.	Nara janda Kheil	Nil	60.	Masti Khel	Nil
21.	Nara Gulla Kheil	Islahi Committee Shnwa Gudi Kheil	61.	Dinger Wala	Nil
22.	Mona Kheil	Zara Keel Welfare Organisation	62.	Krashki Kala	Nil
23.	Chakmanzai	Vo Yaqoobi Kala	63.	Dabaki Kala	Nil
24.	Fateh Banda	Sadaqat organisation	64.	Gundi Kalla	Nil
25.	Damgeriserijkhel	Nil	65.	Jahangeri Banda	Jahangeri WUG
26.	Gharang seraj khel Bala	Nil	66.	Jatan Banda	Oqaab WUG
27.	Gharang seraj khel payan	Nil	67.	Mirkhwas Banda	DafayeTanzeem (male), Islam Rana (Female)
28.	Shadi Khel	Nil	68.	Lakki Banda	Nil
29.	Mashkiwala / Kanda Zyarat	Shan-e-Seraj khel	69.	Inzar Banda	Alkhalid Welfare Organisation / Shaheen WUG male.
30.	Vankiseraj Khel	Shaheen Welfare Organisation	70.	Ibrahim Kheil	Ibrahim Kheil WUG (Female)
31.	Sarki Lawaghar	Al-Ahwan Welfare Organisation	71.	Machaki Banda	Ihsas Welfare Organisation
32.	Poya sarki lawagher	Nil	72.	Yaghee Musakan	Nil
33.	Mati Khel	Nil	73.	Hamidan Banda	Hamdan Welfare Organisation
34.	Ahmed Abad	VO Omeed	74.	Mir Adam Kala	Nil

35.	Warana ahmed Abad	Abaseen Welfare Organisation (Men)	75.	Hojakee Kala	Nil
36.	Warana Mir Hassan Khel / Ghari Khel	Nil	76.	Lagharee Rajab Khel	CCB Rajab Khel, Formed WUG
37.	Warana vilayat Khel	Nil	77.	Marrwatan Banda	Marwatan Welfare Organisation
38.	Warana Musakan	Falahi Committee	78.	Manzane Banda	Nil
39.	Ploskay Banda	Vo Paloskay Ajmeer Koroone	79.	Takht-e- Nasrati- Bala	Esar Welfare Organisaon
40.	Muhabbati Kala	Nil	80.	Zarke Nasrate	Nil
			81.	Takht-e-Nasrati-Kachere	Al Madina colony
			82.	Takht-e-Nasrati-Payan	Nil
			83.	Bogara	Salman Shah Korona Welfare Organisation
			84.	Muhabat khel (Bogara)	Nil
			85.	Khada Banda	Jazba WUGs

Source: WUMP Planning Exercise

### 3.5 Drinking Water Supply Status

Groundwater is the main source of drinking water in Tehsil Takht-e-Nasrati. Almost all water supply schemes are based on groundwater extraction through tube wells by Public Health Engineering Department (PHED). Individuals also extract groundwater through pressure pump / dug wells / hand pumps in order to meet the domestic demands. The different types and numbers of water sources are depicted in the table below.

Water Sources (Types & Number For Drinking Water Supply)						
Tube well	Pressure Pump	Dug Well	Hand Pump	Water Pond	Infiltration Gallery	Dam
181	1801	43	7	15	5	1

The quantity of extracted water for drinking purposes is calculated and shown in Table (3.3), whereas the water demand is given in Table (3.4). The water demand is based on the population of 362050 heads, livestock of 111606 heads and industrial water demand calculation as per population strength. The water quality is already discussed in § 3.2.4.

### 3.6 General Water Resource Analysis

All the aspects of water resources have been neither assessed nor explored in Tehsil Takht-e-Nasrati, whereas in the past some studies were regionally conducted either at the level of the province / country or a few at district level. In other words, no systemic and planned (hydrological, hydro geological, geophysical etc.) investigations have been carried out for the quality, quantity, availability, demand and balance of water resource in Takht-e-Nasrati. Water resource analysis is currently based on the available secondary data at a regional level, due to non-availability of specific primary data, e.g. long-term climatic data; stream flow / discharge data; aquifer characteristic data.

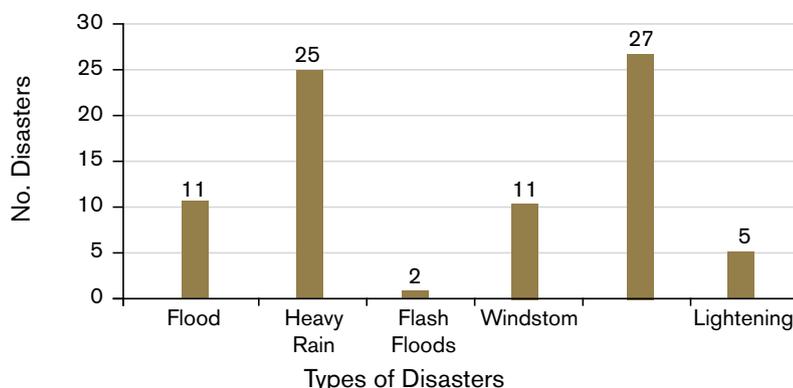
### 3.7 Disaster Risk Reduction

Tehsil Takht-e-Nasrati is also prone to various types of natural disasters such as floods; heavy rain, flash floods, windstorm, lightening and drought. Out of these disasters, floods are ranked as the highest probability. The different nature of disastrous incidents during 1994 – 2012 in Tehsil Takht-e-Nasrati and the data is given in table & graph below.

Sr.	Disaster Type	No. of Disasters	Period
1.	Flood	11	1994 - 2012
2.	Heavy Rain	25	
3.	Drought	2	
4.	Flash Floods	11	
5.	Windstorm	27	
6.	Lightening	5	

Source: Focus and Intercooperation Pakistan

Disaster (Types & No.) in Tehsil Takht-E-Nasrati during 1994 -2012



As a result local communities sometimes face disastrous losses and cannot manage in a sustainable manner. The irrigation infrastructures have been rendered nonfunctional due to floods. Owing to lack of proper preparedness, communities face difficulties in responding to disasters. In order to enhance preparedness against these disasters, organisations such as FOCUS Humanitarian and Intercooperation Pakistan carried out Risk Assessments as well as training sessions (after 2010) to build capacities and to organise communities.

### 3.8 Sanitation

Sanitation practices comprise of pit latrines, open defecation and flush latrines. Rain water and surface drains are mostly unpaved or stone lined. Majority of large households have no concept of septic tank provision and sewerage is being drained out directly into natural drainage system without any treatment. Furthermore due to open defecation, the sanitation situation is rather unsatisfactory. In the absence of proper drainage system, waste water finds its way into irrigation channels, streams and open fields. This situation is polluting the natural watercourses and channels. The social assessment conducted in the project area shows that the personal, domestic and environmental sanitation status seems moderate primarily due to lack of knowledge embedded by cultural practices / taboos and poor housing conditions. The water sources being used for drinking purposes also pose risk of contamination because of the open defecation near the water sources (in some cases).Furthermore the practice of keeping the domestic animals inside residential houses is common. The animal waste / dung are being collected openly into a pit near the house (usually in the yard). Such practices are one of the root causes of spreading diseases from waste and animal dung. The situation shows that there is a drastic need for improvement of the sanitation situation in the area through a programme that should include both awareness raising and training as well as support in improving sanitation facilities.

In Tehsil Takht-e-Nasrati, the generated solid waste is estimated as 39645 tonne / year (i.e. = 362052 \*@ 0.3 kg/capita/day; \* Population). The households throw their garbage either into open plots or in the streets and in the nearby natural drainage as there is no solid waste management system in the project area. 55% of households have pit latrines facility. The remaining households (45%) practice open defecation.

Table 3.8: Union Council-wise Sanitation Data

S. No.	Union Council Name (UC)	Village Council (No.)	Village (No.)	Pit Latrines Facility (% of HHs)	Open Defecation (% of HHs)
1.	Mianki	2	9	59.7	40.3
2.	ShnawaGudi Khel	3	15	28.3	71.7
3.	Seraj khel	2	9	57.4	42.6
4.	Warana Ahmed Abad	5	13	50.6	49.4
5.	Chokara	3	18	61.1	38.9
6.	Jahangeri	3	14	56.2	43.8
7.	Takht-e- Nasrati	3	7	71.3	23.7

Source: WUMP Planning Exercise

All these methods of disposal are the main cause of land and water pollution which threaten the local environment and the ecosystem and also causes unhygienic conditions. Local communities are not in a position to improve or introduce the existing level of the solid waste collection and disposal without guidance. There is a need to create a greater awareness on environmental sanitation.

