



RAWALPINDI REGIONAL DEVELOPMENT PLAN

WATER RESOURCES AND IRRIGATION SECTION



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IRRIGATION DEPARTMENT PUNJAB
SMALL DAMS ORGANIZATION
JAMMERGAL DAM
MAIN DAM
TYPE --- EARTH FILL DAM
CATCHMENT AREA ---- 4.86 SQ.MILES
LENGTH AT TOP ---- 500 FT
WIDTH ---- 20 FT
HEIGHT OF DAM ---- 63 FT
LIVE STORAGE ---- 1650 AFT
R. L. ---- 890.81
DEAD STORAGE ---- 1502 AFT
D. S. L. ---- 879.25
GROSS STORAGE ---- 1152 AFT
H. F. L. ---- 887 FT
TOP LEVEL ---- 903

Introduction:

Water is a prime factor in all sectors of life and has a major contribution towards survival of livelihood. For the development of urban agriculture sector, water is one of the most important contributory factors and a major issue for sustainable development. There is no scarcity of water resources in Pakistan but it needs to be conserved. The efficiency of each sector is towards declination due to the poor water management techniques. Construction of small dams is a step towards revolution in water sector development and to match water needs in the barani areas of the country. The barani area is totally dependent upon the surface water flows, and to conserve this auspicious resource there is need for construction of small dams. In Rawalpindi region, there is scarcity of water resources especially due to ground water abstraction.

The Rawalpindi region, comprising on Rawalpindi, Attock, Chakwal and Jehlum districts of the Punjab, lying between the Indus and Jehlum rivers and bounded on the north by the Hazara Hills and on the south by the Salt Range. Its elevation varies from 1,000 to 2,000 ft (300 to 600 m) in a system of residual hills and hillocks formed from glacial debris as remnants of the Ice Age. The Kala Chitta Range thrusts eastward across the plateau toward Rawalpindi; the valleys of the Haro and Soan rivers cross the plateau from the eastern foothills to the Indus.

Total Area of Potohar region is 5.55 million acres. Presently cultivated area is 35-45 per cent. Population of Potohar is 10.007 million (2017 census data). Rural Population is 70 per cent. Area equipped with irrigation system is 11 per cent. Rainfall intensity during monsoon is 60-70 per cent. Total runoff is 2.31 billion cubic meters (1.88 MAF). The land of Potohar plateau is broken and uneven. The average runoff is about 1.88 MAF, whereas only 0.26 MAF (14%) runoff has been tapped so far by 58 small to medium dam projects (Source: Small Dams Department, Irrigation Potohar Zone, 2023). The balance runoff of 1.318 MAF (Approx.) still flows towards sea, unutilized. In Potohar area two third of the total annual rain precipitates during the three monsoon months of summer i.e. July, August and September, while the remaining nine months are nearly dry. Moreover, the delayed monsoon and erratic winter rainfall which is a common feature, makes the availability of water very uncertain. On the other hand, the topography of the hilly areas, with steep ground slopes, helps the rain water to form into numerous streams running at high velocities, resulting in erosion of the fertile agricultural barani land. This drought cycle is frequent. Consequently, the only solution is to build dams, to conserve the rain runoff for agriculture and sustainable water supply for domestic water utilization.

Ground water in Potohar plateau, is generally available along the natural streams. In other areas ground water is not available even up to 300 feet depth, therefore, only sources of drinking water are mini to medium size reservoirs. The water needs of rapidly growing population of cities, towns & villages are met through existing reservoirs, mini ponds, ground water pumpage, which are also under threat in respect of future requirements.

Water Resources of Rawalpindi Region (Potohar Plateau)

The Rawalpindi region located in Barani area of the Punjab. The barani area is totally dependent upon the surface water flows, and rainfall runoff water. The Rawalpindi region is located in Potohar plateau in Punjab. The Potohar irrigation zone of Punjab irrigation department is sole custodian to develop water resources sources for drinking, irrigation, recharge, fishing, and environmental water requirements through construction of small to medium dams in region.

The Indus river basin in Pakistan is being divided into two plains i.e. upper and lower Indus plain. The upper Indus plain comprises of Himalayan piedmont, the doabs, and the Suleiman piedmont. The Punjab Irrigation consist of eight (08) irrigation field administrative zones as listed below.

- I. Lahore Zone
- II. Sargodha Zone
- III. Faisalabad Zone
- IV. Sahiwal Zone
- V. Multan Zone
- VI. Bahawalpur Zone
- VII. Dera Ghazi (D.G.) Khan Zone
- VIII. Potohar Zone.

The salient feature of irrigation zones is shown in table 1.

Table 1: Salient Features of Punjab Irrigation Zones

Descriptions	Lahore Zone	Sargodha Zone	Faisalabad Zone	Sahiwal Zone	Multan Zone	Bahawalpur Zone	Dera Ghazi Khan Zone	Potohar Zone
No of Channel	549	576	350	262	331	706	423	-
Length of main, branch, and link canals (Miles)	725	657.75	544.00	454.00	344.65	519.60	453.00	-
Outlets (No.)	12,499	9,046	8,380	6,709	6,100	7,812	8,197	-

Gross Command Area (M. Acres)	4.50	4.69	3.44	3.76	1.83	3.50	2.33	-
Culturable Command Area (M. Acres)	4.00	4.11	3.22	3.03	1.66	3.25	2.11	-
Design flow (Cusec)	29,767	23,225	21,294	15,528	9,292	3,593	20,088	-
Length of Drains (Miles)	527	1835.27	1500	1552.29	425	498.18	412	-
No of Small Dams	-	-	-	-	-	-	-	58

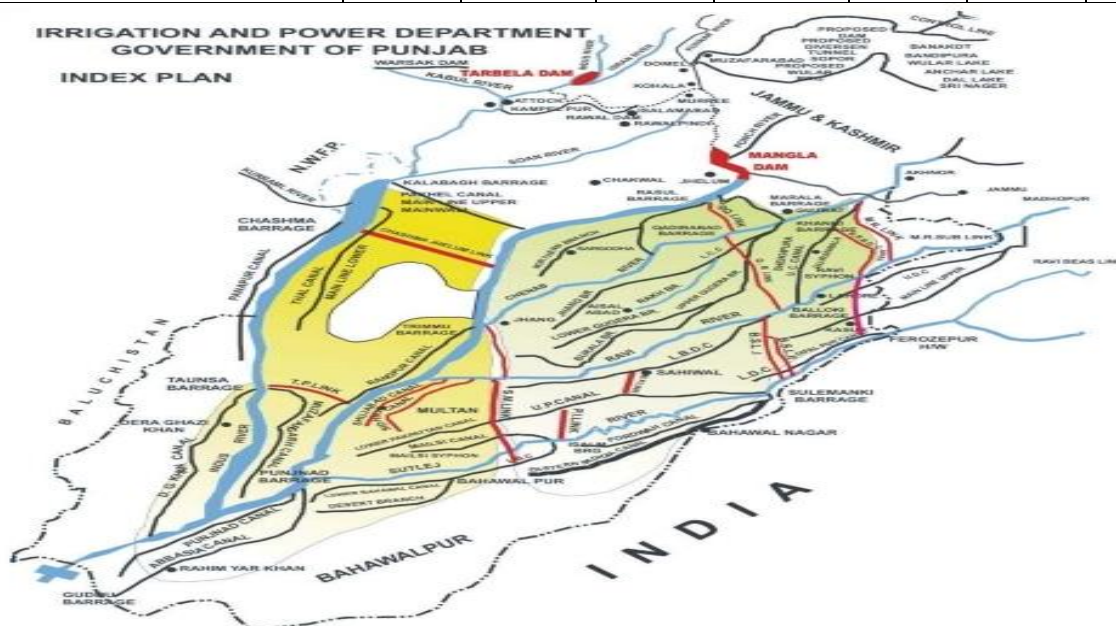


Figure 1: Punjab Irrigation Network Index Plan

The district-wise water resources storages with utilizations in Potohar irrigation zone are provided in table no. 1.

