

**GOVERNMENT OF PAKISTAN
MINISTRY OF WATER & POWER**

**ANNUAL FLOOD REPORT
2015**



**OFFICE OF THE CHIEF ENGINEERING ADVISOR &
CHAIRMAN FEDERAL FLOOD COMMISSION
ISLAMABAD**

ANNUAL FLOOD REPORT-2015



District D.G. Khan (Punjab)



District Khairpur (Sindh)



District Chitral (KP)



District Peshawar (KP)



District Zhob (Balochistan)



District Gilgit (Gilgit-Baltistan)

**OFFICE OF THE CHIEF ENGINEERING ADVISOR/CHAIRMAN
FEDERAL FLOOD COMMISSION ISLAMABAD**

TABLE OF CONTENTS

SR. NO.	DESCRIPTION	PAGE NO.
	Executive Summary	v
	Acknowledgement	x
1.	FLOODS IN GENERAL PERSPECTIVE	1
1.1	Flood Problem in Perspective	2
1.2	Floods in Pakistan	2
1.3	Flood Control Objective and Need	3
1.4	Water Resources in Pakistan	4
1.5	Irrigation Network of Pakistan	5
1.6	Flood protection facilities in Pakistan	5
1.7	Impact of climate change and global warming on flood management	7
1.8	Historical flood events in Pakistan	7
1.9	Integrated approach in flood management	8
1.10	Flood and development process	9
1.11	Traditional flood management options	9
1.12	Challenges of flood management	11
1.13	Rapid urbanization	12
1.14	Climate variability and change	12
2.	FEDERAL FLOOD COMMISSION	14
2.1	Historic Background	15
2.2	Functions of Federal Flood Commission	15
2.3	Achievements of Federal Flood Commission	15
2.4	National Flood Protection Plan –IV	18
2.5	Normal/Emergent Flood Programme	19
2.6	Summary of GOP Investment on Flood Protection Works	20
3.	FLOOD MANAGEMENT MECHANISM	21
3.1	Organizations involved and responsibilities	22
3.2	Flood Warning Dissemination System	27
4.	PREPAREDNESS/ CONTINGENCY PLANNING FOR MONSOON SEASON 2015	28
4.1	Consultative Workshop for Monsoon Season 2015	29
4.2	Preparatory Meetings of FFC for Monsoon Season 2015	30
4.3	50 th Annual meeting of Federal Flood Commission	31
4.4	Follow up meeting to review progress on decisions taken in 50 th Annual meeting of FFC	33
4.5	Special meeting of FFC held on 14.7.2015 to review status of flood preparedness and compliance of recommendations of Honourable Supreme Court of Pakistan	34
4.6	Establishment of Flood Communication Cell	35

4.7	Post flood meeting/2 nd meeting of FFC held on 27.10.2015 to review status of 2015 flood damages and updated status of compliance of recommendations of Honourable Supreme Court of Pakistan	35
4.8	Specific activities/ initiatives undertaken by FFC to mitigate damages/losses due to Monsoon Season 2015	37
5.	MONSOON SEASON-2015	39
5.1	Seasonal Rainfall Forecast for Monsoon Season 2015 issued by PMD	40
5.2	Floods /Rains during Monsoon Season 2015	41
5.3	Highest ever recorded flood peaks during major flood events	42
5.4	Country-Wide Losses/Damages Due to 2015 Rains/Floods	45
5.5	2015-Rains/flood damages to flood protection infrastructure and need for their restoration and rehabilitation	45

LIST OF TABLES

Table #	Description	Page #
Table 1	Existing Flood Protection infrastructure in Pakistan	5
Table 2	Historical Flood events experienced in Pakistan	8
Table 3	Budget demand by the Provinces & Federal Line Agencies, budget allocated & released during past five years	19
Table 4	Summary of Federal Investment on Flood Protection Works	20
Table 5	Major Flood Events & Historic Flood Peaks recorded in major rivers	43
Table 6	Flood Peaks & their retention time recorded in major rivers during Monsoon Season 2015	44
Table 7	Country-Wide Losses/Damages Due to Rain/Flood 2015	45
LIST OF FIGURES		
Figure #	Description	Page #
Figure 1	Schematic Diagram of Indus Basin Irrigation System	6

LIST OF APPENDICES

Appendix #	Description	Page #
Appendix-I	Flood Protection Schemes taken up under Normal/Emergent Flood Programme of PSDP	47
Appendix-II	Major Rivers Flow Data during Monsoon Season 2015 including Hydrographs of 2015 floods	59
Appendix-III	Monthly Rainfall Data (June –September 2015): Source PMD.	76
Appendix-IV	Escapages below Kotri Barrage (1976-77 to 2015-16): Source IRSA.	86

EXECUTIVE SUMMARY

Flood constitutes one of the world's most serious environmental hazards. Thousand years of recorded history tells man's repeated failure to evade the destruction of floods. In spite of many years of experience and highly developed techniques, flood even now continues to play havoc in every part of the planet.

The frequency of occurrence of floods in the region in general and Pakistan in particular has considerably increased since past several years, because of global warming and rapid climate change. That is why Pakistan has faced consecutive flood events during the past six years i.e. 2010, 2011, 2012, 2013, 2014 & 2015, which indicates that flood has now become an annual feature in the country. This is exacerbated by the inadequate surface water storage capacity for absorbing flood peaks, chronic and increasing threat of encroachments in flood plains, inadequate discharge capacity of some of Barrages/Bridges, inadequate budget allocation under PSDP and Provincial ADP for execution of flood projects, weakness in flood defenses due to improper maintenance and importantly a distorted natural drainage network. Capacity deficits exist both at provincial and district levels. There is a lack of effective coordination among institutions involved in flood management, caused in part by limitations of technical capacities such as dissemination of early warning, disaster preparedness measures, emergency response and structural measures for flood mitigation. The local communities do not have enough disaster preparedness information and there is lack of general awareness raising, sensitization and education of the masses regularly affected by floods, focusing especially on populations residing within the active flood plains along major and other rivers.

In Pakistan, floods are generally caused by the heavy concentrated rainfall, which are sometimes augmented by snowmelt due to high temperature and generate exceptionally high flood flows in major and other rivers flowing across the country. The torrential rains are caused due to monsoon currents originating from Bay of Bengal and resultant depressions (strong weather system) often cause heavy downpour in the catchment areas of major and other rivers including hill torrents, which is sometime augmented by the Westerly Wave from Mediterranean Sea.

Pakistan has suffered a cumulative financial loss of more than US\$ 38.165 billion during the past 68 years. Around 12,177 people lost their lives, some 197,230 villages damaged/destroyed and an area more than 616,598 Sq.km was affected due to 23 major flood events. The 2010 floods were worst flooding in the past about 80 years in the region (**Table-2**).

Prior to 1976, the Provincial Governments were responsible for the planning and execution of flood protection works. Disastrous floods of 1973 & 1976 caused heavy loss of life and property and it was felt that the existing flood protection facilities and planning were inadequate to provide effective protective measures for the country. Heavy losses to the

economy due to floods were discussed in the Inter-Provincial Conference held in January 1977 wherein it was decided to establish Federal Flood Commission (FFC) for integrated flood management on country wide-basis.

Since its establishment, FFC has so far prepared three National Flood Protection Plans i.e. National Flood Protection Plan-I (1978-88), National Flood Protection Plan-II (1988-1998) & National Flood Protection Plan-III (1998-2008) and executed through Provincial Irrigation Departments and Federal Line Agencies. A total investment of more than Rs 20.00 billion has been made on construction of around 1,400 sub-projects i.e. flood protection infrastructure, besides, upgradation of country's existing Flood Forecasting & Warning System during the past 37 years (**Table-4**).

Work on preparation of National Flood Protection Plan-IV was started in (2006-07), but it could not be approved for implementation at that time due to low priority given to Flood Sector as result of drought like conditions over the country. Due to large scale damages as a result of 2010 floods, followed by subsequent flood events during 2011 & 2012, the need for investment in flood sector gained importance. Hence, Federal Flood Commission re-started working on formulation of National Flood Protection Plan-IV. For that purpose, consultants were engaged in May 2013 through World Bank Funded Water Sector Capacity Building & Advisory Services Project (WCAP) for preparation of NFPP-IV for next ten years. The draft National Flood Protection Plan-IV (2016-26) has been prepared in close consultation with all stakeholders at Federal and Provincial Governments level keeping in view the lessons learnt from past flood events. The draft final NFPP-IV (2016-26) was submitted by the consultants in May 2015. It has been forwarded by the Ministry of Water & Power to Ministry of Inter Provincial Coordination for approval of Council of Common Interests (CCI). Actual implementation has been planned during the next ten years subject to timely approval of Plan by the Government of Pakistan and provision of adequate funds for construction of various interventions proposed in the NFPP-IV (2016-26) in coming years. Meanwhile, urgent nature flood protection works are being carried out through Provincial ADP and GOP funded Norma/Emergent Flood Programme.

2015 Floods

Flood flows triggered by torrential rains and cloudburst affected various parts of country especially Chitral valley in Khyber Pakhtunkhwa and parts of Gilgit-Baltistan besides, riverine/ low lying areas along River Indus in Punjab & Sindh province including mountainous areas of Balochistan. Moderate to heavy downpour in upper catchments of major rivers and their tributaries generated flood flows, which caused losses to human lives and damages to private and public infrastructure. 2015-rains/floods affected more than 1.933 million population and 4,634 villages (damaging 10,716 houses), besides, loss of 238 lives.

Way Forward

Irrigation Department of the four provinces (PIDs) and concerned Federal Line Agencies, (WAPDA, PMD, PCIW, GB-PWD, Irrigation Directorate FATA, Irrigation & Small Dams Organization, Government of AJ&K) may take immediate action on the following recommendations for early completion, so as to face monsoon season 2016 in a much better way.

- i. PIDS & Federal Line Agencies to complete all ongoing flood protection works being executed through Public Sector Development Programme (PSDP) and Provincial Annual Development Programme well before the start of Monsoon Season 2016.
- ii. The Irrigation, Drainage & Flood Protection Infrastructure damaged during previous floods, especially 2015 floods may be restored/rehabilitated on fast track basis, so as to complete the task well before the start of Monsoon Season 2016.
- iii. Pre-flood inspection of all Flood Protection Infrastructures (flood bunds, spurs, Barrages/Head Works and their allied components etc.) may be carried out jointly with concerned Corps of Engineers and critical reaches as identified by the inspection teams may be got repaired/strengthened well before the start of Monsoon Season 2016.
- iv. Adequate O&M funds for Flood Protection Infrastructures may be allocated through Provincial Budget and all urgent nature O&M works related to Irrigation, Drainage & Flood Protection Infrastructures may be completed well before the start of Monsoon Season 2016.
- v. PIDs, NHA and Pak. Railways to make necessary arrangements of explosive and others flood fighting material at sites of pre-determined breaching sections. Stone reserve stock/ flood fighting material may also be arranged at all critical reaches of flood embankments well before start of monsoon season 2016.
- vi. PID, Punjab to expedite action on preparation of Proposal/ PC-I for long term measures (based upon fresh model study recommendations) on war footing basis. Meanwhile, all necessary precautionary measures may be undertaken for safe passage of upcoming Monsoon season 2016.
- vii. Flood Fighting Plans may be prepared by the PIDs & Federal Line Agencies including NHA and Pak. Railways keeping in mind lessons learnt during the past consecutive flood events (2010, 2011, 2012, 2013, 2014 & 2015) and circulated among concerned organizations.
- viii. The encroachments may be removed flood plains/waterways of main & other rivers including hill torrents and drains network (particularly along Bara Kas Nullah and Jhelum river downstream Mangla), besides, settlement on flood protection structures well before the start of Monsoon Season 2016.

- ix. All essential O&M Civil & E/M works of all Barrages/Headworks may be carried out well before start of monsoon season 2016.
- x. WAPDA & Pakistan Metrological Department/FFD, Lahore may carry out all essential O&M works of Flood Forecasting and Warning System equipment well in time and ensure that System is fully functional before start of Monsoon Season 2016.
- xi. The links for coordination among flood management related organizations at Federal & Provincial Government level needs to be further improved keeping in mind the experiences of past flood events. All concerned organizations may link up with Mangla Dam Authorities (through video link system) for better coordination during upcoming Monsoon Season 2016.
- xii. National Highway Authority (NHA) may take necessary measures for safe passage of flood flows during Monsoon Season 2016.
- xiii. PCIW may initiate working on making necessary arrangements with Indian Counterpart well in time for obtaining Eastern Rivers flow data and its transmission to end users (FFC, PMD/FFD, Lahore, WAPDA, NDMA & PDMAs) during Monsoon Season 2016.
- xiv. WASA Rawalpindi may arrange visit of Lai Nullah by Experts from IRI Lahore at the earliest in order to determine the technical viability of desilting/dredging work carried out each year, besides, long-term measures required for permanent solution of flooding problem. The short term measures may be carried out on immediate basis, so as to complete the same well before the start of monsoon season 2016.
- xv. WASA Rawalpindi may carry out desilting work of constricted sections of Lai Nullah as recommended by Experts of IRI, Lahore well before the start of Monsoon Season 2016. TMA & City District Government may take necessary steps for removal of existing and restricting further encroachments, besides, stoppage dumping solid wastes/garbage & building material in bed of Lai Nullah.
- xvi. As authenticity and credibility of Flood Plain Inundation maps is of paramount importance. Hence, concerned organizations including M/S NESPAK, SUPARCO and NDMA/PDMAs etc. should coordinate with each other, in order to ensure availability of most appropriate and authentic information for integrated flood management.

In addition to above, ten (10) years Plan {NFPP-IV (2016-26)} has been prepared by the FFC in consultation with all stakeholders and its draft final version has been submitted by Ministry of Water & Power to Ministry of Inter Provincial Coordination for approval from the Council of Common Interest. The NFPP-IV (2016-26) may be processed for early approval of competent authority and thereafter arrangement of funds may be made through GOP resources/international donor agencies e.g. World Bank, ADB, JICA, etc. for timely implementation of various interventions proposed under the Plan.

Besides the above, under the increasing flood risk in the context of climate change, allocation of funds for Normal/Emergent Flood Programme under PSDP may also be significantly enhanced as per actual needs of the provinces. Provinces may also allocate adequate funds through their provincial resources for proper maintenance of their flood protection structures.

ACKNOWLEDGEMENT

The preparation of Annual Flood Report of Federal Flood Commission commenced from 1998 with a view to compile essential information on yearly basis for documentation of the yearly flood events, flood flow data, lessons learnt from those yearly events and for exploring the needs for future protective measures.

The 2015 Annual Flood Report contains inter-alia, information about historical floods in Pakistan, flood management works, functions of FFC & other related Provincial and Federal Government organizations, flood warning dissemination system and flood preparedness activities carried out during the flood season. The report focuses on flash floods experienced during monsoon season 2015, which caused considerable damages to private and infrastructure in various parts of country especially Chitral valley in Khyber Pakhtunkhwa and Gilgit-Baltistan besides, riverine/low lying areas along river Indus in Punjab & Sindh province including mountainous areas of Balochistan.

Services of following officers are greatly acknowledged who contributed in a dedicated manner for the preparation of 2015-Annual Flood Report of Federal Flood Commission:

Sr. No.	Name	Designation	Role
1.	Mr. Asjad Imtiaz Ali	Chief Engineering Advisor/Chairman Federal Flood Commission	Supervisory
2.	Mr. Alamgir Khan	Chief Engineer (Floods)	Contributory
3.	Mr. Ashok Kumar	Superintending Engineering (Floods)	Contributory
4.	Mr. Zafar Iqbal	Senior Engineer (Floods)	Contributory
5.	Mr. Yawar Rasheed	Assistant Engineer (Floods)	Contributory

FLOODS IN GENERAL PERSPECTIVE

1. FLOODS IN GENERAL PERSPECTIVE

1.1 Flood Problem in Perspective

Floods occur in all types of river and stream channels. Localized flooding may be caused or exacerbated by drainage obstructions such as landslides, ice, debris, or dam failure. The increase in flow may be the result of sustained rainfall, rapid snow melt, monsoons, or tropical cyclones. Rapid flooding events, including flash floods, more often occur on smaller rivers, rivers with steep valleys or rivers that flow for much of their length over impermeable terrain. The cause may be localized convective precipitation (intense thunderstorms) or sudden release from an upstream impoundment created behind a dam, landslide, or glacier.

Climate change is considered to be a critical global challenge and recurring flood events have demonstrated the growing vulnerability to climate change. The impacts of climate change range from affecting agriculture to further endangering food security, to rising sea-levels and the accelerated erosion of coastal zones, increasing intensity of natural disasters like floods & droughts, species extinction and the spread of vector-borne diseases.

It is generally recognized that complete prevention from floods is humanly impossible, but protection from flood is feasible and is a vital necessity. By proper planning, means can be devised to harness the fury of floods to safeguard human life and property. Devoid their destructive power, floods can be used in the service and the welfare of a community.