### 3.9 Health and Hygiene Practices

Health and hygiene are important indicators of community well-being. The health facilities are very limited in the project area. Common diseases reported in the area are flu, diarrhea, malaria, typhoid, kidney disorders, hepatitis, stomach disorders and hypertension. The number of diseases indicate that water-borne diseases are commonly experienced. The water-borne diseases in the area are Cholera, Dysentery, Diarrhea, Malaria etc. and mostly children (70%) suffer from these diseases. In Tehsil Takht-e-Nasrati, the data on health and hygiene practices indicates that the community does not practice proper hygiene related rituals (e.g. only 28.3 % of community washes hands with soap).

On a daily average, 30-50 patients visit Takht-e-Nasrati (headquarter) suffering from water-borne diseases; among whom 25 are children and remaining are men or women. The death ratio against these diseases is 3%. A decade ago, the daily average was 45-60 patients which has reduced due to the availability of medical facilities and adoption of safe handling or drinking water practices. Diarrhea and dysentery are most common amongst children, observed at an incidence of 70% while the ratio of other diseases is 30%.

The spread of these diseases is mostly due to water contamination, lack of awareness about health and hygiene, malnutrition, open defecation and unavailability of proper sanitation facilities.

The availability of health facilities in the villages is far less than even the basic level which might be due to the carelessness of the community / government and of course, poverty. The UC-wise health facility data is tabulated in Table (3.9).

**Table 3.9: Union Council-wise Health Facility Data**

	No. of Union Councils (UC)	Village Council (No.)	Villages (No.)	Dispensaries	BHUs	Clinics	Hospitals	THQ	Medical stores
1	Mianki	2	9	3	2	-	-	-	-
2	Shnawa Gudi Khel	3	15	-	1	1	-	-	-
3	Seraj khel	2	9	1	-	6	-	-	-
4	Warana Ahmed Abad	5	13	2	4	3	-	-	-
5	Chokara	3	18	1	1	3	-	-	-
6	Jahangeri	3	14	-	2	1	-	-	1
7	Takht-e-Nasrati	3	7	-	-	-	2	2	-
Total	21	85	7	10	14	2	2	1	

Source: Tehsil Headquarter Hospital Takht-e-Nasrati District Karak-2015

### 3.10 Other

#### 3.10.1 Soil Conservation

In Takht-e-Nasrati, the capital earned from agriculture is one of the major sources of livelihood, but about 60% of agriculture land falls near down-stream of the seasonal flood streams (89 in number). The land is often destroyed due to the heavy rainwater runoff / flood. Since the last two decades, 1040 acre of land has been destroyed due to soil erosion. The situation is further intensifying as the rainfall patterns are becoming more erratic due to climate change.

In Takht-e-Nasrati, the rainwater / flood mostly flows away as runoff without any productive utilisation that amounts to 207 Mm<sup>3</sup> / year (about 60% of annual rainfall water). It often causes destruction of the agricultural land.

The local community adopts coping strategies in the shape of temporary clay-made diversions or protection structures to protect the land from flood water but these are not sustainable and cannot protect the land when the rain becomes excessive.

The Department of Soil Conservation is actively trying to find a solution to the problem and till now nothing substantial has come about. Although the Soil Department has constructed 30 disaster risk reduction (spurs) structures against the seasonal flood streams. Likewise 45 inlet / outlet structures have also been constructed.

Water for Livelihood Project also works towards reducing soil erosion problem during its 1st Phase. The Project initiated 5 DRR structures costing 5.6 Million in Takht-e-Nasrati Valley.

In addition to the above stated remedial measures for soil erosion / soil conservation , it is suggested to conserve and utilise the heavy rainfall / runoff water through rainwater harvesting, construction of subsurface dams and artificial recharge to groundwater (where required). It ultimately conserves the soil as well as provide sustainable water supply for irrigation and drinking purposes. The multi-purpose project can bring about revolutionary change in the livelihoods of the people of rain-fed areas.

### 3.10.2 Forest Conservation

In Tehsil Takht-e-Nasrati, the area under forests is very low and constitutes about 3-4% only. The total forest land in the entire district is about 8349 hectare, out of which 1669 hectare is in Tehsil Takht-e-Nasrati. The Forest Department's plantation / catchment area in the District is 3000 acre, out of which 600 acre is in Tehsil Takht-e-Nasrati.

The Forest Department has planted 1305000 plants till 2014 in District Karak, of which 26100 plants are planted in Tehsil Takht-e-Nasrati. Major forest trees in the area are Acacia, Indian Jujube (Ber), Rosewood (Sheesham), of which Jujube constitutes 45%, Acacia 35% and Rosewood 20%.

Major forest related issues are grazing, lack of community cooperation with the Forest Department, climate change, water scarcity and deforestation.





## Chapter 4 Planning and Development

### 4.1 Planning and Development Strategy

This WUMP for Tehsil Takht-e-Nasrati has been developed keeping in view social, economic and environmental needs of an area which needs to adopt multiple strategies to promote efficient and effective water resource utilisation. In the project area, it is evident that changing climate situation is giving rise to complex challenges for management of water resources. As a result of climate change the water availability is becoming uncertain and bringing about a vulnerable situation with increasing demand from local people. In addition, demographic changes have increased demand for space and resources across the area.

There are three principal components of recognised beneficial water use in Tehsil Takht-e-Nasrati, District Karak. These include municipal and industrial demand, agricultural demand and in-stream flow demand. Information about the water resources for these demand sectors was evaluated based on existing knowledge. Water demands were summarized for current conditions but major demands need to be projected for the future. This information provides a snapshot of how water is currently distributed in the area, and anticipates what this picture might look like in the coming years.

Municipal demand increases significantly due to population growth. Multiple assumptions create uncertainties in these demands, and changes in political conditions or environmental regulations could accelerate or delay these needs. The role of future municipal conservation will affect the demands, as will any modifications to the system that are under consideration at this time. Table (4.1)

**Table 4.1: Estimated Water Requirement For Domestic –Industrial-Livestock-Agriculture**

Water Requirement For	Water (Gal / capita / day )	2014		2025	
		Population	Mm <sup>3</sup> / yr.	Population	Mm <sup>3</sup> / yr.
Domestic use / consumption	40	362050	24.0303	508912	33.7780
Industrial	20	362050	12.0152	508912	16.8890
Livestock	7	111606	1.2963	163870	1.9034
			37.342		52.570

**Table 4.2: Water Requirement For Agriculture**

Land Type	Cultivated	Uncultivated
Land	(Existing)	(Future)
(acres)	44014	95616
(km <sup>2</sup> )	178	387
Water for Agriculture		
(acre-feet)	126577	274977
(Mm <sup>3</sup> )	236.260	513.254

The meteorological, hydrological data analysis and water requirement estimation for domestic / industrial / livestock & agriculture requirements clearly indicate that implementation of IWRM approach can play vital role to improve livelihood and overcome the current water shortage. The current issues that the community is facing are due to lack of water resource management / water distribution network / non-appropriate agriculture techniques application; no flood water storage etc. The community is striving hard to earn bread and butter for their families. They also wish to have a balanced livelihood without financial strains ensuring a better future, but the hurdles are poverty, no technical knowledge or guidance for the effective uses of resources and their management.

It was observed during social and technical assessments for data collection that the community possesses the potential for natural resources exploration / management and to solve majority of the issues if they are facilitated, properly guided and imparted skills. They have established associations / groups / organisations at village / village council levels for water use and other purposes; their setup needs to be enhanced in order to achieve the water sector goals.

Likewise, Intercooperation (IC) initiated the Water for Livelihood (W4L) project to address the water sector issues in semi-arid and poor districts of KPK. In general, the strategy is a series of policy objectives related to water resources management in the area (Figure: 1.1 & 1.2). The major elements of the WUMP Strategy are summarized briefly below:

Health of the tributaries is critical to maintain water quality and flow goals, and is a fundamental part of watershed health. To establish minimum flow targets for the tributaries, Actively manage consumptive uses of tributary flows, Improve the ecological condition of tributaries through community based watershed management practices, Develop small, multi-purpose storage projects to augment low flows in tributaries, Evaluate opportunities for replacement of tributary supplies for irrigation with other sources of water and Conservation of heavy rainfall / flood water can become an additional source of water to meet future needs.