Table 2: District-wise Water Storage Dams in Potohar Irrigation Zone (Source: PID)

District Name	Completed Dams	Gross Storage (A-Ft)	Drinking Purpose	G.C.A (Acres)	C.C.A. Irrigated (Acre)
Islamabad	2	38,259	23	1050	757
Rawalpindi	9	48,323	12	21,449	3,076
Chakwal	19	57,425	4.51	19,039	15,103
Attock	17	107,922	3.64	23,405	11,879
Jhelum	11	38,484	-	14,330	7,080
Total	58	239,521 (0.239 MAF)	43.15-MGD	79,273	37,895



Figure 2: Layout Plan of Punjab Irrigation Potohar Zone

Irrigation and Water Resources Assessments of Rawalpindi Region:

The water resources storages developed by Potohar irrigation zones are mainly utilized for domestic use, livelihood use, agricultural irrigation, and watershed management. A detailed irrigation and water resources assessment survey was conducted by irrigation and water resources specialist. An introductory meeting was held between chief engineer (planning) and Urban unit team at Potohar



Irrigation zone Rawal dam irrigation colony, Islamabad. It was concluded in meeting that irrigation department key responsibilities are as follow in Barani areas.

- Construction and maintenance of small and medium dams for irrigation, water supply and aquaculture.
- Design and construction of irrigation network for command area development.
- Operation & maintenance of dams.
- Water management at primary / secondary level & equitable water distribution.
- Irrigation and drainage network management.

The Rawalpindi region is comprised on following four Potohar irrigation zones.

- 1. Small Dams Rawalpindi District.**
Mr. Sheikh Hamza Saeed (Executive Engineer)
- 2. Small Dams Attock District.**
Ms. Fatima Mobeen (Executive Engineer)
- 3. Small Dams Chakwal District.**
Mr. Naeem ul Hasnain Executive Engineer)
- 4. Small Dams Jhelum District.**
Mr. Fahim Fareed (Executive Engineer)

Water Resources Assessment in Rawalpindi District

The small dam Rawalpindi district develop water resources storages as primarily source of drinking water and secondly is being utilized for irrigation. The surface water resources in Rawalpindi district are shown in figure 3.

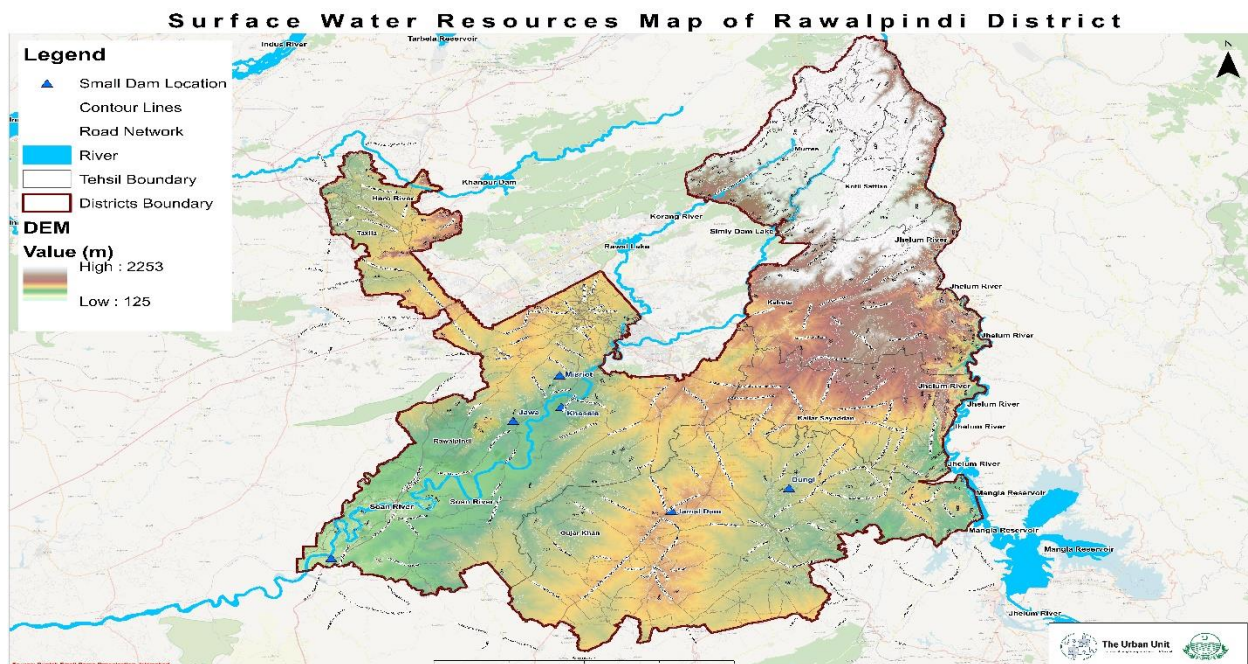


Figure 3: Surface water resources map of Rawalpindi District

A detailed discussion session was conducted between urban unit water team and executive engineer of small dams Rawalpindi district. Eleven dams existed under jurisdiction of small dam's department Rawalpindi district out of which two existed in Islamabad and nine dams are located in Rawalpindi district boundary. Only two dams, i.e. Rawal and Chahan dams, are fulfilling water supply demand of Islamabad and Rawalpindi. The total water supply of 35 MGD is being provided by these two dams. The salient features of these dams are shown in table 3.

Table 3: Salient features of Dams in Small Dams Irrigation Zone Rawalpindi

Sr. No.	Name of Dam	Location	Year of Completion	Gross Storage Capacity (A-ft)	C.C.A. (Acres)/ Drinking (MGD)	Maximum Irrigated Area (Acres)	Status
Islamabad							
1	Rawal	N33°41'37.8" E73°7'22.49"	1962	37,397	500/23	343	Operational
2	Dhok Sanday Mar	N33°39'34.21" E72°51'39.31"	1990	862	550/-	414	Operational
Grand Total				38,259	1050/23	757	
Rawalpindi							
1	Misriot	N33°30'59.95" E72°59'26.74"	1963	573	100	110	Operational
2	Nirali	N33°19'31" E73°23'50"E	1970	754	315	256	Operational
3	Dungi	N33°17'30" E73°17'52"	1971	1760	246	224	Operational
4	Khasala	N33°26'46.12" E72°58'15.04"	1985	2415	1250	740	Operational
5	Jawa	N33°25'40.47" E72°56'7.00"	1994	1575	850	734	Operational
6	Chahan	N33°27'34.00" E72°52'54.17"	2022	27,386	12000 / 12 MGD	0	Operational
7	Phalina	N33°24'08" E73°19'38"	2007	3900	2200	203	Operational
8	Ughan	N33°17'25" E73°18'01"	2012	8100	3000	564	Operational
9	Jamal	N33°17'13" E73°07'15"	2006	1860	1488	245	Non-operational
Grand Total				48,323	21,449/12	3,076	

A site survey was also conducted with field staff of small dams of Rawalpindi for assessment of water resources infrastructure.