1.2 Floods in Pakistan

Pakistan is a country with diverse type of land and fluctuating pattern of climate. Climate is usually considered hot and dry in Pakistan but it has shown significant obvious variations in last few years. Many districts and urban centers lying nearby to rivers are ever on a great risk to confront with different types of floods i.e. riverine flood, flash flood and urban floods particularly in Punjab & Sindh provinces. Losses from floods annually destroy about million acres of crops land and affect hundred thousands of people with a monetary loss in billion of rupees. Major direct flood damages in Pakistan are to agricultural crops, urban and rural abadies, besides, other private & public utilities.

The floods in rivers are generally caused by heavy concentrated rainfall in the catchments, during the monsoon season, which is sometimes augmented by snow melt flows. Monsoon currents originating in the Bay of Bengal and resultant depressions often result in heavy downpour in the Himalayan foothills, which occasionally generate destructive floods in the main rivers and their major tributaries. Sometimes exceptionally high flood flows in major rivers are generated due to formation of temporary natural dams by landslide or glacier movement and their subsequent collapse.

Flooding of the Indus River and its tributaries represents the greatest hazard in Pakistan. Floods occur normally in summer season (July - October). Therefore, damages to agriculture are mainly to the standing Kharif crops. However, in some cases the inundated lands do not dry up in time and ultimately affecting sowing Rabi crops.

The major rivers (Indus, Jhelum, Chenab, Ravi, Sutlej) and secondary rivers (Kabul, Swat etc.) cause flood losses by inundating low lying areas round the rivers bed by damaging irrigation and communication network, besides, land erosion along the rivers banks. In the upper part of the Indus Basin (Punjab & Khyber Pakhtunkhwa), floodwater spilling over the high banks of the rivers generally returns to the river.

In the lower parts of the country (Sindh province), the River Indus is flowing at ridge i.e. higher elevation than adjoining lands, hence, spill flood water do not return to the main river channel. This largely extends the extent and period of inundation resulting in more damages to abadies, standing crops and other private as well as public infrastructure. For that purpose flood embankments have been constructed on either side almost in the entire length of River Indus in the Sindh Province and many vulnerable locations in the upper parts of the country.

Sometimes breaches are occurred in the flood embankments/River Training Works, when the rivers attain the Exceptionally High Flood Level *{LMB Taunsa Barrage in Punjab & Tori Bund Complex in Sindh Province events during 2010-Monsoon Season}*. At times, the flood embankments have to be breached at pre-determined locations to save the main structures *(RMB Jinnah Barrage was operated during Monsoon Season 2010)*. The work on remodeling/ rehabilitation of barrages on the basis of 100 years return period had already been started in Punjab & Sindh province.

1.3 Flood Control Objective & Need

Flood management planning in Pakistan is being carried out to essentially cover the following three specific objectives:

- i. To reduce or eliminate damages to existing properties;
- ii. To prevent future increase in damages; and
- iii. To mitigate the residual hazards.

In Pakistan, flood control planning is a complex problem and calls for great ingenuity and experience on the part of the planners. The nature of flood problems varies in each of the four provinces and federally administered areas due to varying physiographic, climatic, demographic, and socio-economic conditions. Even the characteristics of catchment areas of various rivers differ from each other. Flood problems relating to various provinces are given as under:

PUNJAB

In Punjab, the flood protection marginal bunds have been generally constructed either to protect Headworks and other irrigation structures, or to safeguard certain towns, villages & adjoining agricultural lands. Due to general topography of the area sloping towards the south-west, pre-determined breaching sections have been provided in the right marginal bunds for operation for safety of Headworks/ barrages in case of exceptional high flood flows i.e. likely to exceed the designed level. In order to protect areas from erosion, spurs have been constructed in critical reaches. These spurs have protected vast areas and in some cases even large tracks of eroded lands have been reclaimed.

SINDH

The Indus River flows on a ridge in Sindh Province and generally, surrounding areas (outside the flood embankments) are lower than the river bed; hence, water once leaving the Indus River does not return back to the main channel. Escaped water thus causes greater damage to widespread areas, and it persists for a longer period even after flood peaks are over *(Refer Tori Bund, Mulchand Shah (M.S) Bund breaches during 2010-Monsoon Season)*.

Sindh provinces is situated on a receiving end of drainage of all the rivers and if flood protection measures adopted in the upper reaches are not properly planned, severe damages are likely to occur in the Province. In most of the reaches, a double line of flood embankments has been constructed on both sides of the river from Guddu to few kilometers short of Arabian Sea. These flood embankments have been further compartmentalized to contain widespread inundation.

KHYBER PAKHTUNKHWA

In Khyber Pakhtunkhwa, the floods are mainly due to flash flood flows in secondary rivers (Kabul, Swat, Panjkora, Kurram etc.) and major hill torrents/flood flow generating nullahs having steep bed slopes, which greatly increase flood velocity and severely erode the banks. In Khyber Pakhtunkhwa, mostly short spurs have been constructed to save the areas from erosion.

A battery of about 40 spurs having considerable shank length and a Marginal Bund have been constructed along the right bank of Indus River “Chashma Barrage – Ramak Reach” for protection of D.I. Khan City and adjoining area from devastating flood flows of Indus River. A large number of spurs and flood embankments in critical locations have also been constructed along Kabul, Swat, Panjkora, Kurram rivers and other flood flows generating nullahs/hill torrents.

BALUCHISTAN

Due to peculiar physiographic and climatic characterizes in Balochistan, mostly the flood protection walls/embankments & short spurs have been constructed for protection of orchards, agricultural lands and abadies. Some bunds have also been constructed to serve as a flood diversion measures. The bed slopes of rivers and nullahs in Balochistan are very steep; hence, generate flash flood flows with high velocity causing banks erosion and inundations of low lying area along the banks of rivers and their tributaries.

GILGIT-BALTISTAN, FATA & AJK

The bed slopes of rivers and nullahs in Gilgit-Baltistan, FATA and AJ&K are very steep. The flash flood flows generated in main rivers and their tributaries cause severe banks erosion. Flood Protection walls and short spurs in PCC & gabion crates are constructed to check the spill action and banks erosion. The main purpose of such interventions is to provide protection to abadies, agricultural lands and other private and infrastructure.

1.4 WATER RESOURCES IN PAKISTAN

Five main rivers, namely, the Indus, Jhelum, Chenab, Ravi and Sutlej and their tributaries flow through the country's plains. The Indus, Jhelum and Chenab are known as the **Western Rivers** and Ravi, Beas, and Sutlej known as the **Eastern Rivers**. These rivers supply water to the entire Indus Basin Irrigation System. The rivers have their origin in the higher altitudes and derive their flows mainly from snowmelt and monsoon rains.

The catchment area of Indus is most unique in the sense that it contains seven (7) of the world's highest-ranking peaks, after Mount Everest. These include **K-2 (28,253 feet)**, **Nanga Parbat (26,660 feet)**, **Rakaposhi (25,552 feet)** etc. Likewise, barring the polar areas, seven (7) glaciers situated in the Indus catchment, **namely Siachin, Hispar, Biafo, Batura, Baltoro, Barpu and Hopper** are amongst the largest in the world.

1.5 IRRIGATION NETWORK OF PAKISTAN

The Irrigation System of Pakistan is the largest integrated irrigation network in the world, serving around 45 million acres of contiguous cultivated land. The system is fed by the waters of the Indus River and its tributaries. The irrigation network of Pakistan mainly comprises of 3 major reservoirs (Tarbela, Mangla & Chashma), 19 Barrages, 12 inter-river link canals, 45 independent irrigation canal commands and 143 medium dams (having height 15 meters and above).

The major storage reservoirs include Tarbela (*existing Live Storage Capacity = 6.434 MAF against original storage capacity of 9.70 MAF*), Chashma (*existing Live Storage Capacity = 0.276 MAF against original storage capacity of 0.70 MAF*) on River Indus and Mangla with existing Live Storage Capacity = 7.406 MAF (*this includes the additional storage capacity of 2.88 MAF after Mangla Dam Raising allowing Maximum Conservation Level of 1242 feet*) against original storage capacity of 5.34 MAF on River Jhelum. The schematic diagram of Indus Basin Irrigation System is given at **Figure-1**.

Diversion of river waters into off-taking canals is made through Barrages, which are gated diversion weirs. The main canals in turn deliver water to branch canals, distributaries and minors. The watercourses get their share of water through outlets in the irrigation channels. Distribution of water from a watercourse is made through a time-schedule called “Warabandi”.

According to IRSA record, the average annual surface water availability from Western and Eastern Rivers is 144.57 MAF (Western Rivers:138.03MAF & Eastern Rivers: 6.54MAF), whereas the maximum inflows recorded was 183.45 MAF (in year 1978-79) and minimum inflows were 99.05 MAF (in year 2001-02) during the post Tarbela period (1976-77 to 2014-15). The Provincial utilization was 97.05 MAF, System losses were 18.22 MAF and Escapages downstream Kotri Barrage were 29.30 MAF.

1.6 FLOOD PROTECTION FACILITIES IN PAKISTAN

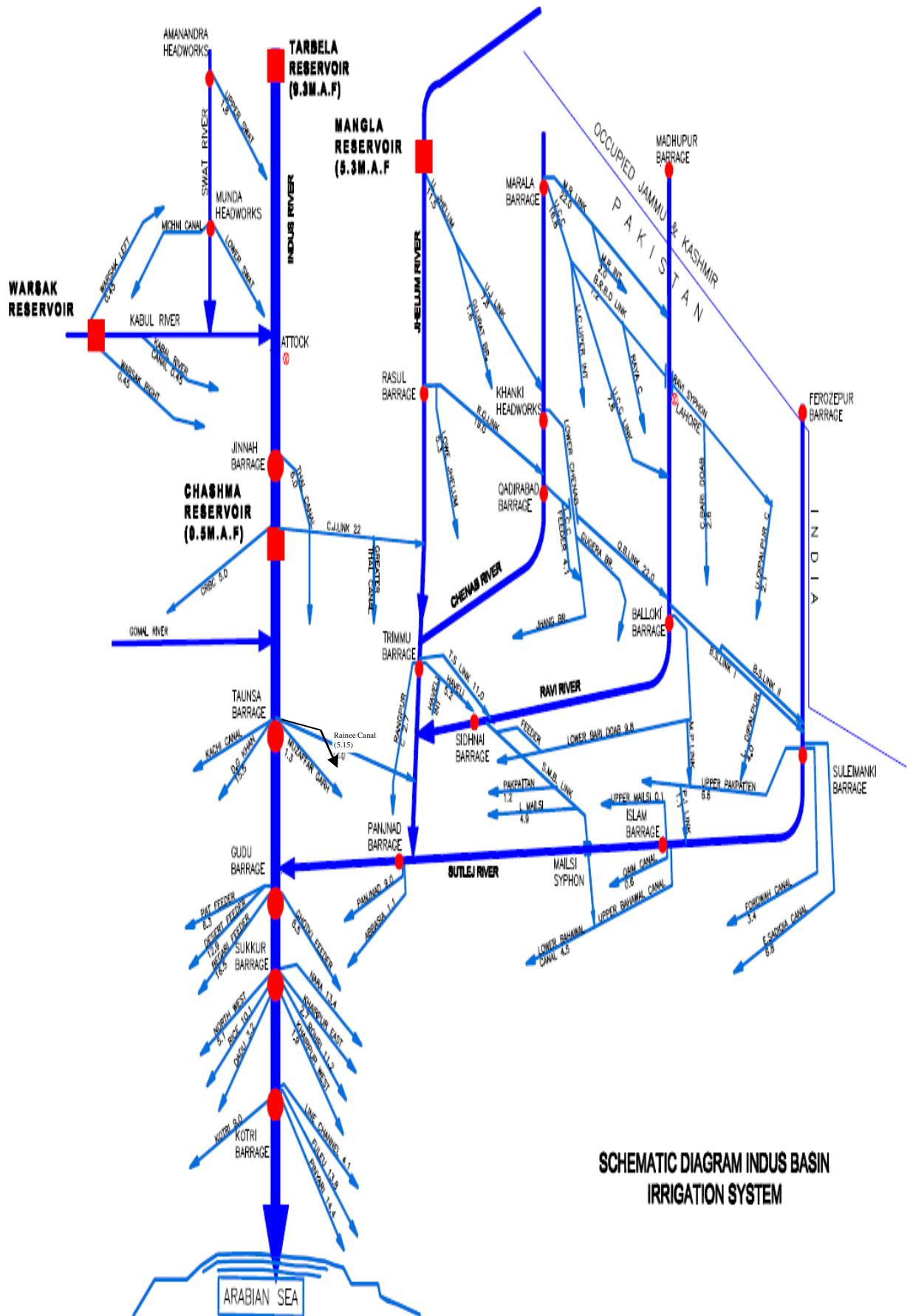
The existing flood management strategy includes flood flows regulation by three major reservoirs (Tarbela, Chashma on Indus & Mangla on Jhelum), protection of important private & public infrastructure, urban/rural abadies and adjoining agricultural lands located along the rivers banks by flood embankments and spurs & other interventions, besides, Flood Forecasting & Early Warning System, Rescue & Relief measures in case of flooding situation. The Provincial Irrigation Departments (PIDs) maintain about 6,807 km of flood protection embankments and around 1410 spurs along main and other rivers. Province-wise break up of existing flood protection facilities is given in **Table-1**.

TABLE-1

EXISTING FLOOD PROTECTION INFRASTRUCTURE*

Name of Province	Embankments (K.M)	Spurs (No.)
Punjab	3,334	496
Sindh	2,424	46
Khyber Pakhtunkhwa	352	186
Balochistan	697	682
Total	6,807	1,410

* The inventory is being updated



SCHEMATIC DIAGRAM INDUS BASIN IRRIGATION SYSTEM

Figure 1: Schematic Diagram of Indus Basin Irrigation System

1.7 IMPACT OF GLOBAL WARMING & CLIMATE CHANGE ON FLOOD MANAGEMENT

Climate change is about the growth of greenhouse gas emissions due to the burning of fossil fuels, resulting mainly from industrial activities and motor transportation, hence there is a build-up of the carbon dioxide levels in the atmosphere. The carbon dioxide build up is made worse by the increasing loss of forests, which act as “carbon sinks” that absorb gases and prevent its release into the atmosphere. Further, the increase of carbon dioxide and other gases in the atmosphere also enhances the “Greenhouse Effect” (in which more heat is generated), thus leading to temperatures rising.

According to United nation’s Intergovernmental Panel on Climate Change, it is estimated that the mean global surface temperature has increased by about 0.3 to 0.6 degree Celsius since the late 19th century to the present, and an increase of 0.2 to 0.3 degree over the last 40 years. A significant rise in temperature can trigger several events, such as melting of the ice sheets, the death of some significant marine life and other biodiversity, and effects on agriculture and human health.

Global warming causes climate change, which is a serious issue for the world. It is a serious threat to the third world as its impacts will not be felt equally across our planet. Developing countries including Pakistan are much more vulnerable to the impacts of climate change. The melting rate of glaciers in South Asia has increased, which may cause floods in Pakistan and surrounding countries in the coming years. Pakistan economy has faced significant losses due to environment damages and degradations.

1.8 HISTORICAL FLOOD EVENTS IN PAKISTAN

Flood damages are caused mainly due to riverine flooding in main rivers and flash floods in Secondary & Tertiary Rivers/Hill Torrents, Coastal flooding due to Cyclone & urban flooding due to torrential rains and inadequate storm drainage facilities, besides, GLOFs. The unprecedented floods of 2010 were the worst floods in history of the country in which about 1985 people lost their lives, 1,608,184 houses were damaged/ destroyed, 17,553 villages were affected and total area of 160,000 Km² was affected.

Since its creation, Pakistan has faced 23 severe flood event i.e. 1950, 1955, 1956, 1957, 1959, 1973, 1975, 1976, 1977, 1978, 19981, 1983, 1984, 1988, 1992, 1994, 1995, 2010, 2011, 2012, 2013, 2014 & 2015, the 2010 floods were worst ever in the country. The floods of various magnitudes since 1950 to 2015 affected vast areas in the four provinces including Gilgit-Baltistan, FATA & Azad Jammu & Kashmir. Owing to adverse impacts of climate change, in the recent years, vulnerabilities of communities to coastal & urban flooding have also increased. The Sindh province, particularly southeastern parts of the province was severely affected due to unprecedented rains and inadequate drainage facilities during Monsoon Season-2011. The torrential rains during 2012 rains/floods affected Southern Punjab, Sindh & Balochistan provinces. About 571 people lost their lives, 636,438 houses were damaged/ destroyed, 14,159 villages were affected and a total area of 4,746 Sq.km was affected.

About 333 people lost their lives during 2013 rains/floods, around 8,297 villages with land area of around 4,483 Sq.km was affected. The floods of 2014, affected cropped area of about 2.415 million acres (9,779 square kilometers) affecting 4,065 villages, claiming about 367 lives, fully damaging 107,102 houses and population of about 2.600 million was affected. The floods 2015, affected more than 1.933 million population, 4,634 villages (damaging 10,716 houses) and claiming about 238 lives all over the country. The historical flood events experienced in the past and their damages are given in the **Table-2**.