Flood Management increases the natural flood storage capacity. Promote responsible land use practices and legal restrictions on floodplain development. Develop small, multi-purpose storage projects to provide flood control benefits. Pursue all viable alternatives to ensure a reliable, safe and cost effective water supply to meet future needs.

Highly treated wastewater effluent is an important water resource. Pursue the use of recycled effluent for other consumptive uses, i.e. irrigation, when these uses are economically feasible, publicly acceptable and demonstrate clear environmental benefits.

Through the WUMP process data collection, the land holding size and proportion in the Tehsil from landless come to 11%. The number of tenants is 9782 which constitutes 50%. Number of landholders who have more than 2 acre land is 2425 which is 12.4% of total. The landowners who have land between 0.6-2 acres is 4963 which is 25.4%. Number of subsistence less than 0.6 acre land is 2344 which stands to 12% of total.

Takht-e-Nasrati is a place where water resources are limited, however efforts are needed to utilise and manage the resources in a manner that people make optimum use of this resource for their livelihoods. At the same time, water is a major cause of vulnerability for local people in the form of minor and major water related disasters such as flash floods and torrential rains, which cause heavy erosion in the valley that damages productive assets like land, standing crops and road access.

Therefore the major highlights of the WUMP strategy in Tehsil Takht-e-Nasrati include (in the order of priority):

1. Improved access to potable water (drinking water supplies) through new schemes (rainfall harvesting, floods, subsurface storage / dam) as well as rehabilitation of the existing ones.
2. Improved access to irrigation water (irrigation water supplies) through developing new sources as well as rehabilitation of the existing ones.

3. Improved access to productive use of water (water channels, and improvement in existing water course) through lining and extension to new command areas.
4. Disaster risk reduction (protection, watershed management) through construction of check dams, flood protection structures and building community resilience.
5. Strengthening water management systems through local institutions to ensure effective implementation of WUMP under the auspices of District Authority.
6. Sensitise local communities in Takht-e-Nasrati regarding health and sanitation through raising awareness and demonstration.

The prioritisation was conducted with the representatives coming from all segments of village population (VO / WO) including males and females. During the process, in the Tehsil where joint sessions (male and female) were not possible, separate sessions were conducted with women groups to ensure inclusion of their say in the prioritisation of initiatives. In the second round, representatives from several villages in a Village Council came together to understand and prioritise the potential water sector issues based on mutually agreed selection criteria (water hardship, extent of beneficiaries, investment level, benefit to optimum land, multi-use, capacity to contribute, operate and maintain through beneficiaries involvement for enhanced sustainability).

With discussions at WUAs / WUGs level, the water related issues were better understood. The importance of watershed management in the long term sustainability also became visible in the prioritisation process.

During WUMP, the water sector GLAs (Public Health Engineering Dept., On-Farm Water Management, Irrigation Dept., Soil Conservation, etc.) were involved the Village Council level prioritisation processes. Due importance was given to the already existing lateral experience from projects in water sector in the Tehsil. At VC / UC / Tehsil level, the WUMP is further vetted and owned for long term assistance and commitment from District Authority.

## 4.2 IWRM Approaches

- The formulation of IWRM Plan follows a distinct four phase approach: Identify the range of water resource issues that occur across a Tehsil and assess their severity, mutual dependence and frequency of occurrence. A 'user requirement issue' results from an inadequate matching of user requirements (demand) and water resources availability and quantity (supply) while an 'impact issue' results from human activities (which negatively affects the quantity or quality of the water resource) or from natural causes in the case of floods and droughts. National and International issues would also be taken into account, for instance upstream- downstream issues.
- Identify measures and management interventions at all levels—national, basin / valley, local—which are necessary to address the issues identified. From the interventions required identify the management functions at each level. Management functions include such items as policy development, planning and coordination, water allocation, discharge regulation, monitoring, enforcement and information dissemination. Trans-boundary problems may require concerted international cooperation and joint efforts.
- Analyse the present institutional capacities at all levels - national, basin / valley, local and examine the potentials and constraints relating to the issues to be dealt with and functions to be undertaken. The capacities relate to factors such as the efficiency of institutional structures and the adequacy of human and financial resources as well as the adequacy of policies and legislation.
- Prepare strategies in consultation with different water related stakeholders for removal of any deficiency in the frame work of national policies, legislation and regulations for IWRM, for the development of institutional roles that allow a coordinated implementation of IWRM with required management instruments and associated skills. International strategies have to be developed in collaboration with other riparian nations.

## 4.3 Conservation and Protection of Water Resources

The limited fresh water resources as well as un-planned use of water resources at the community level have resulted in poor delivery of services in Tehsil Takht-e-Nasrati, in contamination and wastage in terms of drinking water. Whereas due to flash floods and use of saline water for irrigation has caused an imbalance in soil characteristics and reduced crop production. Due to high rate of evaporation in the area, the subsurface dam constructions will help conserve / store the water while the floods / rain water could be used for artificial groundwater recharge.

Waste water and solid waste needs to be disposed of properly by following the standard procedure that ultimately help to protect water resources from the contamination and environmental pollution.

Due to the deforestation and degradation of range lands in the Tehsil, any investment on water resources and its utilisation are at a risk of flash floods. Therefore during WUMP, identified initiatives have been considered integral with suitable environmental concerns such as initiating dialogues for watershed management with the support of Forest Department in Tehsil Takht-e-Nasrati.

#### 4.4 Multiple Use of Water

In Tehsil Takht-e-Nasrati, multiple water uses include access to drinking water, improved sanitation and irrigation. Currently, there is no multiple use of water schemes in the area. The relevant project - such as waste water to be treated and used for irrigation; subsurface dam as a protective storage of water as well as to conserve the excessive rainwater runoff, needs to be identified and implemented.

#### 4.5 Productive Use of Water

In Tehsil Takht-e-Nasrati, the productive use of water, such as extending irrigated farm land, improvement of existing water courses to improve conveyance and supply to un-cultivated land, introduction of efficient irrigation techniques and ensure mainstreaming disaster prevention in irrigation infrastructure - need to be adopted. In addition to enhanced productivity from land, access to proper agricultural extension services for better crop returns is equally important so that farmers make optimal use of water yet enhance productivity of the crops as well. In this regard access to services from Agriculture Extension Department is to be delivered.

#### 4.6 Efficient Use of Water

Domestic water supply and irrigation systems often face major water losses. These losses can be recovered through improving water supply systems and recycling the waste water for irrigation etc. Design, construction, operation and maintenance of systems also contribute to efficient use of water at various stages. In the area, the economical and efficient use of water approach is not in practice. All the water users ought to be made aware regarding the facts and introduced to efficient water usage techniques for irrigation.

#### 4.7 Water Use Disputes

The water related disputes have been identified in ownership on the basis of social assessment data. The causes of these disputes are either water distribution or water source or access to water. These disputes are being mostly resolved by the organisation established at village / village council level or traditional system "Jirga". The disputes (86 out of 101) in Tehsil Takht-e-Nasrati (Table 3.6) have been resolved by the organisations such as Village Organisation (VO) ; Water User Group (WUG) ; Water User Association (WUA); Group of Elders (GoE).

#### 4.8 Gender and Social Inclusion

In Tehsil Takht-e-Nasrati, both women and men are involved in carrying out agricultural activities, firewood collection and fetching of drinking water. Management of irrigation channels / system is however carried out by the male population. Women have a lot of contribution in maintaining drinking water posts, maintaining water supply to farms, irrigating agriculture fields etc. However this contribution is often invisible and unrecorded. Based on this premise, it is important to ensure implementation of women specific priorities (e.g. drinking water), and building their skills in maintaining water schemes close to their houses and farms as well as learning the art of record keeping.