Figure 4: Irrigation and water resources assessment of Rawalpindi District

Major issues identified during field surveys were as follow;

1. Depletion of storage capacity of Rawal Dam due siltation.

- II. Shortage of water resources to fulfill district water supply.
- III. Water logging issues due to deterioration of drainage infrastructure of chill drain in Chach area.

The following projects proposed are:

- A. Restoration of Rawal Lake reservoir through desilting during high flow season through flushing and low flow season through de-silting/excavation.
- B. Rehabilitation and upgradation of Chill drain in Chach area.
- C. Installation of telemetry system for regular monitoring of water storage and operation management of water inflow in Rawal Dam.

Irrigation Small Dams office, Attock District

A brainstorming session conducted between executive engineer of small dam's department Attock district.

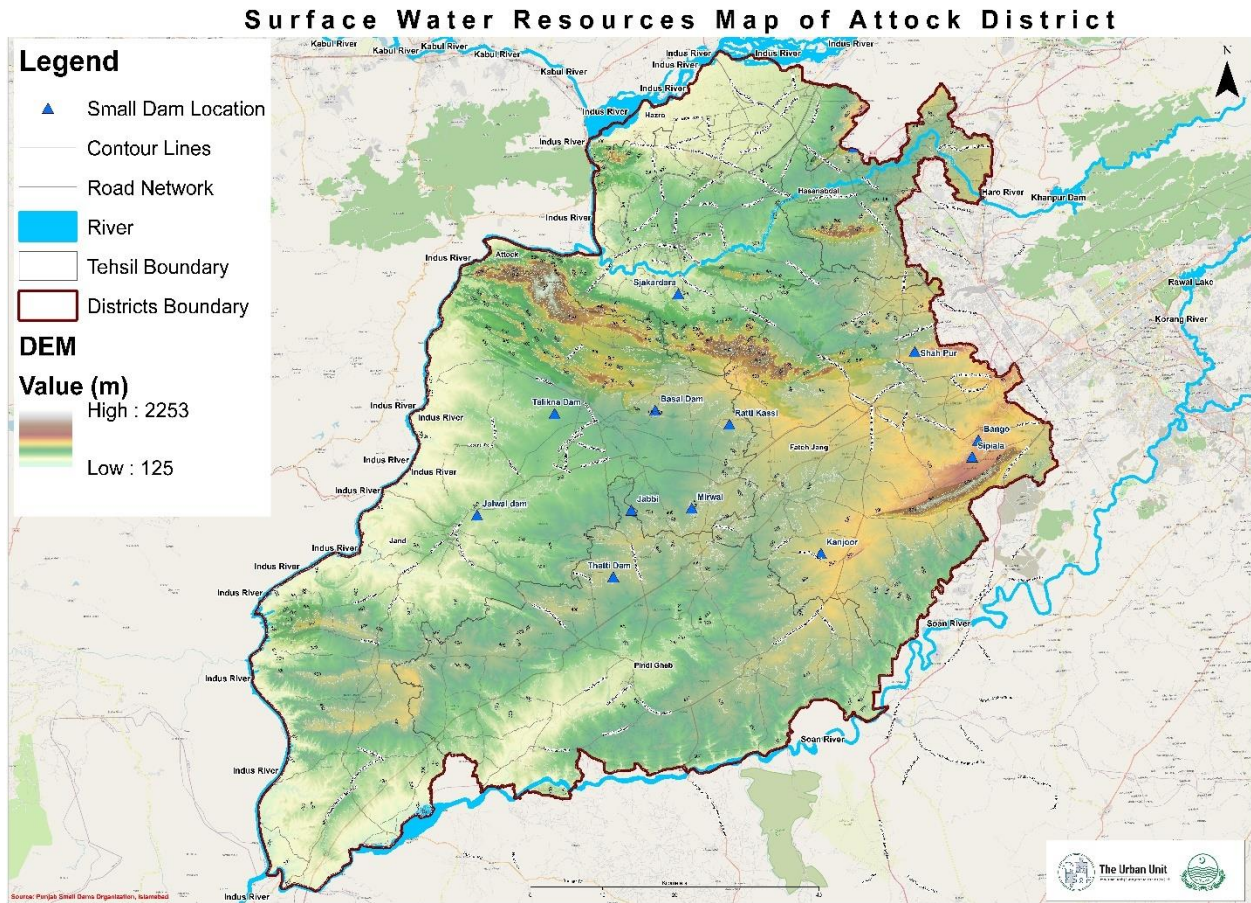


Figure 5: Surface water resources map of Attock District

The executive engineer explained about existing scheme and issue faced during field operation & maintenance. She shared that Seventeen dams existed in

Attock district which irrigated approximately 11,900 acres and fulfill water supply demand upto 3.64 MGD in Attock district. The salient features of these existing dams are given in table 4.

Table 4: Salient features of Dams in Small Dams Irrigation Zone Attock District

Sr. No.	Name of Dam	Location	Year of Completion	Gross Storage Capacity (A-ft)	C.C.A. (Acres)/ Drinking (MGD)	Maximum Irrigated Area (Acres)	Status
1	Sipiala	N 33°32'26.6'' E72°46'54.41''	1964	568	140	112	Operational
2	Ratti Kassi	N33°33'15.76'' E72°23'16.11''	1970	2116	650	965	Operational
3	Kanjoor	N33°24'34.21'' E72°32'14.97''	1978	2824	2000	725	Operational
4	Channi Bor	N33°33'32.61'' E72°20'43.79''	1979	958	1500	1237	Operational
5	Qibla Bandi	N33°53'16.54'' E72°34'51.03''	1971	3650	850	704	Operational
6	Shahpur	N33°37'09.38'' E72°40'29.60''	1986	14320	1231/3	875	Operational
7	Mirwal	N33°28'19.19'' E72°19'36.07''	1990	3765	1050	697	Operational
8	Jabbi	N33°28'33.26'' E72°13'17.77''	1991	3079	1500	794	Operational
9	Shakar Dara	N33°41'39.05'' E72°19'21.96''	1994	5679	4200	2792	Operational
10	Thatti Syedan	N33°25'47.81'' E72°12'39.55''	2006	680	300	675	Operational
11	Sawal	N33°15'10.26'' E72°34'52.35''	2006	2400	930	132	Operational
12	Talikna	N33°34'18.66'' E72°15'59.84''	2006	2050	550	708	Operational
13	Jabba	N 33°19'47.67'' E71°54'11.20''	2006	860	400	260	Operational
14	Basal	N 33°33'56.68'' E72°17'57.41''	2004	1700	400	507	Operational
15	Haji Shah	N33°52'50.30'' E72°19'8.60''	2015	2200	1520	450	Operational
16	Sowra	N33°15'39.83'' E72°09'22.59''	2021	4224	2300 /0.64	113	Operational
17	Jalwal	N33°33'10.73'' E72°00'70''	2006	5000	2364	133	Non-Operational
Grand Total				107,922	23,405/3.64	11,879	