TABLE-2

HISTORICAL FLOOD EVENTS EXPERIENCED IN PAKISTAN

Sr. No.	Year	Direct losses (US\$ million) @ 1US\$= PKR 86	Lost lives (No)	Affected villages (No)	Flooded area (Sq-km)
1	1950	488	2,190	10,000	17,920
2	1955	378	679	6,945	20,480
3	1956	318	160	11,609	74,406
4	1957	301	83	4,498	16,003
5	1959	234	88	3,902	10,424
6	1973	5134	474	9,719	41,472
7	1975	684	126	8,628	34,931
8	1976	3485	425	18,390	81,920
9	1977	338	848	2,185	4,657
10	1978	2227	393	9,199	30,597
11	1981	299	82	2,071	4,191
12	1983	135	39	643	1,882
13	1984	75	42	251	1,093
14	1988	858	508	100	6,144
15	1992	3010	1,008	13,208	38,758
16	1994	843	431	1,622	5,568
17	1995	376	591	6,852	16,686
18	2010	10,000 @ 1US\$= PKR 86	1,985	17,553	160,000
19	2011	3730* @ 1US\$= PKR 94	516	38,700	27,581
20	2012	2640** @ 1US\$= PKR 95	571	14,159	4,746
21	2013	2,000^ @ 1US\$= PKR 98	333	8,297	4,483
22	2014	440^^ @ 1US\$= PKR 100.89	367	4,065	9,779
23	2015	170# @ 1US\$= PKR 105.00	238	4,634	2,877
Total		38,165	12,177	197,230	616,598

* Economic Survey of Pakistan 2011-12

** NDMA (<http://www.claimsjournal.com/news/international/2012/10/05/214891.htm>)^ Thomson Reuters Foundation (<http://www.trust.org/item/20130909134725-rm708/>)(Agriculture sector)

^^ Economic Survey of Pakistan 2014-15

Based on PIDs & FLA's interim reports related to irrigation, drainage & flood protection infrastructure only

1.9 INTEGRATED APPROACH IN FLOOD MANAGEMENT

Flood management plays an important role in protecting people and their socio-economic activities in flood plains from flooding. The development in the river basins has been closely linked with successful implementation of flood control projects. In the past, exposure to flood risks has been handled largely through structural measures. However, strategies that rely largely on structural solutions (e.g. dams and reservoirs, embankments and bypass channels) unfortunately alter the natural environment of the river, which may result in loss of habitats, biological diversity and ecosystem productivity.

Further, structural approaches are bound to fail the moment an extraordinary or unforeseen event occurs. These traditional approaches, where the risks are merely transferred spatially, are likely to generate conflicts and inequities. Environmental degradation has the potential to threaten human security, including life and livelihoods, and food and health security. This realization has recently led to calls for a paradigm shift from traditional flood management to Integrated Flood Management.

Integrated Flood Management (IFM) is a concept that addresses issues of human security against flood risks and sustainable development within the framework of Integrated Water Resources Management (IWRM). Such an integrated approach to flood management can play an important role in sustainable development and poverty reduction. Integrated Flood Management aims at minimizing loss of life from flooding while maximizing the net benefits derived from flood plains.

1.10 FLOODS AND THE DEVELOPMENT PROCESS

Historically, flood plains have been the preferred places for socio-economic activity as is evident from the very high densities of human settlement found there. Floods are a natural phenomenon, with both negative and positive impacts, and, generally, should not be considered a hindrance to economic development. Floods play a major role in replenishing wetlands, recharging groundwater and support agriculture and fisheries system, making flood plains preferred areas for human settlements and economic activities. Extreme demands on natural resources due to population growth have forced people and their property to move closer to rivers in many parts of the world. Further, flood control and protection measures have encouraged people to utilize newly protected areas extensively, thereby increasing flood risks and consequent losses.

Recurrent and extreme flooding, however, pose grave risks to development and have negative impacts on lives, livelihoods and economic activity and can cause occasional disasters. Flood disasters result from the interaction between extreme hydrological events and environmental, social and economic processes. These disasters have the potential to put development back by five to ten years, particularly in developing countries. The spiraling economic losses in developed countries also have given rise to grave concerns.

The balancing of development needs and risks is essential. The evidence worldwide is that people will not, and in certain circumstances, cannot abandon flood-prone areas. There is a need, therefore, to find ways of making life sustainable in the floodplains. The best approach is to manage floods in an integrated manner.

1.11 TRADITIONAL FLOOD MANAGEMENT OPTIONS

The traditional management response to severe floods was typically an adhoc reaction – quick implementation of a project that considered both the problem and its solution to be self-evident, and that gave no thought to the consequences of flood risks for upstream and downstream areas. Thus, flood management practices have largely focused on mitigating floods intensity and reducing their localized damages to private and public property. Traditional flood management has employed both structural and non-structural interventions, besides, physical and institutional interventions. These interventions were employed prior, during and after flooding and have often overlapped. The traditional flood management interventions are listed below;

- Source control to reduce runoff:

Permeable pavements, a forestation artificial recharge;

- Storage of runoff:

Detention Basins, reservoirs etc;

- Capacity enhancement of Headwork/Barrages across rivers:

Remodeling of Barrages/Headworks, provision of Bypass/Escape channels etc;

- Separation of rivers and populations:

Land-use control, flood plan mapping & zoning, removal of illegal encroachments, construction of flood protection infrastructure.

- Emergency management during floods:

Flood forecasting & warnings, flood fighting works i.e. raising/strengthening flood embankments, evacuation of flood affectees from dangers zone and their temporary settlement at safe places; and

- Flood recovery:

Compensation of flood affectees and restoration of damaged public infrastructure.

Surface water storages (large, medium & small dams), flood embankments and flood flows retention basins, is a traditional approach to attenuating flood peaks. Water storage attenuate floods by slowing the rate of rising waters, by enhancing the time it takes for the waters to attain high level and evade the synchronization of flood peaks, hence, lowering the peak level in the downstream areas. Such storages reservoirs serve multiple purposes i.e. storage of water mainly for irrigation water supplies, hydropower generation including flood management. Storage Reservoirs have to be used in an appropriate combination with other structural and non-structural measures.

Seemingly self-evident, but regularly overlooked in practice, is the need to make flood management a part not only of the planning and design, but also of the operation of reservoirs. Releases of surplus water from reservoirs at the time, when rivers in the downstream areas experiencing high flood flows can create risks, therefore, careful operation of reservoirs can minimize the loss of human life and damages to property due to properly managed releases. In this context transboundary cooperation is indispensable.

Flood embankments are most likely to be appropriate for floodplains that are already intensely used, in the process of urbanization, or where the residual risks of intense floodplain use may be easier to handle than the risks in other areas i.e. (from landslides or other disturbances).

Land-use control is generally adopted where intensive development on a particular floodplain is undesirable. Providing incentives for development to be undertaken elsewhere may be more effective than simply trying to stop development on the floodplain. Where land is under development pressure, however, especially from informal development, land-use control is less likely to be effective. Flood protection or construction of houses at high elevation is most appropriate where development intensities are low and properties are scattered, or where the warnings times are short. In areas prone

to frequent flooding, protection of the infrastructure and the communication links from floods can reduce the debilitating impacts of flood on the economy.

Flood Forecasting & issuance of timely warnings are complementary to all forms of intervention. A combination of timely, clear & accurate warning messages with a high level of community awareness gives the best level of preparedness for self-reliant action during floods. Public education programme/awareness campaign is crucial to the success of warnings intended to preclude a hazard from turning into a disaster.

Evacuation is an essential constituent of emergency planning, and evacuation routes may be upward into a flood refuge at a higher elevation or outward, depending upon the local circumstances. Outward evacuations are generally necessary where the depths of water are significant, where flood velocities are high and where the buildings are vulnerable. Successful evacuations require planning and awareness among the population of what to do in a flood emergency.

Active community participation in the planning stage and regular exercises to assess the viability of the system help ensure that evacuations are effective. The provision of basic amenities such as water supply, sanitation and security in areas where affectees gather is particularly important in establishing a viable evacuation system.

1.12 THE CHALLENGES OF FLOOD MANAGEMENT

Besides many other challenges, climate change is emerging as perhaps the greatest environmental challenge for Pakistan causing floods, droughts and increasing hunger, poverty, displacement, soil degradation, desertification and deforestation. Rising number of extreme climate events, shift of monsoon rainfall zone from North-east to North-west. Intense, concentrated monsoon rains in short time of interval, inconsistent behaviour of monsoon and erratic flash flood events are the major future challenges. There is strong need to educate people about these natural disasters that why these disasters are becoming more frequent in the region including Pakistan.

There is a growing recognition that current approaches to flood management are not as sustainable as they might be. Hence, it is imperative to cope with increasing risks of flooding and the uncertainties of climate change more effectively. Increased population pressure and enhanced economic activities in floodplains, such as the construction of buildings and infrastructure, further increase the risk of flooding. In developing countries with primarily agricultural economies, food security is synonymous with livelihood security. Floodplains contribute substantially to the food production that provides nutrition for the people of these countries.

Asia-Pacific region is under the very frequent and severe impacts of floods because of its geographical composition. Majority of the region's major cities are riverine or coastal, which have concentration of population, assets, economic & industrial development and infrastructures.

Flooding can be caused by urban water-logging, flash flood, riverine flooding, or storm surges. In this respect, rapid urban growth brings us not only the prosperities but also a series of challenges, in which the water-related issues, including the escalation of urban floods, have become essential problems in connection with sustainable development. The increasing urban flood risk has urged all nations and international organizations to take measures to confront the threats caused by floods and to build flood resilient cities.

Pakistan is a resource constraint country with a fast growing population, low natural resource development based and unfavorable local socio-cultural conditions, and climate change is an additional stress for the country. Educating masses about natural disasters and building up their preparedness at educational institutions can be of great help to minimize the damages of disasters. Media can play its due role in this regard as without its support, awareness cannot be boosted. Areas vulnerable to climate change-induced natural disasters must have adequate flood protection facilities, besides, reliable Medium Range Weather/Flood Forecasting & Warning System in place.

1.13 IMPACT OF RAPID URBANIZATION ON FLOOD MANAGEMENT

According to World Urbanization Prospects (2014 revision), world is experiencing a historically unprecedented transition from predominantly rural to urban living. In 1950, one-third of the world's population lived in cities; today the number has already reached more than one-half, and in 2050 city dwellers are expected to account for more than two-thirds of the world's population. This rapid rise will mainly take place in developing countries. Africa and Asia will be the fastest urbanizing regions with the urban population projected to reach 56% in Africa and 64% in Asia by 2050 (currently at 40% and 48%, respectively).

People move from rural environments into cities to seek economic opportunities and better access to basic services. Climate change is likely to accelerate the migration patterns into urban areas by altering the livelihood basis from both fishing and farming, and by increasing the occurrence and intensifying the effects of natural hazards. Land use and other human activities influence the peak discharge of floods by modifying how rainfall and snowmelt are stored on and run off the land surface into streams.

Construction of roads and buildings often involves removing vegetation, soil, and depressions from the land surface. The permeable soil is replaced by impermeable surfaces such as roads, roofs, parking lots, and sidewalks that store little water, reduce infiltration of water into the ground, and accelerate runoff to ditches and streams. With less storage capacity for water in urban basins and more rapid runoff, urban streams rise more quickly during storms and have higher peak discharge rates than do rural streams. In addition, the total volume of water discharged during a flood tends to be larger for urban streams than for rural streams.

1.14 CLIMATE VARIABILITY AND CHANGE

Climate change poses a major conceptual challenge as it shakes the foundation of the normal assumption that the long term historical hydrological conditions will continue into the future. At the same time, the future development path and the consequent impacts on climate change can at best be projected in terms of different development scenarios. Tackling climate change requires leadership, vision, capacity, and resources beyond our experiences to date.

A variety of climate and non-climate parameters influence flood processes. Apart from the antecedent basin conditions, flood magnitudes depend on precipitation intensity, depth, timing, and spatial distribution. Temperature and wind affect snowmelt, which in turn affects flood magnitudes. The projected effects of global warming include changes in atmospheric and oceanic circulation, and many subsystems of the global water cycle are likely to intensify, leading to altered patterns of precipitation and runoff. Various climate model simulations show complex patterns of precipitation change, with some regions receiving less and others receiving more precipitation than they do now.

The likely increase in the intensity of tropical cyclones implies a corresponding increase in the intensity of precipitation events. Similar patterns are also likely in high latitude areas that are expected to experience an increase in mean precipitation. Most tropical and middle and high latitude areas are expected to experience a greater increase in extreme precipitation than in mean precipitation. These heavy precipitation events are likely to increase in magnitude and frequency, resulting in an increase in the frequency of major floods.

FEDERAL FLOOD COMMISSION

2. FEDERAL FLOOD COMMISSION

2.1 Historic Background

Prior to 1976, the Provincial Governments were responsible for the planning and execution of flood protection works. Disastrous floods of 1973 & 1976 caused heavy loss of life and property and it was felt that the existing flood protection facilities and planning were inadequate to provide effective protective measures for the country. Heavy losses to the economy due to floods were discussed in the Inter-Provincial Conference held in January 1977 wherein it was decided to establish Federal Flood Commission (FFC) for integrated flood management on country wide-basis.

2.2 Functions of Federal Flood Commission

The existing charter of duties of FFC is given as under;

- i. Preparation of Flood Protection Plan for the country including management of the Plan;
- ii. Scrutiny of flood control/protection schemes funded by the federal government and prepared by Provincial Governments and Federal Agencies;
- iii. Review of damage of flood protection works and review of plans for restoration and reconstruction works;
- iv. Measures for improvement of Flood Forecasting & Warning System;
- v. Preparation of a Research Programme for flood control and protection;
- vi. Standardization of designs and specifications for flood protection works;
- vii. Recommendations regarding principles of regulation of reservoirs for flood control;
- viii. Evaluation and monitoring of progress of implementation of the National Flood Protection Plan;
- ix. Federal Flood Commission may notify sub-committees as it deems appropriate.

Provincial governments and Federal Line Agencies undertake flood protection schemes proposed under the National Flood Protection Plans (NFPPs). The Federal Government, however, provides the resources for meeting the capital costs of projects under NFPPs.

2.3 Achievements of FFC

Since its establishment in 1977, FFC has so far executed three 10-Years National Flood Protection Plans covering periods from 1978-1988 (NFPP-I), 1988-1998 (NFPP-II) and 1998-2008 (NFPP-III). Brief details of projects are given as under:

National Flood Protection Plan-I (1978-88):

Details of flood protection schemes executed under **National Flood Protection Plan-I (NFPP-I)** through various programme/projects are given as under;

Normal/ Emergent Flood Programme:

- | | |
|---|---------------------|
| • Expenditure incurred: | Rs 1,729.75 million |
| • No. of flood protection schemes completed in the four Provinces, AJ&K, FATA & NA (now G-B): | 311 |
| • Source of Funding: | 100% by GOP |

Under NFPP-I, emphasis was mainly given on the implementation of structural measures (construction of flood protection structures). Pakistan Meteorological Department (PMD) and WAPDA carried out only maintenance works related to Flood Forecasting & Warning System equipments.

National Flood Protection Plan-II (NFPP-II) (1988-98):

Details of flood protection schemes/activities carried out through various programme/projects are given as under;

Normal/ Emergent Flood Programme:

- Expenditure incurred Rs 805.33 million
- No. of Schemes executed 170
- Source of funding 100% by GOP

Flood Protection Sector Project-I (FPSP-I):

- Expenditure incurred Rs 4,735.29 million
- No. of flood protection schemes executed 256
- Co-financed by GOP & ADB
ADB= 80%
GOP = 20%

Under NFPP-II, the following activities were undertaken for improvement of Country's existing Flood Forecasting & Warning System through Flood Sector Protection Project (FPSP-I), which was jointly funded by ADB and GOP.

- Procurement & installation of Meteor-burst Telecommunication System (Phase-I) including one Master Station and 24 remote sensing stations.
- Installation of 10-CM Quantitative Precipitation Measurement (QPM) Weather Radar at Flood Forecasting Division (FFD) Lahore.
- Pre-feasibilities studies for four Barrages i.e. Sulemanki, Baloki, Trimmu & Panjnad for increasing their design discharge capacity to carry increased flood flows in view of 1992 floods.
- Preparation of Flood Plain Maps of Indus River (5-Reaches i.e. Chashma-Taunsa, Taunsa-Guddu, Guddu-Sukkur, Sukkur-Kotri & Kotri-Seas Reach).