## Chapter-5

### Water Use Management Plan (WUMP)

Water Use Management Plan (WUMP) applies participatory principles as an approach in identifying different water resources and needs for the use of water. It involves social and technical assessments of Village Councils (VCs) in a Tehsil with potential to make an integrated plan for water use in a rational, equitable, efficient and sustainable way. The WUMP basically consists of;

- WUAs based on demography (Socio-economic baseline information, water resources, opportunities, access, services, support available within and outside the VC, health, hygiene, sanitation and other developmental activities).
- Inventory of water sources with their available infrastructure and their current uses (existing situation of water use, level of facilities and functional status) - (Table 3.5).
- Inventory of existing uses of water resources under IWRM principles, respecting water supply and sanitation, irrigation and drainage, environment and related sectors.
- Gender sensitive, inclusive, pro-poor and socially accepted development priorities of the communities.
- Preliminary design and costing of potential investments including activities such as capacity building and taking care of the DRR aspects.
- Proposals of water projects contribute to recommendations towards changes in frame conditions. These would be prepared in view of the existing traditional water use systems and rules & regulations established to steer equitable water rights at Union / Tehsil / District levels.

The projects of different categories / sub-categories have been identified for WUMP (Tehsil Takht-e-Nasrati) and are summarised in Table 5.1 – A. The following yardstick is adopted for WUMP planning process:

- Participatory Planning- (Dublin Principle 2)
- Scarcity of Water (Water Hardship) - (Dublin Principle 1)
- Representative & Inclusive Management Committee (Dublin Principle 3)
- Technically & Financially Feasible and Socially acceptable
- Use of Internal resource of VC / Tehsil & Attracting Funds
- Potential of improving the livelihoods of Locals
- Awareness & improving frame conditions towards equitable water rights

The Tehsil is considered on the basis of Union councils, village councils, and villages. A number of schemes under different categories, have been identified for different villages. The details regarding these schemes are available at page 61 to 79.

**Table 5.1– A: Summary of Proposed Schemes , WUMP Tehsil Takht-e-Nasrati**

Sr. No.	Scheme		No. of Schemes	Estimated Cost RS. (Million)	Page No.
	Category	Sub-Category			
1.	Drinking Water Supply Schemes	Filtration Plants	3	25.5	61
		Ground / Overhead Water Tanks	12	21.5	61
		Pipeline for water distribution	54	61.95	62 -65
		Pipeline for water distribution & Water Tank	11	19.1	66
		Machinery Repair	3	4.6	67
		Solar System for tube well operation	14	21.5	67
		Misc. (Mini Dam for DWSS, Tube well rehabilitation etc.)	10	11	68
		Water Tank	12	9.1	69-70
2.		Irrigation	Mini Dam , Channel , Pipeline,Storage Tank	26	55.69
3.	Sanitation	Street Pavement , Drainage Repair, Sewerage , Pit Latrines	15	9.5	71-72
4.	Disaster Risk Management	Spur , Protection Wall	51	73.66	76-79
Total	211	313.1			

In addition to the above stated project, the government needs to pay attention and arrange the required fund for the water resources assessment / investigation schemes as listed in (Table 5.1 – B).

**Table 5.1- B : List of Proposed Water Resources Assessment / Investigation**

Sr. No.	Name of Scheme	Remarks
1	Groundwater & Surface Resources Assessment in Tehsil Takht-e-Nasrati , District Karak	The estimated cost can only be determined after collecting primary / secondary data and the required analysis
2	Feasibility study for sub-surface dam & artificial groundwater recharging in Tehsil Takht-e-Nasrati , District Karak	
3	Assessment / study for heavy metals in water resources	
4	Assessment / study for Uranium concentration in water resources	
5	Environmental pollution & control	
6	Sewerage waste treatment & disposal	
7	Solid waste recycle & disposal	
8	Development and conservation of resources in range land	

## 5.1 WUMP for VCs / Tehsil Planning (Village level WUMP)

The VCs / Tehsil Council and District Development Advisory Committee (DDAC) can use their WUMP(s) as a planning tool for

- Annual planning of water sector activities
- Interaction with an organised group of beneficiaries (WUAs) at Tehsil level
- Investment Plan for Donors / NGOs / government agencies to work in concern with WUAs
- DDAC can make acceptance for WUMP and its prioritised investment plans as a pre-condition to work in the water sector in VCs since a baseline study on the existing conditions as well as priorities has been set up in a truly participatory approach
- Enabling easy updating of water resource inventory and water related infrastructure / facilities, which is currently unavailable
- Become a precedence desired by Water User Communities (WUC) towards changes in framed conditions

Some schemes have been identified and prioritised at village / VC levels. The details regarding these schemes are available at page 61 to 79.

## 5.2 Proposed Water Supply and Sanitation Schemes (New & Rehabilitation)

### 5.2.1 Water Supply

The drinking water supply schemes (DWSS – 118 in number) have been identified in the Tehsil. The DWSS are further sub-categorised and coded as assigned. The details of 118 DWSS are on pages 61 to 70 and the codes used for the types of schemes are in Table (5.2) on page 59.

### 5.2.2 Sanitation

The sanitation schemes (SAN - 15 in number) have been identified in the Tehsil. The SAN are further sub-categorised and coded. The details of which on page 71 to 72 as well as the codes in Table (5.2) on page 59.

## 5.3 Proposed Irrigation Schemes

The irrigation water supply schemes (IWSS - 26 in number) have been identified in the Tehsil. The DWSS are further sub-categorised and coded as assigned. The details of 26 DWSS are on page 73 to 75 and the codes are given in Table (5.2) on page 59.

## 5.4 Proposed Multiple Use system Application

Presently, the identified multi-use system applications are mostly Subsurface Dams and Artificial Groundwater Recharges.

## 5.5 Proposed Environment and Ecology Schemes

Presently, no environmental pollution, monitoring and control works are being carried out in the project area. It is recommended to initiate the study "Environmental Monitoring & Control" (page viii)

The increase in water demand for domestic use - caused by population growth and the rising standard of living, has led to over-utilisation of its renewable water sources affecting ecology and environment.

- Currently, natural resources (like Oil & Gas; Uranium) exploration may create some challenges in future; so it needs to be addressed today for a better tomorrow
- Existing sanitation system would surely create irreversible conditions (i.e. health hazards, water resources contamination, environmental pollution)

## 5.6 Proposed DRR Mitigation Management & Others

The current project deals with District Karak with specific emphasis on Tehsil Takht-e-Nasrati which has a semi-arid climate. Such regions are always characterised by highly variable and unpredictable rainfall which is a precursor for more attention. The causes of the crises are both natural and man-made, intensified by several years of drought.

### 5.6.1 Proposed DRR Mitigation Management

Natural disasters are a leading cause of land erosion, damage to existing irrigation water infrastructure and affecting all dimensions of food security including access to food, availability and stability of food supplies. For disaster risk reduction in the area different schemes have been proposed to overcome the worst conditions.

The Disaster Risk Reduction schemes (DRR; 51 in number) - Spur, Protection Wall have been identified in the Tehsil. The DRR are further sub-categorised and coded. The details of these 51 schemes are on page 76 to 79 and the codes used are given in Table (5.2) on page 59.

The additional schemes regarding drought and flood management need to be initiated in due course.

### 5.6.2 Proposed Water Resources Assessment / Investigation

The detailed water resources assessment / investigation and related schemes are proposed in order to determine groundwater / surface water potential, water quality, chemical analysis of water, groundwater recharge / discharge components, determine groundwater balance, electrical resistivity survey to map / investigation of subsurface formation (lateral and vertical direction). The schemes as listed in Table 5.1 – B.

## 5.7 Proposed Supporting Activities and Required Skills

In order to best apply the management schemes and systems and get high value from their application, supporting activities are suggested. Certain skills are a key to the process of change and sustainability.

The activities suggested as a result of the current project will help gain the skills to keep the system intact and running. Top of the list in the supporting activities is the process of involving the community and creating awareness about the management tools. Periodic hands-on trainings would enhance the chances of gaining the desired results.

Inclusion of masses in the process of understanding is of utmost importance. Assigning the management of prioritised resources to community members will give them the sense of ownership leading to a higher level of mutual benefit.

The scarcity of water resources in this semi-arid region of district Karak calls for better skills to manage water and hence improve the quality of life and environment. This is true for all the union councils and villages in the project area. The services of professionals need to be integrated to improve coordinates among GLAs at all & district level that will be helpful to assess, to develop and monitor the resources of the area. The professional in the field of agriculture, water resources, environment, health caring, needs to give the necessary awareness and educate residents, so that they become able to manage the natural resources on solid technical grounds.