A site survey was also conducted with field staff of small dams of Attock district for assessment of water resources infrastructure



Figure 6: Irrigation and water resources assessment of Attock District

Major issues identified during field surveys were as follow;

- I. Shortage of water resources to fulfill district water supply and irrigation.
- II. Rehabilitation/upgradation of existing Irrigation Infrastructure.
- III. Command area development

The following projects proposed are:

- A. Construction a dam on perennial stream near Jodh village.
- B. Flood protection bunds along Indus river at Khair-abad bridge, Attock to mitigate flood damages in surrounding urban areas.
- C. Installation of telemetry system for regular monitoring of water storage at newly proposed dam site.
- D. Installation of telemetry system for regular monitoring of water level at flood protection bund on Indus River.

Irrigation Small Dams office, Chakwal District

The water resources conducted a detailed water resources assessment Chakwal district. This district is most productive source of small to medium dams due to its topography and rainfall. The figure 7 shows surface water resources in Chakwal district.

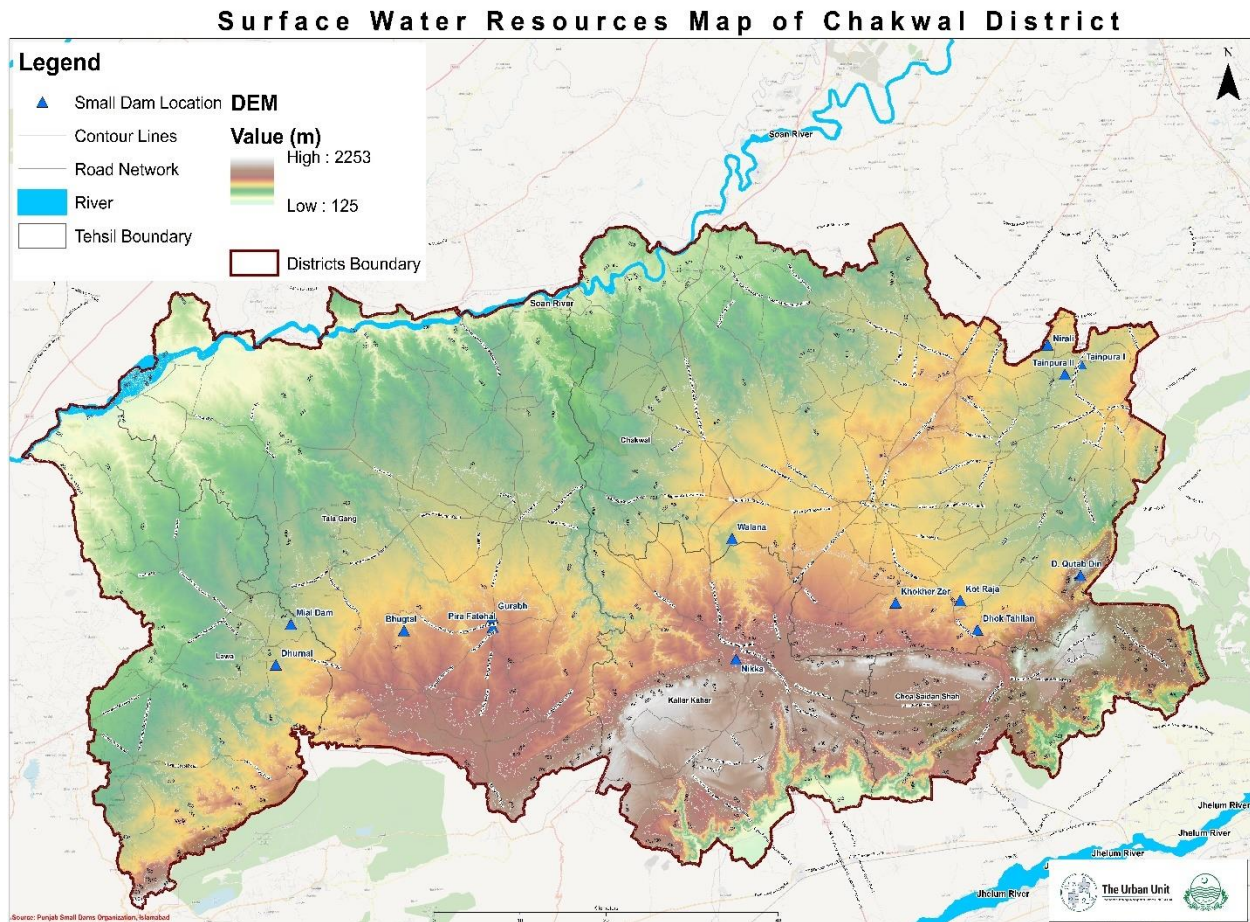


Figure 7: Surface water resources map of Chakwal District

A detailed meeting conducted with executive engineer small dam's department Chakwal district. The executive engineer and his field team explained about importance of Chakwal regarding water availability potential in area. The small dam department of Chakwal district are mainly developing water resource storages for agriculture and water supply is their second in priority. Currently, they are in process of enhancing water storage capacity of Khokhar Zai and Kot Raja dams. This increase in storage capacity of these dams will be utilized to fulfill future agricultural water demand.

The detailed descriptions of existing dams are shown in table 5.

Table 5: Salient features of Dams in Small Dams Irrigation Zone Chakwal District

Sr. No.	Name of Dam	Location	Year of Completion	Gross Storage Capacity (A-ft)	C.C.A. (Acres)/ Drinking (MGD)	Maximum Irrigated Area (Acres)	Status
1	Khokhar Zer	N32°48'24" E72°51'34"	1979	3601	2,680 / 1.29	2276	Operational
2	Surla	N32°47'20" E72°50'30"	1985	2119		0	Operational
3	Walana	N32°52'31" E72°37'32"	1984	2193	830	714	Operational
4	Nikka	N32°47'43" E72°41'17"	1990	1248	777	790	Operational
5	Dhok Qutab Din	N32°48'02" E72°57'32"	1991	1976	706	873	Operational
6	Kot Raja	N32°48'27" E72°59'48"	1991	3550	835 / 0.64	723	Operational
7	Arrar Mughlan	N32°56'31" E73°03'44"	2019	5300	1800	96	Operational
8	Ghazial	N32°58'41" E73°09'25"	2007	2000	900 / 1.29	338	Operational
9	Dhok Tahlian	N32°47'27" E72°58'39"	2002	1808	850	897	Operational
10	Mundee	N33°02'24" E73°07'22"	2012	450	400	160	Operational
11	Dhok Jhang	N32°47'47" E72°55'10"	2012	2650	1070	1238	Non-Operational
12	Minwal	N33°02'21" E72°52'03"	2007	2000	750	205	Non-Operational
13	Khai	N32°48'45" E72°45'52"	2007	5921	1800 / 1.29	713	Non-Operational
14	Gurabh	N32°51'22" E72°21'42"	1966	922	1346	1390	Operational
15	Dhurnal	N32°48'14" E72°05'54"	1971	1950	700	708	Operational
16	Dhok Hum	N33°49'58" E72°16'47"	1990	8000	1230	1400	Operational
17	Bhugtal	N32°48'54" E72°14'03"	1990	1140	680	715	Operational
18	Mial	N32°52'00" E72°06'54"	2004	3200	935	962	Operational
19	Pira Fatehal	N32°51'58" E72°19'33"	1994	7400	750	905	Operational
Grand Total				57,425	19,039/4.51	15,103	

A site survey was also conducted with executive engineer field staff of small dams of Chakwal district for assessment of water resources infrastructure and identification potential addition surface water storages.