Prime Minister's River Management Programme 1994-1996

- Expenditure incurred Rs. 613.386 million
- No. of schemes executed 10
- Source of Funding 100% by GOP

1988-Flood Damage Restoration Project

- Expenditure incurred Rs. 1,874 million
- No. of structures restored 2,028
- Source of Funding 90% by IDA & ADB,
10% by GOP

1992-Flood Damage Restoration Project

- Expenditure incurred Rs. 6,888.36 million
- No. of structures restored 1,980
- Source of Funding 80% by IDA, ADB & KfW
20% by GOP

National Flood Protection Plan-III (NFPP-III) (1998-2008):

Details of flood protection schemes carried out through various programme/projects are given as under;

Normal/Emergent Flood Programme:

- Expenditure incurred Rs 4,192.35 million
- No. of flood protection schemes executed in four Provinces, AJ&K, FATA, ICT and Northern Areas (Now Gilgit-Baltistan) 362
- Source of Funding 100% by GOP

Special Grant through President/Chief Executive Directive (2000-2002)

- Expenditure incurred Rs. 92.035 million
- No. of schemes executed 21
- Source of Funding 100% by GOP

Flood Protection Sector Project-II (FPSP-II):

- Expenditure incurred Rs 4,165 million
- No. of Flood Protection Schemes executed 101
- Source of Funding 80% by ADB,
20% by GOP
- Flood Forecasting & Warning System Rs 432.123 million

The major activities undertaken for improvement and upgradation of country's existing Flood Forecasting & Warning System include;

- Procurement & installation of 24 No. HF-Radio Sets.
- Procurement & installation of 20 additional remote sensing stations under existing Meteor-burst Telecommunication System (Phase-II);
- Upgradation of 10 CM Quantitative Precipitation Measurement Weather Radar procured under FPSP-I in the premises of FFD, Lahore;
- Upgradation of 5.36 CM Sialkot Weather Radar into 10 CM Quantitative Precipitation Measurement Weather Radar;

- Procurement & installation of a 10 CM Quantitative Precipitation Measurement Weather Radar at Mangla;
- Development of initial/1st version of Computer Based Flood Early Warning System (FEWS) through NESPAK, PMD & Delft Hydraulics;
- Expansion of Flood Plain Mapping activity covering major tributaries of River Indus i.e. Rivers Jhelum, Chenab, Ravi & Sutlej.
- Bathymetric Survey & flow measurements of Indus River and its major tributaries (*Sutlej, Ravi, Chenab & Jhelum*) for improvements in discharge rating curves & to collect data for FEWS Model & Flood Plain Mapping activities.

Establishment of Flood Forecasting & Warning System for Lai Nullah Basin (Islamabad & Rawalpindi):

- Expenditure incurred: Rs 348 million
- Source of Funding;
 - *Japanese Grand –in-Aid* Rs 337 million
 - *GOP share* Rs 11.00 million
- Facilities provided include:
 - Two No. Telemetry rainfall gauging stations at Golra, Islamabad and Bokra, Islamabad;
 - Two No. water level gauging stations at Kattarian Bridge, Rawalpindi and Gawalmandi Bridge, Rawalpindi;
 - Master control station in PMD, Islamabad;
 - Two monitoring stations at FFC and TMA/Rescue-1122-Rawalpindi respectively;
 - Executive Warning Control room in Rawalpindi Fire Brigade , and
 - Nine (9) No. warning posts at various locations.

2.4 National Flood Protection Plan -IV

After experiencing 2010 floods in country, the need for investment in flood sector has gained importance. Federal Flood Commission initiated working on formulation of National Flood Protection Plan-IV on fast track basis and consultants were engaged in May 2013 through World Bank funded Water Sector Capacity Building Project (WCAP) for preparation of NFPP-IV. The draft National Flood Protection Plan-IV has been prepared by the consultants in consultation with concerned organizations. The National Flood Protection Plan-IV (2015-25) is under approval process by the Government of Pakistan through Council of Common Interests. Actual implementation has been planned during the next ten years i.e. (2015-16) to (2024-25), subject to timely approval of plan by the Government of Pakistan and provision of adequate funds for construction of various interventions proposed in the NFPP-IV in coming years.

Presently, the urgent nature flood protection works being proposed by the Provincial Irrigation Departments and Federal Line Agencies are executed through GOP funded

Normal/Emergent Flood Programme. However, due to inadequate budget allocation under PSDP each year (*minimal as compared to the Provinces & Federal Line Agencies demands*) for Normal/Emergent Flood Programme, some urgent nature flood protection schemes remain un-attended. Total 170 number flood projects costing Rs. 3.91 billion have been carried out during the period {(2009-10) to (2014-15)}. The budget demand by the Provinces and Federal Line Agencies, budget allocated and actually released during the past 5-6 years {(2009-10) to (2014-15)} to PIDs & Federal Line Agencies is given in **Table-3**.

TABLE-3

**BUDGET DEMAND BY THE PROVINCES & FEDERAL LINE AGENCIES,
BUDGET ALLOCATED & RELEASED DURING PAST 5-6 YEARS**

(Rs. Million)

Sr. No.	Financial Year	Funds demanded	Budget Allocation under PSDP		Funds Released
			Original	Revised	
1	2009-10	3,500.000	1,000.000	575.110	78.358
2	2010-11	3,500.000	740.798	735.798	276.714
3	2011-12	4,000.000	894.000	844.194	567.095
4	2012-13	4,000.000	900.000	900.000	419.325
5	2013-14	4,500.000	1,000.000	1,000.000	855.533
6	2014-15	5,000.000	1,000.000	1,000.000	898.477
	Total	24,500.000	5,534.798	5,055.102	3,095.502

2.5 Normal/Emergent Flood Programme (2014-15) & (2015-16)

Federal Flood Commission is presently coordinating implementation of Normal/ Emergent Flood Programme, which was started in (1978-79). It is a yearly program in which Provincial Irrigation Departments and Federal Line Agencies submit their schemes (based on their shares) each year, which are processed by FFC for technical clearance of Scrutinizing Committee of FFC and approval of DDWP/CDWP. The award of contract, execution and disbursement is the exclusive responsibility of Provincial Irrigation Departments and Federal Line Agencies. The flood protection schemes are processed for approval and implementation before 30th June each year subject to in-time approval and release of funds by Planning Commission/Finance Division to the Line Agencies.

An amount of Rs. 1,000.00 million was allocated under PSDP (2014-15) for Normal/ Emergent Flood programme, under which 65 No. flood protection schemes costing Rs 3,425.057 million were taken up. Overall funds to the tune of 898.477 million were released to PIDs/FLAs. So far utilization of 268.875 Million has been reported. An amount of Rs. 1,000.00 million has been allocated under PSDP (2015-16) for Normal/ Emergent Flood programme. Overall 72 No. flood protection schemes costing Rs 2,606.501 million were taken up which include some of the ongoing schemes, which could not be completed during the previous years due to funding constraints. Detailed list of schemes executed/being executed under Normal/ Emergent Flood Programme during Financial Years (2014-15) & (2015-16) is attached as **Appendix-I**.

2.6 Summary of GOP Investment on Flood Protection Works

The summary of federal investment on flood protection works since 1978-79 to June 2015 is given in **Table-4**.

TABLE 4

SUMMARY OF FEDERAL INVESTMENT ON FLOOD PROTECTION WORKS

Sr. No.	Flood Plans/ Programs	Location	No. of schemes	Expenditure (Rs Million)
1.	NFPP-I (1978-88)			
	Normal Annual Development Programme	Countrywide	311	1,729.75
2.	NFPP-II (1988-98)			
i.	Normal/Emergent Flood Programme	Countrywide	170	805.33
ii.	First Flood Protection Sector Project (FPSP-I)	Four Provinces	256	4,735.29
iii.	Prime Minister's River Management Programme (1994-96)	Punjab, Khyber Pakhtunkhwa & Balochistan	10	613.386
3.	NFPP-III (1998-2008)			
i.	Normal/Emergent Flood Programme	Countrywide	362	4,192.35
ii.	Second Flood Protection Sector Project FPSP-II (1998-2007)	Four Provinces	101	4,165.00
iii.	Special Grant through President/ Chief Executive Directive (2000-2002)	Gilgit-Baltistan	21	92.035
iv.	Lai Nullah Flood Forecasting & Warning System <i>through Japanese Grant</i>	District Rawalpindi & ICT	1	348.00
v.	Normal/Emergent Flood Programme (2008-09 to 2014-15)	All over the country	170	3,906.555
	Sub Total-I (NFPP-I,II &III)		1,402	20,567.70
4.	Flood Damage Restoration Projects			
i.	1988-Flood Damage Restoration Project	Four Provinces	2,028	1,874.00
ii.	1992-Flood Damage Restoration Project	Countrywide	1,980	6,888.36
	Sub Total-II		4,008	8,762.36
	Grand Total		5,410	29,350.06

FLOOD MANAGEMENT MECHANISM

3. FLOOD MANAGEMENT MECHANISM

3.1 Organizations involved and responsibilities

Flood management is a multifunctional process involving a number of organizations. The Government Organizations, which play major role in the flood management are the Provincial Irrigation Departments (PIDs), GB-PWD, Irrigation Directorate FATA, Irrigation & Small Dams Organization, Government of AJ&K, PMD/Flood Forecasting Division, Lahore WAPDA, PCIW, Federal Flood Commission, NDMA, Provincial Relief Organizations, Pak Army, Emergency Relief Cell (ERC), Cabinet Division, NHA, Pakistan Railways, Provincial Disaster Management Authorities, GB-DMA, FDMA, SDMA & DDMAs/ District Administration. Functions of these organizations are briefly described hereinafter;

3.1.1 Provincial Irrigation Departments:

The Provincial Irrigation Departments (PIDs) play a front line role in flood management, fighting and mitigation. Major flood related functions include:

- i. Operation and maintenance of Barrages and measurement of discharges at specific sites (Barrages/Headworks) on rivers, Irrigation & Drains Networks, besides, flood management facilities;
- ii. Planning, design, construction and maintenance of Irrigation, Drainage & Flood Protection & River Training Works;
- iii. Collection and transmission of Rivers flows data to FFD, Lahore, FFC and other concerned organizations for flood management activities;
- iv. Establishment & Operation of Flood Warning Centre during the monsoon season each year for sharing flood flows data and other information, besides, timely dissemination of the flood forecasts/warnings to concerned quarters;
- v. Preparation & implementation of the Flood Fighting Plans during monsoon season every year.

3.1.2 WAPDA

WAPDA is actively involved in the flood forecasting process as it provides water levels of major reservoirs (Tarbela, Chashma & Mangla), river flows and rainfall data collected through Flood Telemetric System/Gauged sites in the catchment areas of major rivers. The system is supplemented by Meteor-burst communication system. WAPDA supports another hydrometric data measurement and transmission system through its Surface Water Hydrology Project.

WAPDA's Flood Telemetric Network is directly linked with FFD, Lahore. WAPDA provides hydrometric flood data and water levels, inflows/ outflows of Tarbela, Chashma and Mangla reservoirs to FFD, Lahore, FFC and other concerned organizations. Coordination between FFD Lahore and WAPDA has considerably improved after the 1992-flood disaster. Regular meetings in the office of General Manager (Planning & Design) are held during flood season and necessary instructions are issued to Tarbela and Mangla Dam Flood Management Committees.

3.1.3 Provincial Relief Organizations/ Provincial Disaster Management Authorities:

Ultimate aim of flood warnings is to reduce the loss of life and damages to property of the community living in the flood prone/high risk areas. Provincial Relief Organizations (*now Provincial Disaster Management Authorities*) are responsible for disaster preparedness, preparation of emergency response plan, rescue and relief measures and rehabilitation plan and its approval from Provincial Government before implementation; examine the vulnerability of various parts of the province to different disasters and specify prevention or mitigation measures; lay down guidelines for preparation of disaster management plans by the Provincial Department and District Authorities; evaluate preparedness at governmental levels to respond to disaster and enhance preparedness; coordinate response in the event of disaster; give directions to DDMA's regarding actions to be taken in response to disaster; and promote general education, awareness and community training etc. pertaining to all disasters including floods. Relief functions at the District and Tehsil/Union Council level are now performed through the District Disaster Management Authorities, who coordinate with the concerned departments to carry out the disaster management functions at the District level.

3.1.4 Pak Army:

Pak Army's Corps of Engineers under the command and control of Engineer-in-Chief (*E-N-C*) provide necessary help to the civil authorities to carry out rescue and relief operations during floods. Provincial Governments facilitate Pak Army in providing necessary logistic support/equipment (boats, life jackets, vehicles, tents etc.) for such operations.

Pakistan Army's flood related functions encompass all the three phases of flood operations from the pre-flood to post flood phases including the important flood phase. Pre-flood phase is the flood preparatory phase during which the adequacy and serviceability of the flood fighting equipment is ensured. Pre-flood meeting are also held at the Corps Head Quarters and Engineer Directorate, GHQ in order to review the arrangements of PIDs, PDMA's & Federal Line Agencies for handling flood situation.

Pre-flood inspections of the flood protection structures are carried out by the respective Commander Corps of Engineers alongwith concerned officers of Provincial Irrigation Departments for their respective areas to ensure that the flood protection structures (Bunds, Barrages, Spurs etc.) are in satisfactory state of maintenance. Deficiencies, if any, are brought to the notice of PIDs. Availability of sufficient stock of explosives is ensured at pre-determined breaching sections to activate the pre-determined breaching sections, whenever required.

An officer of the 4 Corps Engineers is placed on duty in the Flood Warning Centre, Lahore, to keep a close watch on the flood situation. All flood forecasts and warnings are communicated to the CC Engineers 4 Corps in time, which are transmitted to the D.G. Engineers and all other CC of the Engineers. In the event of floods, units of the Pak Army move out to their respective areas of responsibility and carry out the relief and rescue operations in coordination with the respective civil administration. A post flood meeting is

held under the Chairmanship of Engineer-in-Chief/ D.G. Engineers to discuss the performance of all the flood management related agencies with the view to bring about the necessary improvement in future.

3.1.5 Pakistan Commissioner for Indus Waters (PCIW)

Pakistan has a unique flood-forecasting problem in the sense that major part of the flood generating in upper catchments of Rivers Sutlej, Ravi, Jhelum and Chenab lie across the border in India/ held Kashmir. A number of water storage reservoirs have been constructed over Eastern Rivers (Ravi & Sutlej) across the border. As a result, the free flood flow conditions are disrupted making the operation of the rainfall/runoff model extremely difficult. The situation underlines the need for the acquisition of rivers flow data from across the border in respect of important sites over the rivers in India/held Kashmir. Consequently, an agreement had been signed between the two countries in 1989 through their respective Commissioners for Indus Waters, which includes provision/ sharing rivers flows data with India such rivers flow and rain data as is considered important for flood forecasting in Pakistan. A number of river flow stations are specified for this purpose.

The Pakistan Commissioner for Indus Waters receives the Chenab River and Eastern Rivers (Ravi & Sutlej) data normally once in a day. The data is then passed on to the FFD, Lahore for preparation and issuance of Flood forecast to concerned organizations. Frequency of data reception is increased to six hourly and even to hourly in case of severe flood situation. Pakistan Commissioner for Indus Waters is thus responsible to provide to FFD, Lahore, the much-needed data obtained from India for use in the flood forecasting models to ensure accurate forecasts for Rivers Sutlej, Ravi, Jhelum & Chenab. Pakistan Commissioner for Indus Waters is the only forum through which any clarification or further information can be obtained from India with regard to flood flows data of Chenab & Eastern River (Ravi & Sutlej).

3.1.6 Emergency Relief Cell (ERC), Cabinet Division

Emergency Relief Cell (ERC) exists under the Cabinet Division and is controlled by the Cabinet Division. The Cell is headed by the Director General. The main functions of the Emergency Relief Cell include:

- Planning and assessment of relief requirements for major disasters;
- Stock piling of basic need items during emergency such as dry ration, tents, blankets etc;
- Establishing emergency fund upon declaration of any part of the country as calamity affected; and
- Maintaining contact with NDMA, UNO and its related organizations, besides other international aid giving agencies.

3.1.7 Role of Federal Flood Commission in Flood Management/Mitigation

Pre-Monsoon Season action taken by FFC:

- FFC chalks out pre-emptive measures for better flood management during monsoon season, which are circulated amongst all stakeholders for taking further action at their end.

- For that purpose two (2) days consultation workshop was organized by FFC on 12th & 13th January 2015 to review progress on pre-emptive measures recommended by FFC and also to assess the flood preparedness level of PIDs/AJK/FATA & Gilgit-Baltistan.
- A series of meeting were arranged by FFC for review the existing SOPs of Mangla Reservoir in the light of lessons learnt during 2014 floods so as to enhance its role in flood mitigation. The revised SOPs (as recommended by FFC) were approved by the Ministry of Water & Power on 14th April 2015, which were implemented during monsoon season 2015 and proved successful.
- FFC organized Pre-flood meetings to review progress on the pre-emptive measures and necessary instructions are issued to flood management related organizations at Federal and Provincial Government level. First meeting was organized on 27th April 2015.
- 50th Annual meeting of FFC under the Chairmanship of Federal Minister for Water & Power was organized on 14th May 2015, which was attended by all stakeholders for presenting their status of preparedness. Necessary directions were issued to concerned organizations for assurance the safe passage of monsoon season 2015.
- A follow up meeting for review the arrangements of flood management related organizations and also to evaluate progress on decisions taken in 50th Annual Meeting of FFC, was arranged on June 23, 2015 under the Chairmanship of the Honourable Federal Minister for Water & Power in Ministry of Water & Power, Islamabad.
- On the directions of Honourable Supreme Court of Pakistan, issued on 9th July 2015, a special meeting of Federal Flood Commission was organized on 14th July 2015 under the Chairmanship of Honourable Federal Minister for Water & Power to review the status of preparedness of the Provinces and Federal Line Agencies for monsoon season 2015 in the light of decisions taken in Pre-monsoon meetings of FFC held on 14th May & 23rd June 2015 and status of compliance of directions given by the Honourable Supreme Court of Pakistan on the recommendations of Flood Inquiry Commission.
- As per previous practice, the desilting work in critical reaches of Lai Nullah was carried out through WASA Rawalpindi before 30th June 2015.
- Federal Flood Commission participated in Pre-Flood Conference of Pak. Army held on 21st May 2015 in Engineer Directorate, GHQ Rawalpindi;
- Federal Flood Commission attended the Pre-flood Conference of NDMA held on 30th June 2015;

During Monsoon Season Role of FFC:

- FFC issued Daily Flood Situation Report to higher ups and Flood Management related agencies, based on Weather Forecasts/ Advisories and Rainfall & Rivers flow data as received from FFD, Lahore/PMD, WAPDA & PIDs. For that purpose Flood Communication Cell established in FFC worked on round-the-clock basis during entire Monsoon Season (15th June to 15th October). Responsibility for response/ reaction to warnings issued by PMD/FFD, Lahore & FFC rests upon concerned Provincial organizations/District Administrations.