## 5.8 Village Council Level WUMP

The changes at grassroots level can only be beneficial if the changes and modified management benefit the lowest levels. In recent study, the lowest level of Tehsil Management is Village Council. Beneficiaries should be duly considered while implementing initiatives through proper design partnership agreement and role in Operation & Management as per need of the party involved.

Allocation of budget is a key issue in WUMP on village levels. While rehabilitating and improving current facilities, rigorous investigations should be carried out to assess the changes overtime.

## 5.9 Prioritisation of Proposed Schemes and Criteria

The proposed schemes are prioritised by adopting the steps (1-6) of WUMP Development Process (DP); i.e. following the steps of the phases (Preparatory & Assessment Data Collection) of WUMP. In these processes, all necessary tools have been used for collecting the social and technical data / information, in order to achieve the objectives. The service provider for Social & Technical Facilitation has constituted three teams and each comprise of a field engineer, a male and a female social organiser. All activities have been carried out under the supervision of professionals / executives from Intercooperation, Peshawar.

It seemed that there is a gap between water resources availability and demand that needs to be managed. Detailed data regarding the gap was collected before proceeding to next phase (i.e. implementation) of WUMP. So it became necessary to take the measures as listed hereafter:

- Evaluate the feasibility of each scheme
- Check for viability and economic design
- Determine groundwater potential, map groundwater quality, calculate recharge and discharge component & groundwater budget / balance
- Alternate water sources (subsurface / sand dams, artificially recharge groundwater, rainfall harvesting etc.) identification and feasibility studies

## 5.10 Investment Plan (Short, Medium, & Long- Term)

The proposed schemes that are prioritised after the assessments can be executed after the basic analyses / assessment as stated earlier. The beneficiaries would obtain some relief. It is suggested that the integrated water resource management approach needs to be followed precisely, so that a fruitful output can be achieved after making the investment. The execution of schemes and other assessment activities to be carried out side-by-side are:

1. Water (Surface & Groundwater) Resources Assessment
2. Water Quality Study (especially for pollution / contamination aspect)
3. Water Resources Management
4. Water Resources Conservation (e.g. subsurface dam, artificially recharge the groundwater)
5. Agriculture Research & Development (i.e. for suitable crop types in Change Climate Scenario (CCS) ; saline water utilisation for crops and fruit gardening)
6. Environmental Monitoring & Control

### 5.11 Formulation of Detailed Action Plan (year wise)

Action plans to be formulated on basis of each area's (Village / VC) situation and requirements (the issues and demands) are surely going to be different area-wise. The basic development and installation of all assessment and feasibility studies are to be funded by the government and O & M cost to be charged accordingly by keeping in view the economic status of the locals.

The regulation of water rights are to be framed after development of this resource in addition to those as discussed earlier. The optimisation and conservation of water resources as well as water supply, sewerage water & solid waste can only be suggested after conducting the respective feasibility study and design analysis of each individual initiative. Such measures are necessary and important to control rights violations. As it is noticed that some residents who have no access to water have to pay a huge amount (Rs. 82.199 million per annum) for buying water from those who receive it either free of cost or by paying a nominal sum. The affected residents belong to different union councils; detail is given in table below.

Sr.	Union Council	Total No. of HHs Alternate ways of DW (i.e. Purchase )
1.	Seraj Khel	290
2.	Mianki , Chokara , Jahangeri	1768
3.	Shnawa Gudi Khel , Warana Ahmadabad , Takht-e-Nasrati	3770

### 5.12 Implementation Modalities of Action Plan

The implementation of action plan / schedule is available on page 83 to 85 for the identified schemes (as categorised in Table 5.1 –A) on the basis of social & technical assessments data.

However, the action plan is to be chalked out for the schemes as listed in Table 5.1 -B, after the principle agreement on conducting the required assessments / investigations. Generally, the respective study needs to be completed stepwise within one and a half year. In the light of which, the related tasks are to be executed in the remaining period.

### 5.13 Potential Collaborators, Capacity Building and Resource Identification

The professional team / organisation setup needs to be established at district level and comprised of professional teams (Hydro-geologist, Geophysicist, Hydrologist, GIS Professional and other allied staff). Consultants would provide necessary on-project training to GLAs / WUMP allied. The capacity building objective can also be achieved for water resources assessment, management and development.

The services of consultants - having the relevant professional experiences in the field of groundwater, geology , hydrology and geophysics, would identify the resources and would provide detailed strategic plan for development, conservation etc.

### 5.14 Monitoring of Action Plan

The project is to be executed under direct control of WUMP organisational setup and technical guidance from the consultants. Professionals and members of WUMP organisation will monitor the action plan.

**Table 5.2: List of Codes used for the different types of schemes**

Code	Type of Scheme	Sub Type of Scheme
DWSS-FP	Drinking Water	Filtration Plant
DWSS-GWT	Drinking Water	Ground Water Tank
DWSS-WT	Drinking Water	Over Head Tank
DWSS-WT-PL	Drinking Water	Over Head Tank, Supply Line
DWSS-PL	Drinking Water	Networking – Pipe line extension / replacement
DWSS-R	Drinking Water	Repairing of machinery
DWSS-SP	Drinking Water	Spur
DWSS-ISS	Solar System	Tube well Energy
DWSS-MD	Mini Dam	Storage

DWSS-NTW-WT-PL	Drinking Water	New T.W, 4000ft Pipe line & cover existing ground water tanks
DWSS-TWREH	Tube well Rehabilitation	Rehabilitation of DWSS
DWSS-WP	Water For Livestock	Water pond
DWSS-SW	Drinking Water	Safety wall
DWSS-TWR	Drinking Water	Tube well repairing
IR-C	Irrigation	Channel
IR-PW	Irrigation	Gate / protection wall
IR-DS	Irrigation	Diversion Structure
IR-MD	Irrigation	Mini Dam
IR	Irrigation	Inlet and Outlet
IR-PL	Irrigation	Pipe line
IR-PL-ST	Irrigation	System
IR-MD	Mini Dam	Delay Action
IR-SD	Irrigation	Small Dam
SAN-SP	Sanitation	Street Pavement
SAN-D	Sewerage System	Drainage Repairing
SAN-SP-D	Hygiene Sewerage	Street , Sewerage
SAN-L	Establishing Latrines	Health and Hygiene
SAN-D	Hygiene	Drainage
SAN-DR	Hygiene	Drainage Repairing
DRR-SP	DRR	Spur
DRR-DIS	Diversion Irrigation Bund	Irrigation land under command
DRR-WSM	Watershed Management	Irrigation and soil erosion

## 5.15 Proposed WUMP Schemes

61 -79

Sr. No.	Scheme		Page No.
	Category	Sub-Category	
1 To 118	Drinking Water Supply Schemes	Filtration Plants	61
		Ground / Overhead Water Tanks	61
		Pipeline for water distribution	62 - 65
		Pipeline for water distribution & Water Tank	66
		Machinery Repair	67
		Solar System for tube well operation	67
		Miscellaneous	68
		Water Tank	69 - 70
119 To 144	Irrigation	Mini Dam , Channel , Pipeline, Storage Tank	73 - 75
145 To 159	Sanitation	Street Pavement , Drainage Repair, Sewerage , Pit Latrines	71 - 72
160 To 210	Disaster Risk Management	Spur , Protection Wall	76 - 79







## Chapter-6

### WUMP Implementation, Mobilisation and Updating

#### 6.1 WUMP Implementation Agreement & Contents

WUMP will be implemented through engaging WUGs / WUAs with technical support of GLAs / Consultants. Village Councils, Tehsil Councils and District Development Committee would be kept aware of the process and the progress made. Government line agencies will support the WUAs to develop and strengthen collaborative mechanisms with potential technical support and supervision during implementation and operation of community based schemes. For long-term realisation of water related projects the District / Tehsil is also expected to connect with organisations having resources and interest to offer assistance in water related initiatives in WUMP.

Secondly, the WUMP schemes are to be implemented after a detailed feasibility study and economic design analyses as already discussed in § 5.12. The essential assessment / investigation is to be carried out and finally analysed schemes are to be implemented under the supervision of competent authorities. WUMP schemes implementation schedule is worked out and presented hereafter (Pp: 83- 85).