Figure 8: Irrigation and water resources assessment of Chakwal District

Major issues identified during field surveys were as follow;

- I. Shortage of water resources to fulfill district water supply and irrigation.
- II. Rehabilitation/upgradation of existing Irrigation Infrastructure.
- III. Command area development to enhance agricultural productivity.
- IV. Electro-mechanical monitoring system to regulate water outflow for agriculture/water-supply.

The following projects proposed are:

- A. Construction a dam on perennial stream for agriculture and water supply.
- B. Installation of telemetry system for regular monitoring of water storage at newly proposed dam site.
- C. Watershed development through eco-system restoration.

Irrigation Small Dams office, Jhelum District

A brainstorming session conducted between executive engineer of small dam's department Jhelum district and water resources expert of urban unit. The water expert explain purpose of this visit and shared surface water resources map of Jhelum developed by Urban unit with intention to highlighted potential water resources options in Jhelum district.

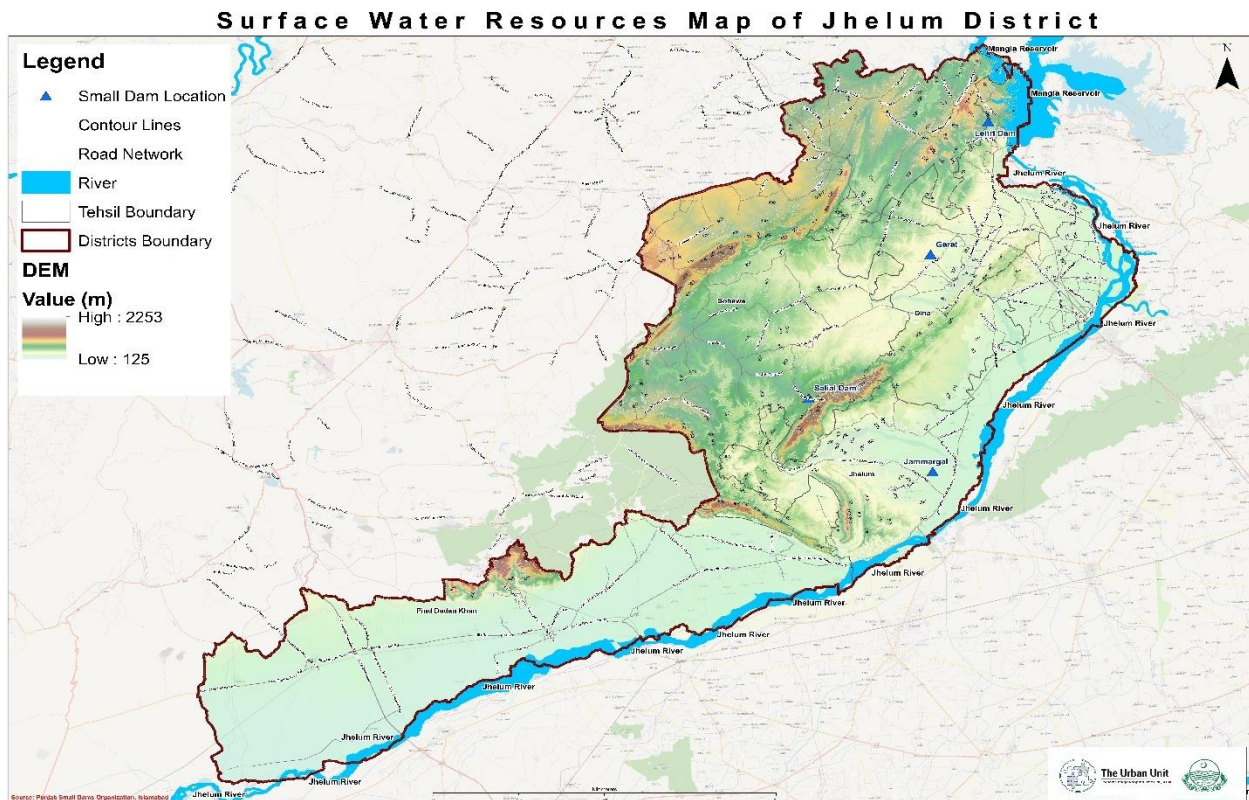


Figure 9: Surface water resources map of Jhelum District

The executive engineer field team explained about current water resources available options in Jhelum district and highlighted major issues faced by them to fulfill water demand for agriculture and water-supply. They shared a detailed description of existing dams in Jhelum which are shown in table 6.

Table 6: Salient features of Dams in Small Dams Irrigation Zone Jhelum District

Sr. No.	Name of Dam	Location	Year of Completion	Gross Storage Capacity (A-ft)	C.C.A. (Acres)/ Drinking (MGD)	Maximum Irrigated Area (Acres)	Status
1	Garat	N33°1'7.75" E73°30'57.72"	1982	2227	638	570	Operational
2	Jammargal	N32°44'40.71" E73°31'48.98"	1992	3152	925	985	Operational
3	Tain Pura I	N33° 3'25.41" E73°30'57.72"	1994	7300	3410	2412	Operational
4	Tain Pura II	N33° 4'7.50" E 73°31'59.25"	1994	1747		0	
5	Lehri	N33° 6'32.59" E73°24'27.69"	2006	5705	2220	1025	Operational
6	Salial	N32°52'41.56" E73°30'57.72"	2006	527	372	217	Operational
7	Pindori	N33°06'09.42" E73°36'16.09"	2022	3795	1500	73	Operational
8	Domeli	N33° 1'22.69" E73°19'37.97"	2007	8690	3000	1418	Operational
9	Gurrah Utam	N32°58'11.52" E73°14'20.42"	2008	2679	1500	368	Operational
10	Fateh Pur	N32°03' 59" E73°30'06"	2007	1733	315	0	Non-Operational
11	Shah Habib	N32°34'40" E73°47'15"	2007	929	450	12	Non-Operational
Grand Total				38,484	14,330	7,080	

After a detailed discussion regarding site issues and water resources storages options, the urban unit team and field staff conducted water resources assessment field visit. The team visited remote areas of Jhelum, Deena, Pind Dadun Khan, Rasul barrage, and Sohawa. This field visit investigates existing hydraulic infrastructures, potential option of water storages, command area development, irrigation network (main, link and distributary canals), and water monitoring mechanization.