Post Monsoon Season Role of FFC

- FFC prioritize the list of emergent flood protection schemes in consultation with Provincial Irrigation Departments and Federal Line agencies for execution under GOP funded Normal/Emergent Flood Programme (2015-16);
- The 2nd meeting of Federal Flood Commission (FFC) held on **27th October, 2015 at 1030 hours** under the Chairmanship of Additional Secretary-II, Ministry of Water & Power in the Committee Room of office of the Chief Engineering Advisor/ Chairman Federal Flood Commission Islamabad in order to review the to review the updated status of compliance of directions given by the Honourable Supreme Court of Pakistan, besides, damages occurred to irrigation, drainage & flood protection infrastructure in the four provinces and Federally administered areas during monsoon season 2015.
- FFC technically scrutinize the PC-Is of flood projects and submit to Ministry of Water & Power for approval of DDWP/CDWP. Total four meetings of Scrutinizing Committee of FFC were organized upto 19th February 2016, wherein 17 (seventeen) number flood protection schemes were technically examined and recommended to Ministry of Water & Power for approval of DDWP/CDWP.
- Four meetings of FFC were organized for review of progress on implementation of flood projects under GOP funded Normal/Emergent Flood Programme.
- The sites inspections of flood protection schemes being executed under GOP funded Normal/Emergent Flood Programme were carried out by the FFC's Teams.

3.1.8 Flood Forecasting Division (FFD), Lahore

FFD, Lahore, the specialized unit of Pakistan Meteorological Department, which plays a pivotal role in the Flood Forecasting & Warning process obtains the hydro-meteorological data from the various National and International sources, which is then analyzed to produce weather & flood forecasts, warnings and disseminated to various Federal/Provincial organizations and electronic/print media through various means and also uploaded on PMD Website.

3.1.9 National Disaster Management Authority (NDMA)

Government of Pakistan had embarked upon establishing appropriate policy to minimize risks and vulnerabilities and passed NDMA ordinance 2006. National Disaster Management Authority (NDMA) has been established to serve as the focal point and coordinating body to facilitate implementation of disaster risk management strategies. This necessitates NDMA to directly interact/communicate with all stakeholders, including Ministries, Divisions, and Departments in relaxation to normal communication channel.

NDMA is an expedient to provide an effective national disaster management system and for matters connected therewith and incidental thereto. As per National Disaster Management Authority Act-2010, the main functions of NDMA are as under:

- i. Act as implementing, coordinating and monitoring body for disaster management;
- ii. Prepare the National Plan to be approved by the National Disaster Management Commission;

- iii. Implement, coordinate and monitor the implementation of the national policy;
- iv. Lay down guidelines for preparing Disaster Management Plans by different ministries or departments and the provincial authorities;
- v. Provide necessary technical assistance to provincial government and provincial authorities for preparing their Disaster Management Plans in accordance with the guidelines laid down by the National Disaster Management Commission;
- vi. Coordinate response in the event of any threatening disaster situation or disaster;
- vii. Lay down guidelines for or give directions to the concerned ministries or provincial governments and provincial authorities regarding measures to be taken by them to response to any threatening disaster situation or disaster;
- viii. For any specific purpose or for general assistance requisition the services of any person and such person shall be co-opted as member and exercise such power as conferred upon him by the authority in writing;
- ix. Promote general education and awareness in relation to disaster management;
- x. Perform such other functions as the National Disaster Management Commission may require performing.

3.2 Flood Warning Dissemination System:

Monsoon Season normally starts in 1st week of July (*sometimes, it starts little early*) and ends in last week of September (*sometimes prolongs upto mid October*). However, the Flood Warning Centers of all flood management related agencies start functioning from 15th June every year for collecting weather & flood flows data and keep continue upto 15th October. During this period effective interaction and communication between various floods related provincial as well as federal agencies is maintained on round-the-clock basis in order to counter any eventuality due to monsoon rains/floods.

**PREPAREDNESS/
CONTINGENCY PLANNING
FOR
MONSOON SEASON 2015**

4. PREPAREDNESS & CONTINGENCY PLANNING BY FEDERAL FLOOD COMMISSION FOR MONSOON SEASON 2015

The Federal Flood Commission (FFC) mainly plays coordination role among the Provincial as well as Federal Government Organizations dealing with flood management in the country minimizing the damages to human life, agricultural lands and other public and private property by managing the flood water, at the sole responsibility of provincial Irrigation Department, and Federal Line Agencies.

As per practice, FFC holds meeting prior to start of Monsoon Season (1st July to 15th October) every year, to review the status of preparedness/ flood fighting arrangements made by Federal/Provincial Organizations in case of flood situation during Monsoon season.

4.1 Consultative Workshop for Monsoon Season 2015

Flood Commission (FFC) chalks out pre-emptive measures for safe passage of monsoon season, each year which are circulated amongst all stakeholders. Two (2) days consultation workshop was organized by FFC on **January 12-13, 2015** to review draft NFPP-IV and assess the flood preparedness level of PIDs/AJK/FATA & Gilgit-Baltistan. The following directions were issued to PIDs/Federal Line Agencies, WAPDA & PMD etc;

- i. Consultants (M/S NESAPK) would submit to PMPIU (WCAP) with in a week's time, the draft NFPP-IV and reports of other studies i.e. (i) Inventory of flood protection structures and benefit monitoring of FPSP-I&II and (ii) Flood Plain Mapping & Zoning & preparation of River Act for circulation among stakeholders. The stakeholders would review reports and submit their written comments within fifteen days to PMPIU (WCAP) for incorporating in finalized versions of reports.
- ii. Consultants (M/S NESAPK) will fully involve all concerned organizations in finalization process of NFPP-IV, so as to prepare a comprehensive bankable document, which is also acceptable to all stakeholders. For that purpose, consultants would visit all the four Provinces and Federally Administered Areas (FATA, Gilgit-Baltistan and AJ&K) on war footing basis, in order to properly address the grievances of all stakeholders and submit the modified studies reports of all the three tasks **by/before February 15, 2015** to PMPIU (WCAP) for joint review with stakeholders, before finalized version of NFPP-IV is submitted to Ministry of Water & Power for approval of competent authority.
- iii. FFC would arrange meeting in 3rd week of January 2015 to review the existing SOPs of Tarbela and Mangla Dam Projects. WAPDA would make presentation on the existing SOPs of reservoirs, lessons learnt during 2010 & 2014 flood events and recommended measures for updating the existing SOPs, so as to enhance the role of reservoirs in mitigating future floods.
- iv. PIDs would carry out field survey of flood protection infrastructure jointly with concerned Corps of Engineers, Pak Army on war footing basis in order to identify the vulnerable sections of bunds. The field survey would be completed by/before 15th March 2015. The proposals/ cost estimates of strengthening/ rehabilitation works of all such structures would be prepared and processed for implementation before 30th June 2015.

- v. Federal Flood Commission will write DO letters to Chief Secretaries of the four provinces and Federally Administered Areas (Gilgit-Baltistan, FATA & AJK) for allocating adequate funds for strengthening damaged/ vulnerable sections of flood protection and drainage infrastructure well before the start of Monsoon Season 2015.
- vi. PIDs will initiate action on removal of encroachments from flood protection & drainage infrastructure including flood prone areas. The task would be completed by 30th June 2015.
- vii. PMD/FFD, Lahore & WAPDA will critically examine the flood forecasting & warning system related equipment and carry out all essential repair/ maintenance works of the system well before the start of Monsoon Season 2015.
- viii. Next consultative meeting of FFC would be held in 3rd week of February 2015 for review the draft reports of NFPP-IV and related studies, besides, preparation of PIDs & FLAs for Monsoon Season 2015.

4.2 Preparatory Meeting of FFC for Monsoon Season 2015

The first preparatory/pre-flood Meeting of Federal Flood Commission was held on April 27, 2015 under the Chairmanship of Chief Engineering Advisor/ Chairman Federal Flood Commission in the Committee Room of office of CEA/CFFC in order to review the status of preparedness of the provinces & federal line agencies for upcoming Monsoon Season 2015 in view of the decisions already taken during the post flood meeting of FFC held on 10th November, 2014 and (2) days consultation workshop organized by FFC on January 12 & 13, 2015. The following directions were issued to PIDs/Federal Line Agencies, WAPDA, PMD & other concerned agencies etc;

- i. PIDs & Federal Line Agencies will submit to FFC the lists of critical locations of flood protection structures and their status of rehabilitation within a week's time.
- ii. PIDs & Federal Line Agencies will ensure strengthening of all weak sections of flood protection infrastructure and urgent nature maintenance work related to flood bunds, spurs, Barrages/Headworks and allied works etc. well before the start of Monsoon Season 2015 (by/before 30th June 2015). The compliance report would be submitted to Federal Flood Commission soon after completion of the task.
- iii. Federal Flood Commission will write D.O. letter to Additional Chief Secretary (Development), Government of Sindh for allocation/release of adequate funds for repair and rehabilitation/strengthening of weak/vulnerable sections of Irrigation, Drainage & Flood Protection Infrastructure so that all urgent nature O&M works could be completed before 30th June 2015.
- iv. PIDs & Federal Line Agencies will ensure full utilization of funds released under PSDP (2014-15) for Normal/Emergent Flood Programme by/before 30th June 2015 so as to complete all new/ongoing flood protection schemes well before the start of upcoming monsoon season 2015.
- v. PIDs & FLAs including NHA, Pak Railway will ensure arrangements of explosive and others material at sites of pre-determined breaching sections and stone reserve stock/ flood fighting material at all critical reaches of flood embankments as identified during pre-flood inspections before start of monsoon season 2015/ (before 30th June 2015).

- vi. PIDs & concerned Federal Line Agencies will ensure removal of encroachments from flood Protection infrastructure and flood plains before start of Monsoon Season 2015 (15th June 2015). The compliance report would be submitted to FFC.
- vii. PIDs & FLAs will finalize District/Division wise flood fighting plans and circulate the same among all concerned organization including FFC before 15th June 2015.
- viii. PMD, FFD, Lahore & WAPDA will carry out all essential repair/ maintenance works of Flood Forecasting and Warning System equipment and ensure that the System /Network is fully functional by/before 15th June 2015.
- ix. PMD/FFD, Lahore will expedite the installation of AWS and flood flows gauging stations over River Munawar Tawi in AJ&K, besides, installation of AWS at Munda Headworks in Khyber Pakhtunkhwa.
- x. District Coordination Officer (DCO) Rawalpindi will notify, within a week's time, a focal person who will be responsible to collect information on flood preparedness activities of Lai Nullah (including the details on removal of solid waste, dumping of construction waste of Metro-Bus project and removal of encroachments etc.) from RDA, TMA & WASA for submission to Ministry of Water & Power through FFC.
- xi. WASA Rawalpindi will immediately arrange visit of ongoing dredging/desilting work of Lai Nullah by a panel of 2-3 experts from IRI Nandipur Lahore in order to determine the technical viability of ongoing activity. Thereafter, WASA Rawalpindi will ensure that de-silting work in the light of recommendations of panel of IRI experts was completed well before the start of Monsoon Season 2015 so as to ensure smooth passage of flood flows during Monsoon Season 2015.
- xii. NDMA will expedite the case for arranging funds for Pak Army for O&M regarding their flood relief equipments, so as to make fully operational the same for monsoon season 2015.
- xiii. PCIW will make all necessary arrangements with Indian Counterpart (ICIW) well in time and ensure smooth flow of information from Indian side during monsoon season 2015 for better flood management in Eastern Rivers including River Chenab. PMD will also carefully watch and determine the validity/reliability of data provided by India through its own Flood Forecasting & Warning System and Radars Network, while using the same for flood management operation in the country.
- xiv. Pakistan Railways & PID, Punjab will resolve the issue regarding O&M of the flood embankments and breaching sections of Pak. Railways Bridges including Shersah Railway Bridge well before start of monsoon season 2015.

4.3 50th Annual Meeting of Federal Flood Commission

The 50th Annual Meeting of Federal Flood Commission was held on 14th May 2015 under the Chairmanship of Honourable Federal Minister for Water & Power in the Committee Room of Ministry of Water & Power, in order to review the status of preparedness of the Provinces & Federal Line Agencies for Monsoon Season 2015. The following directions were issued to PIDs/ Federal Line Agencies, WAPDA, WASA & PMD etc:

- i. Tarbela and Mangla reservoirs are at present 61 feet and 41 feet respectively above last year's levels. Close monitoring by FFC, WAPDA, PMD and provinces should be ensured.
- ii. PIDs & Federal Line Agencies must ensure completion of all ongoing flood protection works, strengthening of weak sections, and completion of urgent nature maintenance works related to flood bunds, spurs, Barrages/Headworks and allied works, etc., well before the start of monsoon season 2015 (**before 30th June 2015**).
- iii. PIDs and Federal Line Agencies to ensure strict vigilance and constant monitoring of flood protection structures, in particular the vulnerable sections, for the monsoon season 2015. PIDs & FLAs will finalize District/Division-wise flood fighting plans and circulate the same among all concerned organization including FFC before **30th June 2015**.
- iv. PID, Balochistan would take up the case with Provincial Government for getting requisite funds (Rs 500 million) for essential repair works of flood protection structures.
- v. PIDs & FLAs including NHA, Pak Railway will ensure arrangements of explosive and others material at sites of designated breaching sections and stone reserve stock/ flood fighting material at all critical reaches of flood embankments as identified during pre-flood inspections before start of Monsoon Season 2015. Pakistan Railways & PID, Punjab in consultation with WAPDA and Engineering Directorate Pak. Army will review the breaching sections issue and O&M of the flood embankments of Pakistan Railways Bridges including Shersah Railway Bridge and resolve the same before start of coming monsoon season.
- vi. PMD, FFD, Lahore & WAPDA will carry out all essential repair/ maintenance works of Flood Forecasting and Warning System equipment (Lahore, Sialkot, Mangla radars & gauging stations etc.) and report that System is fully functional **by/before 30th June 2015**.
- vii. PID, Punjab will expedite action on installation of flood flow gauging station at Mandiala Bridge across River Munawar Tawi and PMD will arrange installation of AWS at appropriate locations as recommended by the concerned Corps of Engineers, Pak. Army in the catchment area of River Munawar Tawi. Both the activities would be completed before start of monsoon season 2015.
- viii. PCIW, in consultation with Ministry of Water & Power, will take up the matter with NESPAK for development of software for estimation of inflows and reservoir levels of dams across River Ravi & Sutlej located in Indian Territory. Arrangements before the start of monsoon season 2015 would be ensured by PCIW/ NESPAK.
- ix. PIDs& Federal Line Agencies will ensure removal of encroachments from plains before start of monsoon season 2015. The compliance report would be submitted to FFC.
- x. WASA Rawalpindi will immediately arrange site visit of ongoing dredging/desilting work of Lai Nullah by a Panel of Experts including representative from IRI Nandipur Lahore, in order to determine the technical viability of ongoing activity. WASA Rawalpindi will ensure that de-silting work is done in the light of recommendations of panel of experts. The excavated soil of Metro-Bus project dumped in waterway of Lai

nullah would be removed before 30th June 2015 so as to ensure smooth passage of flood flows during Monsoon Season 2015.

- xi. NDMA will expedite the case for arranging funds for Pak Army for O&M of flood relief equipment, so as to make the same fully operational for monsoon season 2015.
- xii. PMD will carefully watch and determine the validity/reliability of data provided by India through its own Radar Network and other Flood Forecasting & Warning System facilities, while using the same for flood management operation in the country.
- xiii. Chief Meteorologist, FFD, Lahore would be the spokesperson to respond to the queries related to flood forecasting & warning system facilities and the associated flood management activities carried out during monsoon season 2015.
- xiv. Ministry of Water & Power will arrange a special meeting with GB-PWD for resolving their issues related to meager allocation of funds under Normal/Emergent Flood Programme.
- xv. Next meeting of FFC would be held in **June 2015** to review the progress on the above listed decisions and status of preparedness of provinces and Federal Line Agencies for monsoon season 2015.