#### 6.2 WUMP Implementation Advocacy

Key parties involved in mobilisation for WUMP are WUA, WUA, CBO, Local NGOs and government line departments at District & Tehsil level including Local Government bodies.

### Parties Involved for WUMP Mobilisation

Organisation	Responsibility
WUA / WUG	<ul style="list-style-type: none"> <li>Stay connected with the WUG and keep them motivated for realisation of Water Sector improvement.</li> <li>Ensure that village priorities and information are collected through WUG.</li> <li>In post-WUMP step, maintain regular contact with WUG forum.</li> <li>During or post-WUMP phases, provide any conflict mediation support required to WUG.</li> </ul>
Local NGOs	<ul style="list-style-type: none"> <li>Build capacity of WUG and WUA through organisational management.</li> <li>Guide the process of priority identification and bring up real social dimensions and deserving beneficiaries up front.</li> <li>Ensure that the WUAs are inclusive and gender concerns are duly represented in the WUGs.</li> <li>Support WUAs in their advocacy efforts to mobilise resources for WUMP.</li> <li>Link technical departments and Water Users' Associations for their smooth functioning together.</li> <li>Liaise for proper representation of WUA / WUG</li> </ul>
District Authorities	<ul style="list-style-type: none"> <li>Provide legal and administrative acceptance and support to WUMP implementation</li> <li>Allocate resources for the implementation of WUMP in the district development plan</li> <li>Provide timely technical services to WUAs / WUGs in WUMP implementation</li> <li>Remain involved in participatory monitoring and provide feedback to the district government for improvement in delivery of water sector service.</li> <li>Take issue for larger policy change / improvement (if required) with higher authorities through initiating dialogue</li> </ul>
SDC funded W4L project and WUAs	<ul style="list-style-type: none"> <li>Ensure timely coaching and guidance at all levels</li> <li>Steer WUMP process in collaboration with the district government</li> <li>Organise timely trainings as scheduled in WUMP.</li> <li>Ensure support through timely flow of funds and assistance in water governance</li> </ul>

### 6.3 WUMP Updating and Procedure for changes as needed

WUMP will be implemented after vetting by DCC. On yearly basis, members of Water User Association will review priorities and necessary adjustments will be made according to emerging needs (and removal of redundant activities). For any kind of amendment, 70% of WUG / WUA members will agree and vet necessary amendments in WUMP. These changes will be further verified at Village and Tehsil Councils before approval of District Development Committee.

### 6.4 WUMP Reporting, Coordination and Ownership between stake holders

Village level reporting will be responsibility of WUGs / WUAs for which local NGO will be the focal organisation. This would be reviewed on an annual basis through an assembly of WUAs / WUGs.

The information / technical data / work execution record are to be kept by following standard procedures, so that the same data can be used for further analyses in future. There shall be monitoring of the required water resource and suggestions shall be based on data / results obtained from feasibility / design analysis / working execution. The procedures for all such matters shall be decided by the concerned authorities.



Annex

**Scheme Category: Drinking Water Supply Scheme**

S. No.	Code	Union Council (UC) Name	Village Council (VC) Name	Village Name	Sub Type of Scheme	Detail	Description of proposed site	Expected Cost of the Scheme (Million.)	Benefited /under Risk HHs	Village Level Priority (Category Rank)
<b>Sub-Category : Filtration Plant</b>										
1.	DWSS-FP	Siraj Khel	Sarki Lawaghar	Sarki Lawaghar	Filtration Plant from Dam		Lawaghar Dam	12	1000	B
2.	DWSS-FP	Chokara	Chokara Ahmad Abad	Babal kheil	Filtration Plant	Contaminated Water	TW	1.5	200	B
3.	DWSS-FP	Siraj Khel	Siraj Khel	Wanki Siraj Khel	Filtration Plant from Dam		Lawaghar Dam		4000	D
<b>Sub-Category: Water Tank / Over Head Tank</b>										
4.	DWSS-GWT	Shnawa Gudi Khel	Nara Banda	Fateh banda	GWT	10000 gallon capacity	Near Mufti khali TW	9	120	A
5.	DWSS-GWT	Siraj Khel	Sarki Lawaghar	Poya Sarki Lawaghar	GWT	15000 gallon tank	Asmat Kuruna	0.9	40	A
6.	DWSS-WT	Warana Ahmad Abad	Warana Mir Hassan khel	Warana Mir Hassan Khel	OHT	OHT required to store water	Mir Hassan Khel	1.5	280	A
7.	DWSS-WT	Chokara	Chokara	Nari Khwara	OHT	OHT at Nari Khwara	Gul Pio Kuruna	1.2	200	A
8.	DWSS-WT	Chokara	Ghundi kala	Denger Wala	OHT	20 x 20	TW	0.6	120	A
9.	DWSS-WT	Jhangiri	Khojaki	Laghari Rajab- Khel	OHT	40000 gallons OHT	Laghari	1.7	200	A
10.	DWSS-WT-PL	Warana Ahmad Abad	Tatter khel	Aalamsheri	OHT, Supply Line	OHT required to store water	Mir Hassan Khel	1.5	280	A
11.	DWSS-WT	Chokara	Chokara Ahmad Abad	Babal kheil	OHT	OHT is required to prevent water from wasting	Babal Kheil	1	100	A
12.	DWSS-WT	Chokara	Chokara	Aral Banda	OHT	OHT is required to prevent water from wasting	Aral Banda / Niaz Abad	1	140	A
13.	DWSS-WT-PL	Chokara	Ghundi Killa	Ghundi Killa	OHT PIPE LINE	20 x 20, 1500ft, 3in Dia	TW	1.6	200	A
14.	DWSS-GWT	Shnawa Gudi Khel	Shah Salim	Jarasi Banda	GWT	15000 gallon tank	Near Molana Farooq TW	1.4	550	B
15.	DWSS-WT	Siraj Khel	Siraj Khel	Wanki Siraj Khel	OHT	1 x 20ft x 10ft	Wanki	0.7	300	C

16	DWSS-PL	Mianki	Shaheedan Banda	Shaheedan Banda	Shaheedan Banda	Shahedan Banda	Networking	6000ft, 3in Dia PVC / GI	From Guldali / mufti WSS	0.7	40	A
17.	DWSS-PL	Mianki	Shaheedan Banda	Shaheedan Banda	Shawa Nasrati	Shaheedan Banda	Pipe line	4500ft Length	From other village	0.6	300	A
18.	DWSS-PL	Mianki	Shaheedan Banda	Shaheedan Banda	Mianki	Mianki	Pipe Line	8500ft, 3in Dia	Mianki	1.1	75	A
19.	DWSS-PL	Mianki	Shaheedan Banda	Shaheedan Banda	Alwar Banda	Alwar Banda	Pipe line	4500ft Length	Alwar Banda	0.6	70	A
20.	DWSS-PL	Mianki	Shaheedan Banda	Shaheedan Banda	Mansori Kala	Mansori Kala	Networking	2000ft, 3in Dia PVC	WSS Mansori Kala	0.4	400	A
21.	DWSS-PL	Mianki	Gandari Khattak	Gandari Khattak	Gandari Khattak	Gandari Khattak	Pipe line	2000ft	Gandari khattak	0.8	400	A
22.	DWSS-PL	Mianki	Gandari Khattak	Gandari Khattak	Nusrat abad	Nusrat abad	Networking	12000ft, 3in Dia PVC	From Anwar Zuman WSS	1.7	100	A
23.	DWSS-PL	Mianki	Gandari Khattak	Gandari Khattak	Nusrat abad	Nusrat abad	Networking	12000ft, 3in Dia PVC	From Anwar Hamayoon WSS		170	D
24.	DWSS-PL	Mianki	Gandari khattak	Gandari khattak	Wagi Banda	Wagi Banda	Pipeline	1200ft	Wagi Banda		70	A
25.	DWSS-PL	Shnawa Gudi Khel	Shah Salim	Shah Salim	Dager Sir	Dager Sir	Networking	10000ft, 3in Dia PVC	TW	1.8	300	A
26.	DWSS-PL	Shnawa Gudi Khel	Kari Dhand	Kari Dhand	Kari Dhand	Kari Dhand	Pipe line	8000ft		1.6	350	A
27.	DWSS-PL	Shnawa Gudi Khel	Shah Salim	Shah Salim	Gombatti Mina Khel	Gombatti Mina Khel	Networking	10000ft, 3in Dia PVC	From Musharf WSS	1.3	140	A
28.	DWSS-PL	Shnawa Gudi Khel	Shah Salim	Shah Salim	Jarasi Banda	Jarasi Banda	Networking	10000ft, 3in Dia PVC	From Haji Gul Zuman WSS	1.3	700	A
29.	DWSS-PL	Shnawa Gudi Khel	Kari Dhand	Kari Dhand	Banjakh Banda	Banjakh Banda	Pipe line	6000ft, 3in Dia	Bunjakh Banda	0.9	200	A
30.	DWSS-PL	Siraj Khel	Siraj Khel	Siraj Khel	Damgari Siraj Khel	Damgari Siraj Khel	Pipe line	3000ft, 3in dia	Damgari	0.45	60	A
31.	DWSS-PL	Siraj Khel	Siraj Khel	Siraj Khel	Damgari Siraj Khel	Damgari Siraj Khel	Networking	10000ft, 3in Dia HDPE pipe from under construction t / w	Garang Seraj Khel		450	A
32.	DWSS-PL	Siraj Khel	Siraj Khel	Siraj Khel	Garang Seraj Khel Payan	Garang Seraj Khel	Networking	10000ft, 3in Dia HDPE pipe from under construction t / w	Garang Seraj Khel		450	A
33.	DWSS-PL	Siraj Khel	Siraj Khel	Siraj Khel	Shadi Khel	Shadi Khel	Networking	12000ft, 2in Dia PVC		1.2	170	A