Figure 10: Irrigation and water resources assessment of Chakwal District

Major issues identified during field surveys were as follow;

- I. Shortage of water resources to fulfill district water supply and irrigation.
- II. Rehabilitation/upgradation of existing Irrigation Infrastructure.
- III. Command area development to enhance agricultural productivity.
- IV. Electro-mechanical monitoring system to regulate water outflow for agriculture/water-supply.

The following projects proposed are:

- A. Rehabilitation and upgradation of Jammargal Dam.
- B. Rehabilitation and upgradation of Teinpura Dam.
- C. Installation of telemetry system for regular monitoring of water storage at newly proposed dam site.
- D. Command area development of Jammargal Dam.

Water Resources Assessments Finding:

The detailed conditional and site assessment survey was conducted by water resources and irrigation team in Rawalpindi region. After completing the water resources assessments, following was established as overall condition and respective rating of water resources system of Rawalpindi region (Attock, Chakwal, Jehlum, and Rawalpindi).

Table 7: Water Resources Conditional Assessments in Rawalpindi Region

Asset Attribute	Rating
Civil Structures	C (Fair)
Flood Protection works	C – D (Fair to Poor)
Water Storage Potential	C (Fair)
Distribution Network	C – D (Fair to Poor)
Electro-Mechanical	D (Poor)

The condition assessment indicates that almost all the civil infrastructure in the all four districts including hydraulic structures (outlets, weirs, spillway etc.) & water storages potential developments are in fair to good conditions.

The irrigation distribution systems (cross regulator, main canal, & distributaries), drainage networks (stormwater and sewerage drainage network), and flood

protections measures during flood seasons are fair to poor condition. Most of these systems are problematic due to sectional deuteriations due to hydro-climatological and human induced impacts. There is not provision of telemetry system existed for regular flow monitoring to reduce any disaster impact. So, it is highly recommended to install solar powered telemetry in all projects proposed in this report.

Water Resources Assessments Interventions:

Afore-described gaps relating to the Water resources sources and supply facilities are filled in the planning exercise in detail. Prioritization of these gaps is also done and hence schemes are proposed based on various factors such as essence of intervention, duration required to execute them, cost required, and their impact on general public. Total cost required to uplift the current water resources sources and supply situation to enhance agriculture productivity & water supply demand is 9,750 Million, approximately.

Short Term Plans:

A fair coverage of water supply infrastructure currently exists in the Attock and Rawalpindi districts. The short-term plans required regular R&D of existing facilities along with intensive monitoring of inflows and outflows. Repairs and maintenance works are proposed as per individual needs of the infrastructure to ensure longevity and optimal performance.

Rawal Lake contributing most dominant proportion as water supply of Rawalpindi district and its water storage capacity continuously depleting due to sedimentation. Therefore, it is recommended de-silting with different alternatives such as excavation and flushing. Additionally, regular water and sediment inflow metering system through renewable source of energy (solar, preferably) is also part of this plan. Indus river is one most regular, and destructive during high flows/ flood seasons stream of Pakistan. So, it is recommended installation of solar powered telemetry system and construction of flood protection bund at Khair Abad Bridge, Attock district. Total cost required for short-erm Plan for water resources sources and supply is 711.43 Million.

Medium Term Plans:

The medium-term plan focusses on Chakwal and Jhelum districts to develop sources of water supply to unserved/ partially-served areas, and irrigation distribution efficiency to enhance agricultural productivity of the both districts. Four new potential water storage dams with total storage capacity of 68641 acre-feet are proposed to cater for the water demands of unserved areas and agricultural demands. Moreover, rehabilitation and upgradation of existing irrigation distribution system of Teinpura dam (Jhelum) to improve irrigation

efficiency and fulfill rural water supply demand. Total cost required for medium-term Plan for water resources sources and supply is 4,746.00 Million.

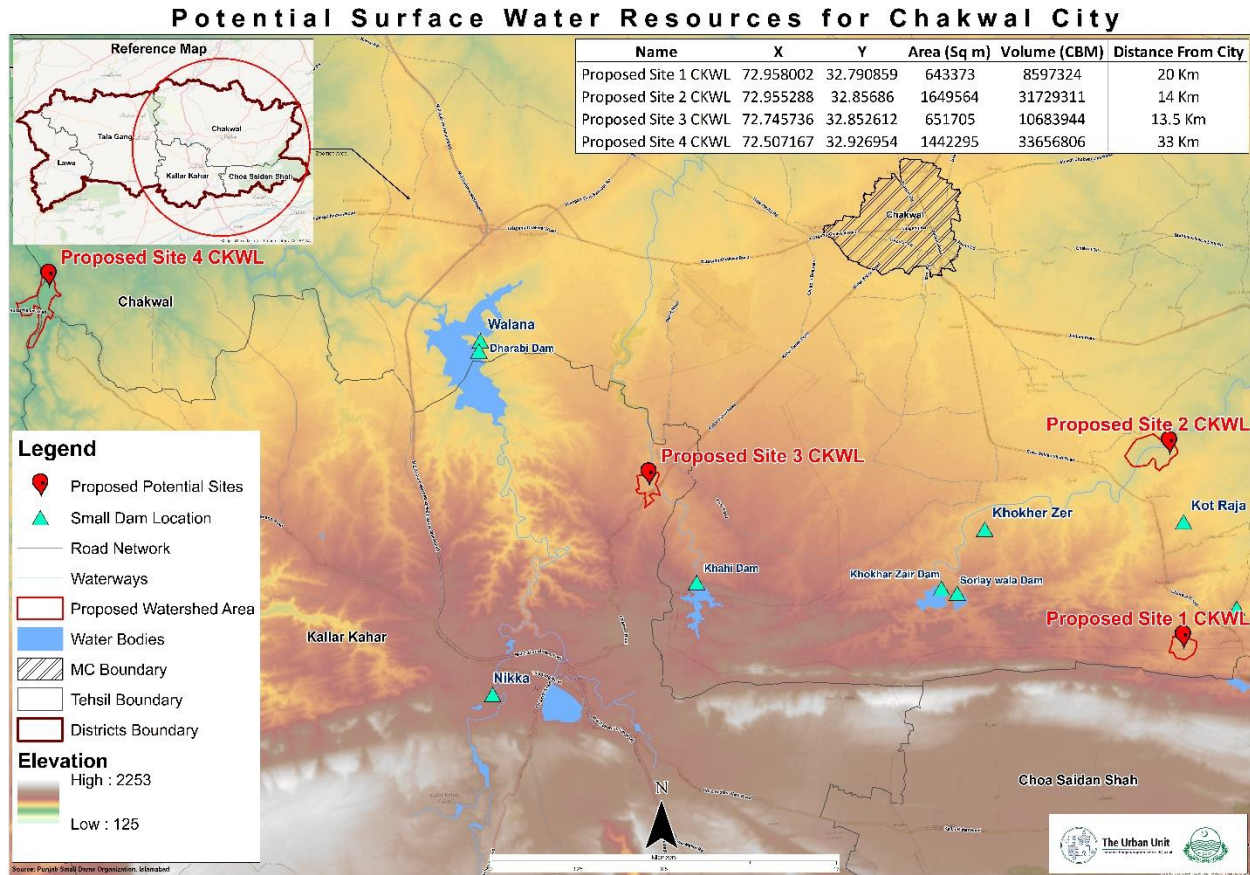


Figure 11: Irrigation and water resources potentials of Chakwal District

Long Term Plans:

The medium-term plan focusses on development of water resources sources fulfill water supply requirement to unserved/ partially-served areas, and irrigation water requirement to enhance agricultural productivity in Rawalpindi region upto 2043.