4.4 Follow up Meeting on decisions of 50th Annual Meeting of Federal Flood Commission

A follow up meeting of FFC was held on 23rd June 2015 under the Chairmanship of the Honourable Federal Minister for Water & Power in Ministry of Water & Power, Islamabad to review the status of preparedness of provinces and federal line agencies for monsoon season 2015. The following directions were issued to PIDs/ Federal Line Agencies, WAPDA & PMD etc:

- i. PIDs & Federal Line Agencies including WAPDA, PMD, NDMA, NHA, Pak Railway & WASA etc. would fully comply with the decisions taken during 50th annual meeting of FFC held on 14th May 2015. The compliance report would be submitted to FFC by/before 30th June 2015.
- ii. PIDs and Federal Line Agencies including PMD/FFD, Lahore & WAPDA will ensure smooth running of their flood flow gauging/flood forecasting and warning system equipments (Radar Network, rainfall & runoff gauging stations etc.) during monsoon season 2015.
- iii. PID, Punjab would submit detailed report on provision of breaching section along Taunsa Barrage and relocation of existing breaching section of Trimmu Barrage to FFC and Ministry of Water & Power before 30th June 2015.
- iv. PID, Punjab would submit detailed report on proposal regarding diversion of Aik Nullah upstream of Sialkot city and its outfall in Chenab River.
- v. Irrigation Department, Government of Balochistan will expedite action on carrying out feasibility study for Kachi Plain/ flood management of Muri - Bughti Hill Torrents. The proposal would be shared with FFC and Ministry of Water & Power for further course of action.

- vi. PID Punjab, NHA & Pak Railway will ensure the clearance of outstanding liabilities of Pak. Army for procurement of explosives for designated breaching sections before 30th June 2015.
- vii. NDMA will facilitate Pak Army for arranging payments of funds through PDMAs or other source for repair of flood relief equipment, so as to make them fully operational for monsoon season 2015.
- viii. PIDs and Federal Line Agencies to ensure strict vigilance and constant monitoring of flood protection structures, in particular the vulnerable sections, during the monsoon season 2015, so as to avoid untoward situation.
- ix. PIDs and Federal Line Agencies would complete all ongoing flood protection works taken up under GOP funded Normal/Emergent Flood Programme (2014-15), besides, urgent nature restoration/rehabilitation works related to flood protection infrastructure before 30th June 2015).
- x. PMD in collaboration with PCIW will carefully watch and determine the validity/reliability of data provided by Indian counterpart through its own Radar Network and other Flood Forecasting & Warning System facilities, while using the same for flood management operation in the country. As per existing practice, PCIW will ensure smooth sharing of transboundary data of Rivers Chenab, Ravi & Sutlej during monsoon season 2015.
- xi. WASA Rawalpindi will ensure desilting work in Lai Nullah is completed by /before 30th June 2015 so as to ensure smooth passage of flood flows during Monsoon Season 2015.

4.5 Special/1st meeting of FFC held on 14th July 2015 to review the status of preparedness of the Provinces and Federally Administered Areas for monsoon season 2015 and compliance of the directions given by the Honourable Supreme Court of Pakistan

On the directions of Honourable Supreme Court of Pakistan, issued on 9th July 2015, a special meeting of Federal Flood Commission was organized on 14th July 2015 at 1230 hours under the Chairmanship of Honourable Federal Minister for Water & Power to review the status of preparedness of the Provinces and Federally Administered Areas for monsoon season 2015 and status of compliance of directions given by the Honourable Supreme Court of Pakistan on the recommendations of Flood Inquiry Commission, while disposing off the Constitution Petition No. 62 of 2010, filed by Ms Marvi Memon versus Federation of Pakistan, through Secretary Cabinet & others. Following decisions were taken related to flood preparedness of the four Provincial Irrigation Departments and Federal Line Agencies, WAPDA & PMD etc.:

- i. Tarbela & Mangla Dam operating authorities to take utmost care and vigilance in operation of reservoirs and strictly follow the SOPs/filling criteria and safety guidelines, so as to ensure safety of structures and avoid synchronization of flood peaks in the downstream areas.

- ii. Irrigation Departments of the four provinces would ensure strict vigilance and regular patrolling of flood embankments, especially the vulnerable reaches, so as to avoid untoward situation during monsoon season.
- iii. WAPDA H&WM Wing would carry out the repair work of non-operational Flood Telemetric Stations recently reported by the Pakistan Meteorological Departments on war footing basis. The compliance report would be submitted to all concerned organizations including FFC & Ministry of Water & Power.
- iv. Pakistan Meteorological Department would ensure that Radars Network & other Flood Forecasting & Warning System Equipments work flawlessly. PMD would make utmost efforts in providing timely & accurate Weather and Flood Forecasts during monsoon season 2015.
- v. PID, Punjab would coordinate with concerned Corps of Engineers, Pak. Army for installation of flood flows gauging station at Mandiala Bridge across Munawar Tawi. PMD will also arrange installation of AWS in consultation of concerned Corps of Engineers, Pak. Army at appropriate location in catchment area of River Munawar Tawi under intimation to all concerned organizations including FFC and Ministry of Water & Power.
- vi. Chief Engineering Advisor/Chairman, FFC would write a D.O Letter to Chief Secretary, Government of the Punjab to resolving the chronic issues of encroachments and dumping solid wastes in bed of Lai nullah and Soan River by the locals of Rawalpindi city.
- vii. Ministry of Water & Power would write a letter to PID, Punjab regarding provision of breaching section along Taunsa Barrage, as provided along other Barrages/ Headwork in Punjab.

4.6 Flood Communication Cell of FFC

The Flood Communication Cell of Federal Flood Commission started functioning from 15th June 2015 till end monsoon season (15th October 2015) on round-the-clock basis for collection, compilation rainfall, rivers flow data and reservoir water levels and its transmission to concerned agencies at Federal and Provincial Government level on daily basis in normal/low flood stage and 6-hourly basis in case of high flood levels in main rivers. Based on PMD's Weather Forecasts and Advisories, FFC also issued Daily Flood/Weather Situation Reports to all concerned agencies through its Flood Communication Cell during the entire monsoon season 2015.

4.7 Post Flood Meeting/2nd meeting of FFC held on 27th October 2015

The Post Flood meeting of Federal Flood Commission was held on November 10, 2014 in the committee room of O/o Chief Engineering Advisor/Chairman Federal Flood Commission, Islamabad under the Chairmanship of Honorable Chief Engineering Advisor/ Chairman FFC, Islamabad in order to review the damages caused to irrigation, drainage and flood protection infrastructure due to 2015 rains/floods. Besides other,

following major directions were also issued to PIDs/ Federal Line Agencies, WAPDA & PMD for improving the flood management during monsoon season 2016:-

- i. WAPDA will expedite repair of damaged/non-operational Flood Telemetric Stations and other flood forecasting & warning system equipments under the use of WAPDA on war footing basis. The status report would be submitted to FFC before next quarterly review meeting.
- ii. PMD/FFD Lahore would organize joint consultative meeting of all concerned organizations including Irrigation Secretaries of four provinces, representatives from FFC, WAPDA, SUPARCO, NDMA/PDMAs, Planning Commission, PCIW, M/s NESPAK (consultants of NFPP-IV) etc., in order to chalk out a comprehensive plan for up-gradation and expansion of existing Radars Network, and Flood Forecasting & Warning System based on actual requirements of the provinces and Federally Administered areas. The recommended plan would be submitted to FFC before next quarterly review meeting.
- iii. Irrigation Department, Government of Khyber Pakhtunkhwa in consultation with other concerned organizations (Forest & Police Departments etc.) will formulate a Comprehensive Plan for promoting reforestation/forestation activities, besides, control over deforestation activities in the catchment areas of major and other rivers/local nullahs in Khyber Pakhtunkhwa in order to check land sliding and excessive bed erosion, so as to minimize flow of debris alongwith flash flood flows and to minimize associated damages. The status report would be submitted to FFC before next quarterly review meeting.
- iv. Irrigation Department, Government of the Punjab would take utmost care and strict vigilance in operation of Taunsa Barrage for safe passage of flood flows in future, keeping in mind the non-availability of designated breaching facility for diverting the excessive flood flows exceeding its design discharge/carrying capacity. Efforts may be made to install the proposed 120 MW Power Plant at Barrage site at the earliest, as the plant would be operated with the help of water channel having discharge capacity around 85,000 cusecs, which can also be used as flood flows escape channel in case of flood emergency during flood season. The progress on the project would be submitted to FFC before next quarterly review meeting.
- v. WASA Rawalpindi will immediately arrange visit of Lai Nullah by Experts from IRI Nandipur Lahore at the earliest in order to determine the technical viability of desilting/dredging work carried out each year, as well as long-term measures required for permanent solution of flooding problem. The report containing the recommendations of Experts of IRI, Lahore would be submitted to FFC before next quarterly review meeting.
- vi. District Coordination Officer (DCO) Rawalpindi would initiate work on removal of buildings waste, solid garbage and encroachments in waterway of Lai Nullah

through RDA, TMA & WASA. The status report would be submitted to FFC before next quarterly review meeting.

4.8 Other Specific Activities/Initiatives undertaken by Federal Flood Commission to mitigate damages/losses due to 2015-Rains/Floods

The following steps were taken by Federal Flood Commission for safe and smooth passage of Monsoon Season 2015:

- i. Chief Secretaries of Provincial Governments & Federal Line Agencies were requested to take necessary steps to combat any emergency arising due to floods, like strengthening of sensitive and critical structures such as embankments, spurs, dykes and other infrastructure, restoration and strengthening/rehabilitation of irrigation, drainage & flood protection Infrastructure damaged during past 4-5 flood events, removal of encroachments from flood plains, preparation and finalization of flood fighting plans, besides, effective arrangements for liaison with Flood Forecasting Division (FFD), Lahore, Pakistan Meteorological Department, WAPDA and Pakistan Army.
- ii. Country-wide monitoring of flood works was conducted by Federal Flood Commission (FFC), during Financial Year (2014-15), despite limited manpower and logistic support.
- iii. PCIW was advised for making all necessary arrangements for obtaining river flow data of “Eastern Rivers i.e. Ravi, Sutlej & Bias” from Indian counterpart and its dissemination well in time to all concerned organizations for taking further action at their end during Monsoon Season-2015. PCIW was also requested to carry out utmost efforts to obtain additional data from Indian counterpart so as to better forecast likely flood flows in “Eastern Rivers i.e. Ravi, Sutlej & Bias” during Monsoon Season-2015.
- iv. Federal Flood Commission (FFC) continued working on formulation of “National Flood Protection Plan-IV” through consultants, which were engaged under World Bank funded Water Sector Capacity Building & Advisory Services Project (WCAP). The draft final version of NFPP-IV (2016-26) was submitted to Ministry of Inter Provincial Coordination for consideration of CCI.
- v. Overall five meetings were arranged by FFC i.e. on (23rd January 2015, 3rd & 20th February 2015, 24th March, 2015 & 9th April, 2015 to review the existing SOPs of Tarbela and Mangla Dam Projects, so as to enhance the role of reservoirs in mitigating future floods. The revised SOPs of Mangla dam project (as recommended by FFC) were approved by the Ministry of Water & Power on 14th April, 2015. However, the SOPs of Tarbela dam project were not revised. The advisors and consultants engaged by WAPDA did not recommend any change in the existing SOPs.
- vi. PIDs & Federal Line Agencies were directed to complete their urgent nature flood protection schemes taken up under PSDP (2014-15) by/before 30th June 2015.
- vii. PID, Punjab, NHA & Pak. Railway were advised to ensure that breaching sections operated during Flood Season 2014 were strengthened and encroachments in the escape routes/channels were removed with the help of District Administration.

NHA & Pak. Railway were also directed to open the choked sections of the bridges as observed during the 2010 & 2014 floods i.e. Kabul & Jindi Rivers Bridges on Motorway M-I, Revaz & Shershah Railway Bridges, Head Muhammad Wala Bridge on River Chenab etc. so as to restore their discharge/flood flow carrying capacity before start of monsoon season 2015.

- viii. A consultative meeting with WASA Rawalpindi was held on 10th March 2015 regarding de-silting work in critical reaches of Lai Nullah (in Rawalpindi City) followed by the joint site inspection of Lai Nullah. The de-silting work in critical reaches (in Rawalpindi City) was completed through WASA Rawalpindi prior to start of Monsoon Season 2015.

FLOODS-2015

5. MONSOON SEASON 2015

5.1 Seasonal Rainfall Forecast for Monsoon Season 2015 issued by PMD

Pakistan Meteorological Department (PMD) issued the seasonal forecasts for Monsoon Season 2015, which is re-produced as under;

5.1.1 Preliminary Monsoon 2015 Outlook for Pakistan

Using local, regional and global data sets upto April, the preliminary monsoon 2015 outlook for Pakistan was prepared by Pakistan Meteorological Department for June to August, 2015. Its salient features are given below;

- i. Pre-Monsoon showers are expected during second fortnight of June and monsoon will attain its normal rhythm gradually toward the end of July.
- ii. In general, 2015 monsoon is expected weaker than normal, therefore less than normal rain is foreseen during June-August.
- iii. Monsoon rains will mainly concentrate in AJK, Northeast Punjab and upper KP embedded with extreme precipitation events sometimes exceeding 200 mm per day.
- iv. Models are indicating some heavy falls in catchment of Kabul River in Pakistan and Afghanistan due to interaction of Westerlies and monsoon currents.
- v. Due to less cloudiness and relatively clearer skies in G-B, glacier melt rate will be higher. A careful operation of dams will be required to avoid the synchronous peak flows.
- vi. In Sindh and Balochistan, rainfall during the period is expected to remain much less than normal which may aggravate the drought conditions in Thar and Cholistan.
- vii. Pakistan Summer Monsoon (July-September) will be issued in June using data sets up to May.

5.1.2 Monsoon Outlook July 2015 for Pakistan

Monsoon Outlook for July 2015 issued by PMD on 25th June, 2015 is given as under;

“Monsoon will gradually pick up rhythm during 2nd and 3rd week of July 2015, producing rainfall in most of the areas of AJK, Punjab and KP, with one or two extreme rainfall events during 3rd or last week of the month in second fortnight. Monsoon currents will also penetrate in south-eastern parts of the country, producing scattered rainfall in Sindh and eastern parts of Balochistan”

5.1.3 Monsoon Outlook August 2015 for Pakistan

Monsoon Outlook for August 2015 issued by PMD on 31st July, 2015 is given as under;

- i. Monsoon is likely remain active during first week, producing widespread rain/thundershowers of moderate to heavy intensity, with one or two extreme rainfall events, over KP, upper Punjab, Gilgit-Baltistan & Kashmir. Extreme rainfall event may generate urban and flash flooding in the said areas.
- ii. The monsoon activity will gradually decrease during second week; however scattered rains/thunderstorms with isolated heavy falls are expected in lower Sindh and northern half of the country.
- iii. Monsoon rains are likely to remain subdued in the country during third and fourth week; however, isolated rains/ thunderstorms with few moderate to heavy falls are expected over KP, Punjab, lower Sindh, northeast Balochistan, G-B and Kashmir.
- iv. In general, more rains/thunderstorms are expected during the first fortnight resulting high river flows and less in the second half of the month.

5.1.4 Monsoon Outlook for September 2015 issued by PMD on 28th August, 2015

Monsoon Outlook for September 2015 issued by PMD on 28-8-2015 is given as under:

- i. Scattered Monsoon rains with gradual decreasing tendency are likely to continue in the country (with 2-3 spells over northern half; Punjab, Khyber Pakhtunkhwa, Gilgit-Baltistan and Kashmir) during first & second week of the month.
- ii. Monsoon is expected to withdraw from Pakistan during third week, however Westerly Waves will continue to pass across north of the country. Under the influence of these Westerly Waves, two spells of isolated rains may occur over upper parts of the country (Khyber Pakhtunkhwa, Upper Punjab, Gilgit-Baltistan and Kashmir) during second half of the month.
- iii. Due to dominating spread of air mass associated with the westerly waves during the month, the temperatures are likely to remain 2 to 4 C⁰ below normal in Khyber Pakhtunkhwa, Punjab, Gilgit-Baltistan and Kashmir.
- iv. Mostly dry weather conditions are expected to prevail in southern half (Sindh and Balochistan) of the country during the month.

5.2 Floods/Rains during Monsoon Season 2015

During monsoon season 2015 Flash floods triggered by cloudburst inundated several parts of Pakistan. The Chitral valley in Khyber Pakhtunkhwa and adjoining Gilgit-Baltistan were badly affected due to flash flood flows generated as a result of torrential rains and glacier melting/GLOFs during the night between 15th & 16th July and on 19th July 2015, which badly damaged village abadies, roads, bridges, drinking water supply systems, public/private property and agricultural crops.

As a result of two major flood waves generated in Indus River, the low lying areas of District Layyah, Muzaffargarh (Tehsil Kot Addu), D.G. Khan, Rajanpur & Rahimyar Khan along River Indus were affected. The low lying area between Stud No. 3 & 4

downstream J-Had Spur No. 47+500 of Shahwala Groyne (District Layyah) came under the erosive action. A breach was occurred on 22nd July 2015 in Ganda Jhakkar Imam Shah located along right bank of Indus River (District D.G. Khan). The concerned field formation of Irrigation Department, Government of the Punjab PID, Punjab checked further erosion and damages to flood protection infrastructures and other private as well as public property through flood fighting till flood water levels receded in the river channel. According to NDMA report, 2015-rains/floods affected population of about 1.933 million (4,634 villages), claiming 238 lives and damaging 10,716 houses.