34.	DWSS-PL	Siraj Khel	Siraj kheil	Kanda Siraj kheil (Maski wala)	Pipe line	300ft infgal extension, 600ft drinking mashti koroona, 2000ft kutub deen koroona	Mashki Wala	1	81	A
35.	DWSS-PL	Warana Ahmad Abad	Warana Mir Hassan khel	Warana Mir Hassan Khel	Pipeline	7000 feet	TW	0.9	230	A
36.	DWSS-PL	Warana Ahmad Abad	Warana Mir Hassan khel	Warana Welayat Khel	Networking	2000'@3" PVC / GI	From Khan Khail WSS	2.9	500	A
37.	DWSS-PL	Warana Ahmad Abad	Seekot	Seekot	Networking	12000ft, 3in Dia GI	From Amberi Kala WSS	1.9	400	A
38.	DWSS-PL	Warana Ahmad Abad	Seekot	Zara gandi	Pipeline	6000ft	PHED	0.8	210	A
39.	DWSS-PL	Warana Ahmad Abad	Surati kala	Surati kala	Pipeline	5000ft pipeline, 3in dia	Surati Kala	1.1	700	A
40.	DWSS-PL	Warana Ahmad Abad	Surati kala	Zanya kala	Main pipe	4000ft	Zanay Kala	1.6	270	A
41.	DWSS-PL	Chokara	Chokara	Goher Khel	Networking	1000ft, 3in Dia PVC	From Rafiq WSS	1.9	65	A
42.	DWSS-PL	Chokara	Chokara	Dar-ul-alom Gundi Chokara	Pipeline	3000ft	Darloom	1.3	65	A
43.	DWSS-PL	Chokara	Chokara Ahmad Abad	Yousah khel	Networking	2000ft, 3in Dia PVC / GI	From Yosaf Khel Bala WSS	1.1	60	A
44.	DWSS-PL	Chokara	Chokara Ahmad Abad	Ghafar koroona	Networking	2000ft, 3in PVC / GI		1	60	A
45.	DWSS-PL	Chokara	Ghundi Kalla	Ambiri kalla	Pipeline	5000ft, 3in Dia	Ambiri kalla	1.1	220	A
46.	DWSS-PL	Chokara	Ghundi Killa	Karashki Killa	Pipeline	10000ft, 3in Dia	Karashki Killa	1.5	190	A
47.	DWSS-PL	Jahangiri	Jahangiri	Jahangiri Banda	Networking	12000ft, 3in Dia PVC	From Anwar Zuman WSS	1.6	170	A
48.	DWSS-PL	Jahangiri	Jahangiri	Mir khawas banda	Networking	5000ft, 3in Dia PVC	From WSS	0.8	40	A
49.	DWSS-PL	Jahangiri	Jahangiri	Inzar Banda	Pipeline	5000ft	TW	4.2	60	A
50.	DWSS-PL	Jahangiri	Jahangiri	Ibraheem kheil	Networking	5000ft, 3in Dia PVC	TW	1	40	A
51.	DWSS-PL	Jahangiri	Yaghi mosakan	Mosakan	OWT	10000 gallon capacity	Near Hujra Miradam Koroona	1.1	80	A
52.	DWSS-PL	Jahangiri	Yaghi mosakan	Hamidan Banda	Pipeline	1000ft, 3in dia water tank 10ft x 10ft x 8ft	Hamidan Banda	2.7	200	A

53.	DWSS-PL	Jahangiri	Khojaki	Khojakkki Killa	Pipeline	5000ft	TW	0.7	130	A
54.	DWSS-PL	Jahangiri	Khojaki	Marwatan	Networking	10000ft, 3in Dia PVC / GI	From WSS Humayun	1.2	120	A
55.	DWSS-PL	Jahangiri	Khojaki	Mazini Banda	Networking	10000ft, 3i Dia PVC / GI	TW	1.2	120	A
56.	DWSS-PL	Takht-e-Nasrati	Tkhti Nasrati Bala	Tkhti Nasrati Bala	Networking	8000ft, 3in Dia PVC	From Inf.gal WSS	1.5	250	A
57.	DWSS-PL	Takht-e-Nasrati	Tkhti Nasrati Bala	Zarki Nasrati	Pipeline	6000ft	From Chata Banda TW	1.5	200	A
58.	DWSS-PL	Takht-e-Nasrati	Takht-e-nasrati paya	Takhti Kacheri banda	Pipe line	3000ft, 4in Dia	Kachehri Kuruna	0.3	150	A
59.	DWSS-PL	Takht-e-Nasrati	Bogara	Khada Banda	Networking	6000ft, 3in Dia PVC	From Guldali / Mufti WSS	0.4	40	B
60.	DWSS-PL	Shnawa Gudi Khel	Shah Salim	Shah Salim	Pipe line	4000ft	DWSS from TW	0.8	200	B
61.	DWSS-PL	Shnawa Gudi Khel	Nara Banda	Fateh banda	Networking	9000ft, 3in Dia PVC	From Mufti khalil TW	0.6	50	B
62.	DWSS-PL	Siraj Khel	Siraj Khel	Wanki Siraj Khel	Pipe line	10000ft, 3in Dia	Wanki	0.5	200	B
63.	DWSS-PL	Siraj Kheil	Sarki Lawagar	Mati kheil	Pipe line	3000ft, 3in dia	Mati kheil	1.1	31	B
64.	DWSS-PL	Warana Ahmad Abad	Warana Mir Hassan khel	Warana Ahmad Abad	Pipeline	4000 feet	TW	1.3	120	B
65.	DWSS-PL	Chokara	Chokara	Daroloom Gundi Chokara	Pipeline			3.3	400	B
66.	DWSS-PL	Chokara	Ghundi Kalla	Masti kheil	Pipeline	3000ft, 3in dia	Mati kheil	1.2	31	B
67.	DWSS-PL	Jahangiri	Jahangeeri Banda	Jattan Banda	Networking			0.6	70	B
68.	DWSS-PL	Takht-e-Nasrati	Takht-e-nasrati paya	Takhte nasrati payan	Pipeline	2500ft, 3in dia	Takht-e-nasrati	0.3	200	B
69.	DWSS-PL	Shnawa Gudi Khel	Shah Salim	Shnawa Gudi Khel	Pipe line	Pipeline from tube wells	Dug Wells	1.5	80	C
69.	DWSS-WT-PL	Shnawa Gudi Khel	Nara Banda	Nara Gulla Khel	Water Tank 10ft x 10ft x 8ft & 2000ft pipe line	Water Tank 10ft x 10ft x 8ft & 2000ft pipe line	Nara Banda	2.4	200	A
70.	DWSS-WT-PL	Shnawa Gudi Khel	Nara Banda	Chakmanzaie	Water Tank, Pipeline	Water tank 6 x 10ft x 8ft, pipe line 7000ft	Chak manzai	1.8	300	A
71.	DWSS-WT-PL	Warana Ahmad Abad	Warana Mir Hassan khel	Ahmed abad	Water Tank, Pipe line	9000 feet	TW	1.5	200	A