The Jammargal dam is multi-purpose dam which is equally beneficial for water supply as well as agricultural uses. There is, still, great potential to store more water to make this dam more productive. Therefore, rehabilitation and upgradation of Jammargal dam (Jhelum) is recommended through raising of existing dam and spillway upto 10 feet, access road, installation of solar powered SCADA & telemetry system at rest house on dam site, increase culturable command area (3000 acres as compare to existing upto 925 acres only), development of irrigation distribution system, and hydraulic infrastructures.

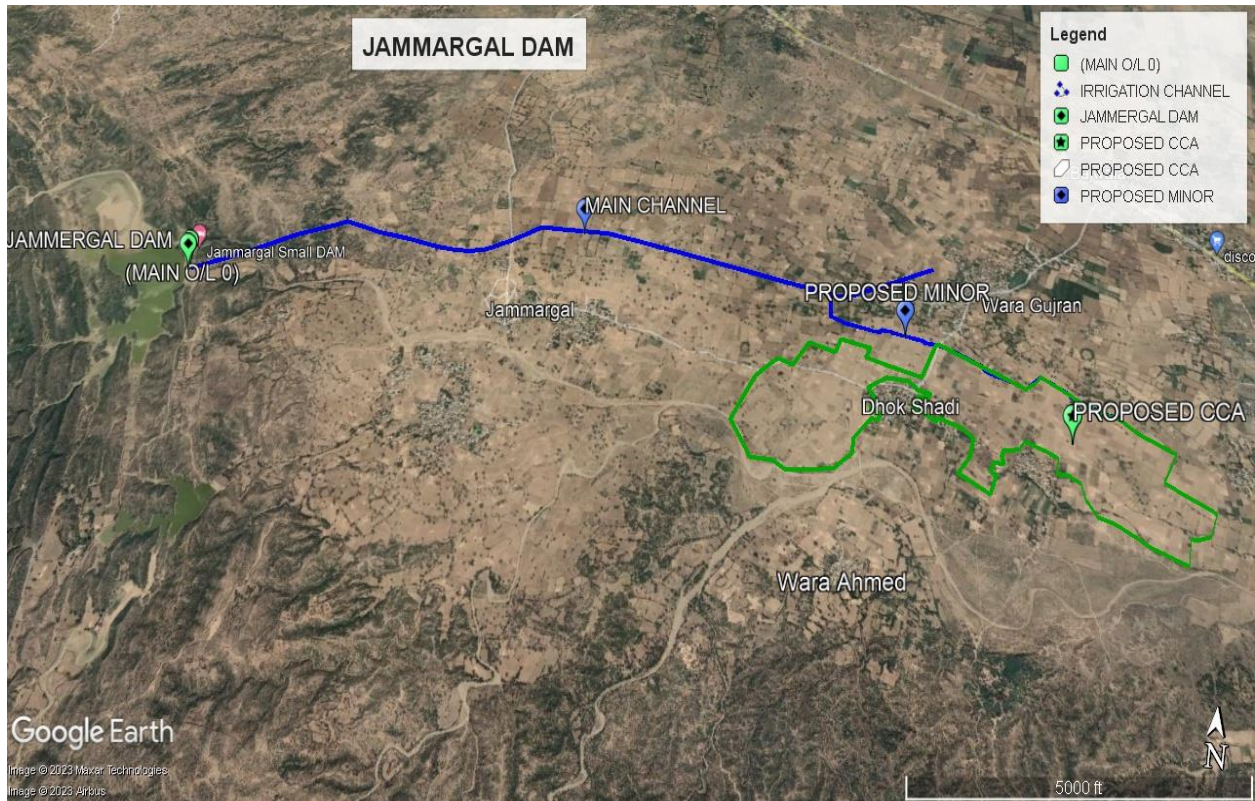


Figure 12: Layout Plan of Jammargal Dam of Jhelum District

The water resources team identified a very much productive water resource storage potential in Bahadur Khas, Johd village of Attock district. The proposed site is situated on run-off river with perennial channel as shown in figure 13. Its watershed consists of vast hilly terrain starting from Margalla range. It was proposed to conduct hydro-climatological feasibility study including irrigation network, command area development, and solar powered SCADA system. Total cost required for Long-term Plan for water resources sources and supply is 4,301.00 Million.