The low lying areas of Districts Ghotki, Kashmore, Shikarpur & Sukkur situated along river Indus in Sindh province were also affected due to High to Very High Flood situation on both sides of the river. With the best efforts of field formation of Provincial Irrigation Departments, the flood water remained within the river main channel and did not over top the flood embankments/high banks. The surplus flood flows safely passed through the river Indus to Arabian Seas. However, certain damages were reportedly occurred to Irrigation, Drainage & Flood Protection Infrastructure due to erosive action of rivers. Provincial Irrigation Departments have already been advised to take immediate steps for strengthening and rehabilitation of infrastructure damaged during flood season 2015.

The flood flows (inflows & outflows) of major rivers at important control structures i.e. Reservoirs & Barrages, besides, hydrographs of Rivers Jhelum & Chenab are attached as **Appendix-II**, whereas rainfall data of monsoon season 2015 is attached as **Appendix-III**. The Escapages below Kotri Barrage during the period {(1976-77) to (2014-15)} is attached as **Appendix-IV**.

5.3 Highest ever recorded flood peaks during major flood events

Highest ever recorded flood peaks during major flood events at various control points of Indus Basin are given in **Table-5**. Flood peaks recorded at important rim stations of major rivers during 2015 monsoon season are given in **Table-6**.

Table-5
Major Flood Events & Historic Flood Peaks Recorded in Major Rivers

Dam/ Barrage Site	Designed Capacity	Highest Recorded		1973 Peak Date	1976 Peak Date	1988 Peak Date	1992 Peak Date	2010 Peak^ Date	2011-Peak^ Date	2012-Peak^ Date	2013-Peak^ Date	2014- Peak^ Date	2015-Peak	
		Year	Flow (Cusecs)										Inflow/ Date	Outflow/ Date
Indus River														
Tarbela Reservoir	1,500,000	1929	8,75,000	<u>420,000</u> July 1973	<u>304,000</u> 3.8.76	<u>556,900</u> 22.7.88	<u>500,000</u> 10.9.92	<u>833,000</u> 30.7.10	<u>272,200</u> 28.6.11	<u>295,000</u> 4.8.12	<u>392,000</u> 14.8.13	<u>299,000</u> 28-7-2014	<u>470,000</u> 26-7-2015	<u>486,900</u> 26-7-2015
Jinnah Barrage	950,000	1942	950,000	<u>564,000</u> 20.7.73	<u>862,000</u> 2.8.76	<u>598,000</u> 2.8.88	<u>849,245</u> 10.9.92	<u>937,453</u> 30.7.10	<u>293,900</u> 26.7.11	<u>285,300</u> 18.7.12	<u>479,603</u> 13.8.13	<u>258,000</u> 25-7-2014	<u>532,998</u> 2-8-2015	<u>528,698</u> 2-8-2015
Chashma Barrage	950,000	2010	1,036,700	<u>510,000</u> 22.7.73	<u>787,000</u> 3.8.76	<u>580,000</u> 3.8.88	<u>668,000</u> 11.8.92	<u>1,036,700</u> 1.8.10	<u>356,500</u> 28.7.11	<u>298,300</u> 8.7.12	<u>637,482</u> 14.8.13	<u>282,000</u> 17-8-2014	<u>638,222</u> 3-8-2015	<u>636,512</u> 3-8-2015
Taunsa Barrage	1,000,000	2010	960,000	<u>568,000</u> 29.7.73	<u>675,000</u> 7.8.76	<u>560,000</u> 21.7.88	<u>655,000</u> 14.9.92	<u>960,000</u> 2.8.10	<u>249,200</u> 31.8.11	<u>243,400</u> 10.9.12	<u>516,017</u> 17.8.13	<u>261,000</u> 30-7-2014	<u>604,714</u> 5-8-2015	<u>604,714</u> 5-8-2015
Guddu Barrage	1,100,000	1976	1,199,672	<u>1,084,000</u> 18.8.73	<u>1,199,672</u> 15.8.76	<u>1,163,000</u> 30.7.88	<u>1,087,000</u> 18.9.92	<u>1,148,738*</u> 8.8.10	<u>272,300</u> 3.9.11	<u>236,100</u> 12.9.12	<u>567,418</u> 20.8.13	<u>367,000</u> 18-9-2014	<u>769,872</u> 3-8-2015	<u>735,246</u> 3-8-2015
Sukkur Barrage	900,000	1976	1,161,000	<u>1,077,000</u> 21.8.73	<u>1,161,000</u> 16.8.76	<u>1,116,000</u> 30.7.88	<u>1,068,000</u> 20.9.92	<u>1,130,995**</u> 10.8.10	<u>260,800</u> 6.9.11	<u>214,800</u> 14.9.12	<u>510,875</u> 20.9.13	<u>321,000</u> 20.9.2014	<u>709,316</u> 5-8-2015	<u>660,216</u> 5-8-2015
Kotri Barrage	875,000	1956	980,000	<u>786,000</u> Aug 1973	<u>765,000</u> Aug 1976	<u>649,600</u> 17.8.88	<u>689,300</u> 30.9.92	<u>964,900</u> 27.8.10	<u>261,400</u> 14.9.11	<u>166,000</u> 21.9.12	<u>381,696</u> 30.8.13	<u>145,000</u> 25-9-2014	<u>634,919</u> 15-8-2015	<u>603,084</u> 15-8-2015
Jhelum River														
Mangla Reservoir	1,230,000	1929	1,100,000	<u>2,20,000</u> 9.8.73	<u>480,060</u> 3.8.76	<u>425,515</u> 16.7.88	<u>1,030,000</u> 10.9.92	<u>344,400</u> 30.7.10	<u>141,300</u> 16.9.11	<u>1150,00</u> 18.9.12	<u>179,000</u> 13.8.13	<u>634,000</u> 5-9-2014	<u>150,000</u> 12-8-2015	<u>109,232</u> 27-7-2015
Rasul Barrage	8,50,000	1929	1,000,000	<u>2,70,000</u> 9.8.73	<u>2,69,000</u> 4.8.76	<u>261,664</u> 17.7.88	<u>952,170</u> 10.9.92	<u>263,796</u> 30.7.10	<u>105,800</u> 17.9.11	<u>42500</u> 4.8.12	<u>43,080</u> 19.8.13	<u>516,000</u> 6-9-2014	<u>110,100</u> 27-7-2015	<u>99,100</u> 27-7-2015
Chenab River														
Marala Barrage	1,100,000	1957	1,100,000	<u>770,000</u> 9.8.73	<u>549,000</u> 1.8.76	<u>751,000</u> 25.9.88	<u>845,000</u> 10.9.92	<u>314,378</u> 6.8.10	<u>150,400</u> 16.9.11	<u>183,200</u> 4.8.12	<u>377,290</u> 15.8.13	<u>861,464</u> 6-9-2014	<u>183,431</u> 12-7-2015	<u>153,408</u> 12-7-2015
Khanki Barrage	8,50,000	1957	1,066,000	<u>1,000,000</u> 10.8.73	<u>615,000</u> 2.8.76	<u>864,000</u> 26.9.88	<u>910,500</u> 10.9.92	<u>334,437</u> 7.8.10	<u>171,400</u> 17.9.11	<u>194,800</u> 4.8.12	<u>410,331</u> 15.8.13	<u>947,000</u> 7-9-2014	<u>160,000</u> 13-7-2015	<u>152,000</u> 13-7-2015
Qadirabad Barrage	8,07,000	1992	9,48,530	<u>854,000</u> 10.8.73	<u>629,000</u> 2.8.76	<u>892,000</u> 26.9.88	<u>948,530</u> 11.9.92	<u>329,483</u> 7.8.10	<u>171,000</u> 17.9.11	<u>194,800</u> 5.8.12	<u>407,803</u> 15.8.13	<u>904,000</u> 7-9-2014	<u>174,100</u> 13-7-2015	<u>161,100</u> 13-7-2015
Trimmu Barrage	6,45,000	1959	9,43,000	<u>753,000</u> 12.8.73	<u>706,000</u> 10.8.76	<u>584,000</u> 19.7.88	<u>888,000</u> 14.9.92	<u>328,926</u> 11.8.10	<u>132,900</u> 20.9.11	<u>87,800</u> 7.8.12	<u>272,609</u> 20.8.13	<u>703,000</u> 10-9-2014	<u>150,865</u> 29-7-2015	<u>134,715</u> 29-7-2015
Panjnad Headworks	7,00,000	1973	8,03,000	<u>803,000</u> 17.8.73	<u>710,000</u> 12.8.76	<u>507,000</u> 27.7.88	<u>744,152</u> 18.08.92	<u>310,117</u> 13.8.10	<u>151,300</u> 24.9.11	<u>65,600</u> 17.9.12	<u>317,261</u> 28.8.13	<u>454,000</u> 16-9-2014	<u>139,366</u> 30-7-2015	<u>135,866</u> 30-7-2015
Ravi River														
Jassar	275,000	1955	6,86,000	<u>228,000</u> 10.8.73	<u>170,000</u> 9.8.76	<u>582,000</u> 25.9.88	<u>149,000</u> 11.9.92	<u>195,000</u> 23.8.10	<u>27,700</u> 19.9.11	<u>30,500</u> 26.8.12	<u>67,700</u> 16.8.13	<u>68,000</u> 7-9-2014	<u>32,350</u> 16-7-2015	<u>32,350</u> 16-7-2015
Shahdara	250,000	1988	5,76,000	<u>237,380</u> 11.8.73	<u>170,000</u> 10.8.76	<u>576,000</u> 27.9.88	<u>63,000</u> 12.9.92	<u>41,900</u> 21.8.10	<u>43,000</u> 14.8.11	<u>40,800</u> 22.8.12	<u>74,880</u> 17.8.13	<u>91,000</u> 8-9-2014	<u>30,000</u> 18-7-2015	<u>30,000</u> 18-7-2015
Balloki Barrage	2,25,000	1988	3,99,000	<u>2,44,000</u> 13.8.73	<u>234,000</u> 11.8.76	<u>399,000</u> 28.9.88	<u>112,157</u> 13.9.92	<u>69,900</u> 23.8.10	<u>72,100</u> 15.8.11	<u>60,800</u> 23.8.12	<u>117,770</u> 18.8.13	<u>132,000</u> 9-9-2014	<u>67,180</u> 19-7-2015	<u>36,680</u> 19-8-2015
Sidhnai Barrage	1,50,000	1988	3,30,000	<u>2,10,000</u> 18.8.73	<u>244,000</u> 15.8.76	<u>330,000</u> 2.10.88	<u>95,500</u> 16.9.92	<u>27,600</u> 28.7.10	<u>30,300</u> 19.8.11	<u>28,600</u> 14.9.12	<u>87,904</u> 23.8.13	<u>86,000</u> 12-9-2014	<u>43,889</u> 28-7-2015	<u>38,539</u> 28-7-2015
Sutlej River														
Suleimanki Headworks	3,25,000	1955	5,98,872	<u>177,000</u> 15.8.73	<u>119,000</u> 6.9.76	<u>399,000</u> 30.9.88	<u>197,000</u> 3.9.92	<u>58,300</u> 30.9.10	<u>82,000</u> 29.8.11	<u>21,700</u> 30.8.12	<u>82,370</u> 22.8.13	<u>26,000</u> 7-9-2014	<u>61,421</u> 17-8-2015	<u>49,582</u> 17-8-2015
Islam Headworks	3,00,000	1955	4,93,000	<u>166,000</u> 17.8.73	<u>111,000</u> 8.9.76	<u>306,000</u> 4.10.88	<u>183,000</u> 7.9.92	<u>31,500</u> 20.9.10	<u>49,600</u> 3.9.11	<u>14,200</u> 13.9.12	<u>70,932</u> 25.8.13	<u>20,000</u> 8-9-2014	<u>45,479</u> 21-8-2015	<u>43,279</u> 21-8-2015

* It does not include flood flows passed through breaches occurred in LMB Guddu Barrage;

** It does not include flood flows passed through breaches occurred in Tori Flood Bund.

^ Based on the Inflows experienced upstream of the Dam/ Barrage site.

Table-6
FLOOD PEAKS RECORDED DURING 2015 MONSOON SEASON IN MAJOR RIVERS

RIVER	NAME OF THE RIM STONION	PEAK INFLOW (Cusec)	DATE & TIME	PEAK OUTFLOW (Cusec)	FLOOD CLASSIFICONION	RETENSION TIME & DATE
INDUS	Tarbela	470,000	1800 HRS on 26-7-2015	486,900	Medium Flood	1800 HRS ON 26-7-2015
	Kalabagh	532,998	1500 HRS on 02-8-2015	528,698	High Flood	1500-2100 HRS ON 02-8-2015
	Chashma *	638,222	1200 HRS on 03-8-2015	636,512	High Flood	1200 HRS ON 03-8-2015
	Taunsa	604,714	1000 HRS on 05-8-2015	604,714	High Flood	1000 HRS ON 05-8-15
	Guddu	769,872	2200-2300 HRS on 03-8-2015	735,246	VERY HIGH FLOOD	1200 HRS ON 03-8-2015
	Sukkur	709,316	0600-2359 HRS on 05-8-2015	660,216	High Flood	0600-2359 HRS ON 05-8-2015
	Kotri	634,919	2359 HRS (15-8-2015) to 0600 HRS (19-8-2015)	603,084	High Flood	2359 HRS (15-8-2015) to 0600 HRS (19-8-2015)
KABUL	Nowshera			165,800	High Flood	0300-0600 HRS ON 02-8-2015
JHELUM	Mangla	150,000	0600 HRS on 12-8-2015	109,232	Low Flood	0100-0500 HRS ON 27-7-2015
	Rasul	110,100	1800 HRS on 27-7-2015	99,100	Low Flood	1800 HRS ON 27-7-2015
CHENAB	Marala	183,431	2100 HRS on 12-7-2015	153,408	Medium Flood	2100 HRS ON 12-7-2015
	Khanki	160,000	0300 HRS on 13-7-2015	152,000	Medium Flood	0300 HRS ON 13-7-2015
	Qadirabad	174,100	1200 HRS on 13-7-2015	161,100	Medium Flood	1200 HRS ON 13-7-2015
	Trimmu	150,865	1800 HRS on 29-7-2015	134,715	Normal	1800 HRS ON 29-7-2015
	Panjnad	139,366	2359 HRS (30-07-2015) to 0600 HRS (31-07-2015)	135,866	Normal	2359 HRS (30-07-2015) to 0600 HRS (31-07-2015)
RAVI	Jassar			32,350	Normal	2359 HRS ON 16-8-2015
	Shahdara			30,000	Normal	1200 HRS ON 18-7-2015
	Balloki	67,180	1200-2359 HRS ON 19-7-2015	36,680	Normal	1200-2359 HRS ON 19-7-2015
	Sidhnai	43,889	0600 HRS ON 28-7-2015	38,539	Low Flood	0600 HRSON 28-7-2015
SUTLEJ	Suleimanki	61,421	1800-2359 HRS ON 17-8-2015	49,582	Normal	1800-2359 HRS ON 17-8-2015
	Islam	45,479	1200-2359 HRS ON 21-8-2015	43,279	Normal	1200-2359 HRS ON 21-8-2015

5.4 Country-Wide Losses/ Damages due to 2015 Rains/ Floods

The rains/floods of 2015 caused considerable damages to private as well as public infrastructure in Khyber Pakhtunkhwa/FATA, Gilgit-Baltistan, Punjab, Sindh and some parts of Balochistan & AJK due to riverine and flash floods. The 2015-rains/ floods have so far affected population of about 1.933 million (4,634 villages), claiming 238 lives and damaging 10,716 houses. Province/region wise detail of losses/damages is given in **Table-7**.

Table-7

COUNTRY-WIDE LOSSES/DAMAGES DUE TO RAIN/FLOOD 2015

Province/ Federal Agency	Villages Affected	Persons Affected	Houses Damaged	Persons Died	Persons Injured
Punjab	586	463,902	3,096	58	11
Sindh	3,203	1,001,696	Nil	Nil	Nil
KP	523 *	361,244 *	4,799	109	148
Balochistan	NR	69,976	1,176	16	34
AJ & K	17	NR	408	26	5
G-B	286	35,717	812	10	21
FATA	19	900	425	19	13
G. TOTAL	4,634	1,933,435	10,716	238	232

Source: NDMA website retrieved on 14.10.2015

NR: Not reported

* Figures relate to **District Chitral** only. Further damages are reportedly under assessment

5.5 2015-Rains/Flood Damages to Flood Protection Infrastructure and need for their Restoration/ Rehabilitation

During the Monsoon Season 2015, flood flows triggered by torrential rains and cloudburst affected various parts of country especially Chitral valley in Khyber Pakhtunkhwa and Gilgit-Baltistan besides, riverine/low lying areas along river Indus in Punjab & Sindh province including mountainous areas of Balochistan. Moderate to heavy downpour in upper catchments of major rivers and their tributaries generated flood flows which caused damages/ losses to human lives and other public and private infrastructure.

Major damages were reportedly caused to five (5) flood protection structures in D.G. Khan Zone, besides, minor damages to seven (7) flood protection works in Sargodha & Bahawalpur zones along river Indus in Punjab province. Irrigation Department, Government of the Punjab reported the restoration cost around Rs 503 million. Flood flows in Sindh province also imparted considerable damages to flood protection infrastructure. Irrigation Department, Government of the Punjab reported damages to their thirty flood protection schemes with restoration cost around Rs. 14,934 million.