72.	DWSS-WT-PL	Warana ahmed abad	Warana Musakan	Warana Musakan	Pipe line, WT	Fetch water from open water pond	12000ft, 4in Dia	2	180	A
73.	DWSS-WT-PL	Warana Ahmad Abad	Ahmad abad	Paloskai Banda	Networking, WT	10000ft, 2in Dia PVC	From Doctor WSS	1.3	170	A
74.	DWSS-WT-PL	Warana Ahmad Abad	Tatter kheil	Tatar kheil	4 Water tank, 3000ft pipe line of 3in dia	4 Water tank, 3000ft pipe line of 3in dia	Tatar Kheil	2	100	A
75.	DWSS-WT-PL	Chokara	Chokara	Dawola / Ameen Khel	Water tank, pipeline	1500ft of 3in dia pipeline & water tank of 10ft x 10ft x 8ft	Dawola	2	550	A
76.	DWSS-WT-PL	Chokara	Chokara	Payanda kheil	Pipeline+W T	3000ft	Daroloom	1.3	65	A
77.	DWSS-WT-PL	Chokara	Ghundi Kalla	Ahmad walla	Pipeline, WT	6000ft, 4in dia & 10 x 100 tank	Ahmad Walla	1.6	250	A
78.	DWSS-WT-PL	Chokara	Gundi kala	Dabaki kala	Water Tank, Pipeline	Water tank 10ft x 10ft x 8ft & 3000ft pipeline	Dabaki Kala	2	200	A
79.	DWSS-WT-PL	Jahangiri	Jahangiri	Marchaki banda	Pipeline water tank	3000ft Pipeline, 10ft x 10ft x 8ft water tank	Marchaki Banda	1.2	238	A
<b>Sub-Category : Machinery Repair</b>										
80.	DWSS-R	Warana Ahmad Abad	Warana Mir Hassan khel	Warana Welayat Khel	Repairing of machinery	Machinery repairing an	Qatar Charity DTF installation Khalifa	1.4	550	B
81.	DWSS-R	Warana Ahmad Abad	Tatter kheil	Mohabatti kala	Repairing and networking	Repairing of WSS Saif ur Rehman machinery 2000ft, 3in Dia PVC	Malik Square	1.3	170	B
82.	DWSS-SP	Chokara	Ghundi Kalla	Ambiri kalla	Spur	2 x 100	Flood Stream	1.9	110	D
<b>Sub-Category : Solar System for tube well operation</b>										
83.	DWSS-ISS	Mianki	Shaheedan Banda	Mianki	Tube Well Energy		Tube well	1.5	50	D
84.	DWSS-ISS	Shnawa Gudi Khel	Nara Banda	Nara Janda Khel	Solar System		Installation of SS in Tube Well	1.6	300	A
85.	DWSS-ISS	Shnawa Gudi Khel	Nara Banda	Nara Gulla Khel	Solar System		Installation of SS	1.6	200	A

86.	DWSS-ISS	Shnawa Gudi Khel	Nara Banda	Mona Khel	Solar System	Solar System	Mona Khel	1.5	200	A
87.	DWSS-ISS	Chokara	Chokara	Payanda kheil	Solar System	Solar System		1.7		B
88.	DWSS-ISS	Shnawa Gudi Khel	Kari Dhand	Kari Dhand	Tube well	Tube well	System	1.7	350	B
89.	DWSS-ISS	Chokara	Chokara	Gunjan Abad	Solar System	Solar System		1.7		B
90.	DWSS-ISS	Chokara	Ghundi Kalla	Ahmad walla	Solar System	Solar System	TW	1.7	200	B
91.	DWSS-ISS	Shnawa Gudi Khel	Shah Salim	Shah Salim	DWSS	Installation of solar system	Tube well	1.6	100	C
92.	DWSS-ISS	Warana Ahmad Abad	Warana Mir Hassan khel	Warana Ahmad Abad	Solar System	Solar System		1.6	140	C
93.	DWSS-ISS	Warana ahmed abad	Warana Musakam	Warana Musakan	Solar System	Solar System		1.8	180	C
94.	DWSS-ISS	Warana Ahmad Abad	Ahmad abad	Paloskai Banda	Solar System	Installation of solar system	TW	1.7	110	C
95.	DWSS-ISS	Jahangiri	Jahangiri	Inzar Banda	Solar System	Solar System	TW	1.7	120	C
96.	DWSS-ISS	Chokara	Ghundi Killa	Ghundi Killa	Solar System	Solar System		1.6	200	D
<b>Sub- Category: Miscellaneous</b>										
97.	DWSS-MD	Shnawa Gudi Khel	Shah Salim	Paki Gudikhel	Storage		Village	2.2	300	A
99.	DWSS-NTW-WT-P	Shnawa Gudi Khel	Shah Salim	Hukami Banda	New T.W, 4000ft Pipe line & cover existing ground water tanks	New T.W, 4000ft Pipe line & cover existing ground water tanks	Hukami Banda	4	350	A
100.	DWSS-TWREH	Shnawa Gudi Khel	Shah Salim	Shah Salim	Rehabilitation of DWSS	Machinery repairing	Tube wells repairing	0.9	300	A
101.	DWSS-WP	Shnawa Gudi Khel	Kari dand	Kasteer Banda	Water pond	4 x 20ft x 40ft x 6ft	Kasteer banda			A
102.	DWSS-WP	Shnawa Gudi Khel	Kari dand	Kasteer Banda	Water pond	4 x 20ft x 40ft x 6ft	Kasteer banda			A
103.	DWSS-SW	Jahangiri	Yaghi mosakan	Mir adam kala	Safety wall	TW		0.3	130	B
104.	DWSS-TWR	Chokara	Ghundi Killa	Karashki Killa	Tube well repairing			0.4	200	B
105.	DWSS-TWR	Chokara	Ghundi Killa	Ghundi Killa	Tube well repairing			0.4	200	C
106.	DWSS-TWR	Jahangiri	Yaghi mosakan	Mir adam kala	DW			0.5	150	C
<b>Sub- Category: Water Tank</b>										
107.	DWSS-WT	Mianki	Gandari Khattak	Gandari Khattak	Water tank	10ft x 10ft x 8ft	Gandari khattak	1.8	400	A
108.	DWSS-WT	Siraj kheil	sarki lawagar	Mati kheil	Water tank	10ft x 10ft x 8ft	Mati kheil	1	31	A

109.	DWSS-WT	Chokara	Chokara Ahmad Abad	Zarhan kala	Water tank	10ft x 10ft x 8ft	Zarhan kala	0.8	150	A
110.	DWSS-WT	Chokara	Ghundi Kalla	Masti kheil	Water tank	10ft x 10ft x 8ft	Mati kheil	0.9	31	A
111.	DWSS-WT	Takht-e-Nasrati	Bogara	Muhabat kheil	Water tank	Water tank	TW	1	100	A
112.	DWSS-WT	Mianki	Shaheedan Banda	Bangi Kala	Water Tank	20 x 20	Tube Well	0.9	140	B
113.	DWSS-WT	Shnawa Gudi Khel	Nara Banda	Nara Janda Khel	Water Tank	10ft x 10ft	OWT	0.3	150	B
114.	DWSS-WT	Siraj Khel	Siraj kheil	Damgari Siraj Kheil	Water tank	10ft x 10ft x 8ft	Damgari	0.3	60	B
115.	DWSS-WT	Siraj Khel	Siraj kheil	Kanda Siraj kheil (Maski wala)	Water tank	10ft x 10ft x 8ft	Mashki Wala	0.4	21	B
116.	DWSS-WT	Warana Ahmad Abad	Surati kala	Surati kala	Water tank	Water tank of 10ft x 10ft x 8ft	Surati kala	0.9	700	B
117.	DWSS-WT	Siraj kheil	Sarki Lawaghar	Sarki Lawaghar	Water tank	1 x 30ft x 30ft	Networking	0.5	300	C
118.	DWSS-WT	Mianki	Shaheedan Banda	Shawa Nasrati	Water tank	2 x 10ft x 10ft x 8ft	Shawa	0.3	300	D