Figure 13: Existing condition of Potential Bahadur Khas Dam Johd Attock District

Potential Surface Water Resources for Attock District

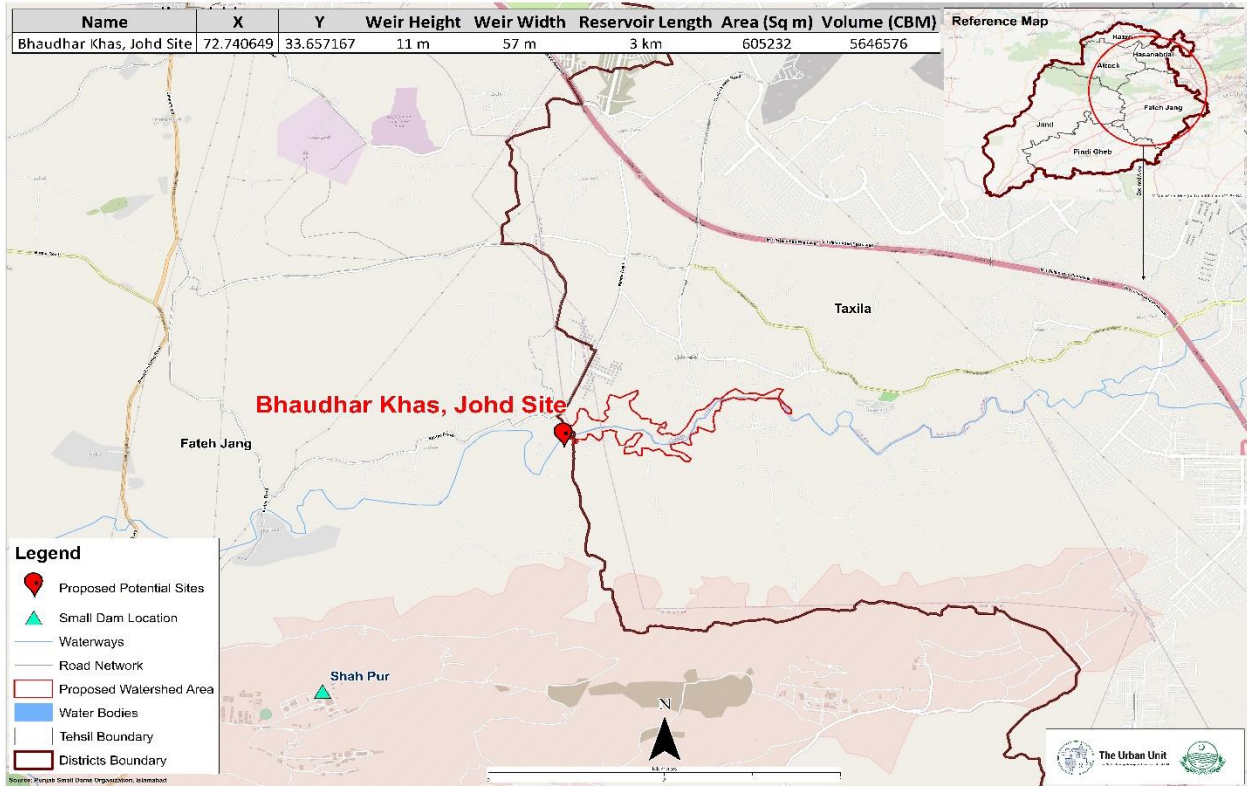


Figure 14: Layout Plan of Potential Bahadur Khas Dam Johd Attock District

The proposed short, medium, and long-term schemes with their summary cost is given in table 8.

Table 8: Proposed Water Resources Schemes in Rawalpindi Region

Proposed Schemes	Scope	Cost (Million)
<u>1. Rehabilitation and Construction of River protection works at Khair-Abad Bridge Attock</u>		
<ul style="list-style-type: none"> <input type="checkbox"/> Construction of flood protection works (height: 20 meter, and length: 4500 meter) at left side of Indus River upto Khair-abad Bridge, in Attock. <input type="checkbox"/> Construction of eco-system park for re-recreational activity and revenue source. <input type="checkbox"/> Installation of Solar-powered SCADA system at bridge for efficient flow measurement for protection of settlement from floods in future. 	<ul style="list-style-type: none"> <input type="checkbox"/> Effective water level monitoring <input type="checkbox"/> Mitigation of flood impacts on settlement, environment, and historical place. <input type="checkbox"/> Re-recreational park to attract public and generate revenue for Irrigation Department 	<ul style="list-style-type: none"> <input type="checkbox"/> 419.00 <input type="checkbox"/> 50.00 <input type="checkbox"/> 52.00

<p><u>2. Restoration of Rawal Lake Reservoir</u></p> <ul style="list-style-type: none"> <input type="checkbox"/> De-silting of sediment through flushing and/or mechanical removal with machinery. <input type="checkbox"/> Development of spoil bank area in Lake vicinity. <input type="checkbox"/> Eco-system restoration through revival of Rawal lake reservoir. 	<ul style="list-style-type: none"> <input type="checkbox"/> Removal sediment deposition along as well as bed of Rawal Lake. <input type="checkbox"/> Land acquisition for disposal of soil removed from lake. <input type="checkbox"/> Development of re-creational park in spoil bank area to protect environment. 	<ul style="list-style-type: none"> <input type="checkbox"/> 80.00 <input type="checkbox"/> 75.00 <input type="checkbox"/> 35.00
<p>Short Term – Rawalpindi Regional Plan: PKR. 711.43 Million</p>		
<p>Medium Term Schemes</p>		
<p><u>1. Restoration / upgradation of irrigation network of Teinpura Dam, Jhelum</u></p> <ul style="list-style-type: none"> <input type="checkbox"/> Upgradation of irrigation network and structures (syphon, aqueduct, outlet etc.) from RD 0+000 to RD 19+000. <input type="checkbox"/> Installation of solar powered SCADA system. 	<ul style="list-style-type: none"> <input type="checkbox"/> Replace pipes/masonry works sections with HDPE pipes <input type="checkbox"/> Surface water level monitoring <input type="checkbox"/> Develop alternative livelihood revenue options 	<ul style="list-style-type: none"> <input type="checkbox"/> 932.00 <input type="checkbox"/> 56.00
<p><u>2. Planning of water supply and sanitation options in Chakwal</u></p> <ul style="list-style-type: none"> <input type="checkbox"/> Hydrological and Hydraulic assessment of four potential sites identified in Chakwal district. <input type="checkbox"/> Conduct feasibility studies for development water supply conveyance and distribution to fulfill future water demand of Chakwal city. 	<ul style="list-style-type: none"> <input type="checkbox"/> Construction of head/cross regulator to regulate flow. <input type="checkbox"/> Conservation of head regulator from back flood water during flood season. 	<ul style="list-style-type: none"> <input type="checkbox"/> 3758.00
<p>Medium Term – Rawalpindi Regional Plan: PKR 4,746.00 Million</p>		

Long-term Schemes		
<p>1. <u>Rehabilitation/ upgradation of Jammargal Dam to enhance agricultural productivity of command area, Jammargal Jhelum.</u></p> <ul style="list-style-type: none"> <input type="checkbox"/> Upgradation/ enhancement of weir and spillway. <input type="checkbox"/> Construction access road of 5 km upto dam location. <input type="checkbox"/> Installation of solar power SCADA system. <input type="checkbox"/> Rehabilitation/ upgradation of existing and new irrigation network of additional command area. 	<ul style="list-style-type: none"> <input type="checkbox"/> Increase water pond level to meet agricultural irrigation demand. <input type="checkbox"/> Improve surface water monitoring system. <input type="checkbox"/> Develop irrigation network of additional command area. <input type="checkbox"/> Rehabilitation of access road and rest house 	<ul style="list-style-type: none"> <input type="checkbox"/> 105.00 <input type="checkbox"/> 72.00 <input type="checkbox"/> 52.00 <input type="checkbox"/> 54.00
<p>2. <u>Construction of Bahadur Khas Dam and irrigation network system, Johd village, Fatehjang Attock.</u></p> <ul style="list-style-type: none"> <input type="checkbox"/> Hydrological, hydraulic, and geological investigation studies of potential site for irrigation and water supply of area. <input type="checkbox"/> Construction of dam, spillway, access road and rest-house. <input type="checkbox"/> Construction of irrigation network for command area development. <input type="checkbox"/> Installation of solar power SCADA system. 	<ul style="list-style-type: none"> <input type="checkbox"/> Develop water storage to enhance water storage to fulfill future water supply and agricultural water demand. <input type="checkbox"/> Command area development of barren land due to non-availability of irrigated water 	<ul style="list-style-type: none"> <input type="checkbox"/> 3726.00 <input type="checkbox"/> 105.00 <input type="checkbox"/> 8.00 <input type="checkbox"/> 72.00 <input type="checkbox"/> 54.00 <input type="checkbox"/> 52.00
<p>Long Term – Rawalpindi Regional Plan: PKR 4,301.00 Million</p>		

For Rough Cost Estimation MRS, 2nd BI-ANNUAL-2023 District Attock, Chakwal, Jhelum, and Rawalpindi have been Applied. The 2% Contingencies and 5% PST are also added in estimates. This is further subject to Detail Design of the proposed schemes upon PC-1 formation. The detailed cost estimates are attached as annexure-I with this report.

Annexure-I: Bill of Quantities