The unprecedented rains/cloud bursts and Glacier Lake Outburst (GLOF) events generated flash floods in Chitral River and its tributaries, which caused severe damages to private and public infrastructure including irrigation and flood protection network in District Chitral. Damaged infrastructure reportedly included 256 flood protection facilities with cost of its restoration, estimated to tune of Rs 1,448 million.

The flood flows generated in Saliaza River badly damaged ongoing restoration works of 1st defence protection Bund, 2nd defence protection Bund and Toe Wall of Inam Ghudai Flood Protection Bund in District Zhob (Balochistan province). Irrigation Department, Government of Balochistan estimated the urgent restoration works to tune of Rs 14.674 million, besides, extension and strengthening the banks of Saliaza River costing Rs 131 million.

Gilgit-Baltistan, Public Works Department, also reported 2015 flood damages to roads & irrigation channels in various Districts of Gilgit-Baltistan with cost of their restoration amounting to Rs 786 million.

APPENDIX-I

**LIST OF FLOOD PROTECTION SCHEMES
TAKEN UP UNDER GOP FUNDED
NORMAL/EMERGENT FLOOD PROGRAMME
DURING
FINANACIAL YEAR (2014-15) & (2015-16)**

**STATUS OF FLOOD PROTECTION SCHEMES BEING IMPLEMENTED
UNDER NORMAL/EMERGENT FLOOD PROGRAMME (2014-15)**

Sr. No.	Name of Scheme	Approved Cost	Upto date Expenditure	Status of implementation Physical Progress (%age)
		Date of App.	(31-10-2015)	
I	PUNJAB			
	ON-GOING SCHEMES			
1	Construction of J-Head Spur at RD: 20 +000 and Guide Head Spur at RS: 25+000 Magasson Branch, Distt. Muzaffargarh	<u>590.920</u> 11-4-2014	91.566	34%
2	Protecting Irrigation System near Head Regulator Bakaini, Area of Bait Daryai Gabbar Arrian from hectic erosive action of Indus River (Revised).	<u>532.440</u> 29-10-2015	426.554	92%
3	Construction of J-Head Spur at RD: 15+000 Shehr Sultan Flood Bund (Revised)	<u>179.392</u> 26-12-2013	176.718	100%
4	Construction of spurs on bank of Indus River at Kalur Kot Mallana, Noor Dogar Umarwali Sharif, District Bhakkar	<u>155.656</u> 14-3-2015	107.707	100%
5	Checking erosion on right bank of river Chenab to protect Bhekho Outfall Drain and Agriculture land of Miana Hazzara.	<u>42.499</u> 17-05-2012	37.193	100%
6	Protecting Agricultural land and village abadies of Pakhwal and Tawakal Pakhwal from erosion on Right bank of River Jhelum, District Jhelum	<u>29.246</u> 17-05-2012	30.690	100%
	NEW SCHEMES			
7	Checking Erosive Action of Chenab river of Left Bank near Gangwal, Papin Village u/s Marala Barrage	<u>171.613</u> 31-03-2015	Nil	15%
	Sub-Total (Punjab)	1,701.766	870.428	
II	SINDH			
	ON-GOING SCHEMES			
1	Raising/strengthening, providing stone pitching along F.P bund RD 169 to 263.5 & RD 502 to 120, District Kambar, Shahdad Kot, Larkana, Dadu, Jamshoro	<u>492.236</u> 1-3-2008	281.023	<u>90%</u> Work Capped
2	Raising/strengthening providing stone pitching along Suprio bund RD 0 to 95 District Kambar, Shahdad Kot, Larkana, Dadu, Jamshoro	<u>253.181</u> 12-1-2008	238.044	100%
3	Extension of stone apron & pitching along K.K bund mile 11/3 to 12/4 and recoupmnt of damage stone apron and pitching from mile 10/7+500 to 11/1+110 District Kashmore	<u>234.549</u> 30-4-2009	220.593	80%
4	Rehabilitation of Short/Spur Stud along Sukkur Begari Bund mile 0/0 to 0/3 Vulnerable Point	<u>54.987</u> 8-4-2014	60.429	100%
5	Providing stone pitching along Qadirpur Bund mile from 10/4 to 12/4	<u>44.667</u> 8-4-2014	51.216	100%
6	Constructing stone pitching along K.K Bund Mile 0/0 to 0/4 and 1/1+110 to 1/2 + 220.	<u>38.678</u> 7-3-2014	43.922	100%
	NEW SCHEMES			
7	R&S along U/S Right Marginal bund from mile 0/0 to 5/4 & U/S Right spur Bund mile 0/0 to 3/0	<u>57.029</u> 13-03-2015	57.522	100%
8	Providing stone apron and pitching along Sukkur Begari Bund mile from 0/0 to 2/0 vulnerable point Sukkur city	<u>127.084</u> 21-12-2015	NIL	Tendering stage
	Sub-Total (Sindh)	1,302.411	952.749	
III	KHYBER PAKHTUNKHWA (KP)			
1	Construction of Flood Protection Structure at critical locations in different Nullahs in District Peshawar and Nowshera.	<u>30.000</u> 13-03-2015	20.530	93%

2	Construction of Flood Protection Structure at critical locations in District Charsadda.	<u>7.000</u> 13-03-2015	6.700	100%
3	Construction of Flood Protection Structure at critical locations in different Nullahs in District Swat.	<u>19.868</u> 04-05-2015	10.000	5%
4	Construction of Flood Protection Structure at critical locations in different Nullahs in District Abbottabad and Mansehra.	<u>10.000</u> 04-05-2015	Nil	35%
5	Construction of Flood Protection Structure at critical locations in different Nullahs in District Kohat & Karak.	<u>9.630</u> 13-03-2015	2.654	90%
6	Construction of Flood Protection Structure at critical locations in different Nullahs in District Bannu & Lakki Marwat.	<u>12.500</u> 04-05-2015	9.590	80%
7	Construction of Flood Protection Structure at village Kala on Badri Nullah District Swabi.	<u>6.106</u> 13-03-2015	1.644	32%
8	Construction of flood protection schemes for the protection of Dheri Village District Malakand on Dheri Julagram Nullah	<u>10.840</u> 13-03-2015	NIL	85%
	Sub-Total (KP)	105.944	51.118	
IV	BALUCHISTAN			
a	SOUTH ZONE			
1	Flood Protection Bund of Shahool at Mouza Drazi Dureji area Hub River, Lasbela	<u>2.500</u> 13-03-2015	2.500	100%
2	Flood Protection Bund along Nehaar River okri area for Agricultural Lands and Abadies of village Haji Ali Bakhsh Shahwani, Lasbela	<u>2.000</u>	2.000	100%
3	Flood Protection Bund along Kundi Wari Dhora Tehsil Hub of Agricultural Lands, Lasbela	<u>2.000</u>	2.000	100%
4	Flood Protection Wall Mastung Town.	<u>2.500</u>	2.500	100%
5	Flood Protection Bund, Sing Sulahi, Kalat	<u>2.500</u>	2.500	100%
6	Flood Protection Bund Kheson Don, Kalat	<u>2.500</u>	2.500	100%
7	Flood Protection Bund for Agriculture Lands of Mir Mohammad Ayoub and others Allah Dumb area Nal, Khuzdar	<u>2.000</u>	2.000	100%
8	Flood Protection Bund for Agriculture Lands of Kundi Umrani village Tehsil Jhao, Awaran	<u>2.000</u>	1.164	85%
9	Flood Protection Bund Kharan Town along Kullar River, Kharan	<u>2.500</u>	NIL	80%
10	Construction of Flood Protection Mirani Kaur Jusak, Kech	<u>2.000</u>	2.000	100%
11	Flood Protection works of Agricultural Lands of Killi Aslam Mehnaz, Bit Buleda, Kech	<u>1.987</u>	1.242	80%
12	Flood Protection Bund at Killi Haji Muhammad Azim Sabrap, Panjgur	<u>2.000</u>	2.000	100%
13	Flood Protection Wall (Killi Kareem Jan) old Poultry Farm Chitkan, Panjgur	<u>2.500</u>	2.500	100%
14	Flood Protection of water Supply scheme Ormara Town and Navy Base, Gawadar	<u>5.000</u>	4.792	100%
	Total (South Zone)	33.987	29.698	
b	NORTH ZONE			
15	PC-I/Estimate for			
-	i. Flood Protection of Zinda Pir area village Haji Hussain.	<u>2.000</u>	2.000	100%
	ii. Flood Protection wall Khudaidad and other Khost area, District Harnai (Court Case).	<u>1.000</u>	1.000	100%
	Sub-total:	3.000		
16	PC-I/Estimate for			
	i. Flood Protection of PCC Wall Meharbzai Nooruddin Bazai Aghberg Area, Quetta	<u>2.000</u>	2.000	100%
	ii. Flood Protection Bund/wall at Hazara Town	<u>2.000</u>	2.000	100%
	iii. Flood Protection of Agricultural land and grave yard Nohisar area, Quetta	<u>2.500</u>	2.500	100%

	iv. Flood Protection of Mashwani Town Punjpai, Quetta	2.000	2.000	100%
	Sub-total:	8.500		
17	Construction of 1 No. Spur for Flood Protection of Trehar Village, District Sibi	2.000	NIL	55%
18	PC-I/Estimate for			
	i. Flood Protection Bund Kachhi Khachar Gurgoi Druq, Musa Khel	2.000	2.000	100%
	ii. Flood Protection Bund for Killi Sardar Raza Khan Musakhail, Musa Khel	2.000	2.000	100%
	Sub-total:	4.000		
19	Flood Protection Work of Chotair area Ziarat Village & Orchards Malik Lal Mohammad & Malik Lal Gul, Ziarat	2.000	2.000	100%
20	Flood Protection for Agricultural Land and houses Killi Yaqoob Karez Suri Mehterzai area District Killa Saifullah	2.000	2.000	100%
21	PC-I/Estimate for			
	i. Flood Protection Works of Killi Nill Ahmed Khan Bostan Pishin	2.000	2.000	100%
	ii. Flood Protection of Lands /Orchards of Haji Abdul Hameed Bazai Koze Kach Rud Mulazai, Pishin	2.000	2.000	100%
	Flood Protection Scheme of Lands/Orchards for Haji Ghulam Murtaza Mara Jalazai Toba Achakzai, Killa Abdullah	2.000	2.000	100%
	iv. Flood Protection of Lands of Machka Manda, District Killa Abdullah	2.000	2.000	100%
	Sub-total:	8.000		
22	Flood Protection of Kohlu Town at Various Location at Kohlu	2.000	2.000	100%
23	Construction of 02 Nos. Flood Protection schemes in District Zhob	2.500	2.500	100%
	Total (North Zone) :	34.000	32.000	
	Sub-Total (Balochistan)	67.987	61.698	
V	Gilgit Baltistan			
1	Const. of flood protective and river training works at Darel / Tangir Valley.	<u>30.900</u> 5/4/2007	20.529	95%
2	Const. of flood protective bund at Sailing (Ph-II)	<u>12.786</u> 16-02-2010	11.439	92%
3	Const. of protective bunt at Ghursej Ph-IV	<u>24.113</u> 17-05-2012	2.542	50%
4	Const. of protective works District Ghanche.	<u>16.428</u> 17-05-2012	3.792	60%
5	Construction of Flood Protection works at Pakora Hoto, Skardu	25.000 04-05-2015	7.000	30%
	Sub-Total (G-B):	109.227	45.302	
VI	FATA			
	FATA (Normal Share) : Total	47.197		
1	Flood Protection Scheme for Protection of Village abadies & agriculture land of Qabal Khan Kach Kurailia Algad in Pir Tangi Area in FR Tank	<u>5.994</u> 14-2-2013	5.945	100%
2	Flood Protection Scheme for Protection of Umer Shah Kach in Khoi Payer Ustrana Area FR DIKHAN	<u>4.414</u> 14-2-2013	4.405	100%
3	Construction of Flood protection Bund for agricultures land and village abadies of Noor Alam Kach Shahoor and Dana Wat Algad Sarwakai Tehsil SW Agency	<u>4.523</u> 14-2-2013	4.502	100%
4	Construction of Flood Protection Bund for the Protection of land Bahadar khan Kach near Khar village in Bajaur Agency	<u>3.500</u> 17-5-2012	3.264	100%
5	Flood Protection bund at Kacha Algad Morang Valley FR Lakki	<u>4.000</u> 17-5-2012	0.913	23%

6	Flood Protection Bund for Protection of land Waheed Kach Haji Lawang Khawar in Bajaur Agency	<u>2.980</u>	NIL	100%
		17-5-2012		
7	Construction of flood protection scheme of Nazar Jan S/o Ghazi Marjan village Mangleen Area, F.R. Tank	<u>5.294</u>	4.596	100%
		17-5-2012		
8	Construction of Flood Protection works for the safety of village abadies and culturable land of Manri Kanri (Saif-ur-Rehman Kach) Tehsil Sararogha SWA	<u>5.944</u> 13-10-2009	5.425	100%
9	Flood Protection Schemes for the protection of cultural land & village abadies of Umer Kach Sada Tehsil Kurram Agency.	<u>3.500</u> 17-5-2012	3.468	100%
10	Flood Protection scheme for Gawaka Khawar in Sadda Kurram Agency	<u>2.990</u> 17-05-2012	2.917	100%
11	Construction of Flood Protection Bund for the land of Bakhta Jan Kach Ping Area FR Tank	<u>2.751</u> 17-05-2012	2.740	100%
Sub-Total(FATA)		45.890	38.175	
VII	AJ&K			
1	Protecting & Checking of Erosion Against flood on River Kunhar Brarkot Distt. Muzaffarabad (Revised)	18.652	17.000	100%
		04-05-2015		
2	Protecting & checking of erosion against flood along left edge of River Mahl near Bhount Chowk in District Bagh (Ongoing/ carry forward)	13.575	8.670	87%
		13-10-2009		
3	Restoring of Damages for Protection of Military Installation at Khandaq Post Near LOC on Right Bank of River Munawar Tawi District Bhimber Azad Kashmir	59.605	NIL	Contract Awarded
		24-06-2014		
Sub-Total (AJ&K)		91.832	25.670	
Grand Total:		3,425.057	2,045.140	

**LIST OF FLOOD PROTECTION SCHEMES TO BE
FINANCED UNDER NORMAL/EMERGENT FLOOD PROGRAM FOR
FINANCIAL YEAR (2015-16)**

(Rs in Millions)

Sr. No.	Name of Scheme	Estimated Cost	Upto date Expenditure	Physical Progress (%age)	Remarks
I	<u>PUNJAB</u>				
	D.G.KHAN ZONE				
1	Restoration of J-Head Spur at RD-165+000 of Link No. 1	246.980	-	-	PC-I under process for approval of CDWP
2	Restoration of J-Head Spur at RD-167+000 of Link No. 1	144.950	-	-	
	Sub Total	391.930			
	LAHORE ZONE				
3	Checking erosion of Chenab River along left bank near Mallianwala D/S of Marala Barrage	245.520	-	-	PC-I awaited
	Total (Punjab)	637.450	0.000		
II	<u>SINDH</u>				
	ONGOING SCHEMES				
1	Extension of stone apron & pitching along K.K bund mile 11/3 to 12/4 and recoupment of damage stone apron and pitching from mile 10/7+500 to 11/1+110 District Kashmore	234.549	220.593	90%	Work pending
2	Raising/strengthening, providing stone pitching along F.P bund RD 169 to 263.5 & RD 502 to 120, District Kambar, Shahdad Kot, Larkana, Dadu, Jamshoro.	492.236	281.023	90%	Work capped
3	R&S along U/S Right Marginal bund from mile 0/0 to 5/4 & U/S Right spur Bund mile 0/0 to 3/0.	57.029	53.415	100%	PC-IV awaited
	Sub Total:	783.814	555.031		
	<u>NEW SCHEMES</u>				
4	Providing Stone Pitching and Stone Apron along Sukkur Begari Bund mile 0/3 to 2/0 Vulnerable Point City.	<u>127.084</u> 21-12-15	-	-	Tendering stage
5	Recoupment Stone Apron to maintenance section S.M Bund mile 12/4 to 12/7 & 0/0+110 Bakhri Loop Bund & Escape channel RD.28+700 to 29+00 & 30+ to 30.325, R&S of S.M Bund mile 12/4 to 12/7 & Escape Channel RD.22 to 28 L.S Rohri Div Kandiaro.	120.291	-	-	Cleared by SC on 4.2.2016.
6	Strengthening & Rehabilitation Launched Stone Apron along 2nd Arm of J-spur from 1475 ft to 3050 of Dadu Moro Makhdoom Bilal Bridge District Nowshero Feroz	82.790	-	-	Cleared by Scrutinizing Committee meeting held on 4/2/2016.

7	Providing Stone Apron along Qadirpur Loop Bund mile 4/6 to 5/0.	32.274	-	-	Approved by DDWP meeting held on 07-01-2016.
8	Providing Stone Pitching along Baiji Bund from mile 2/4 to 3/4 and 7/4 to 8/4.	58.596	-	-	
9.	Closing breach mile 1/1 to 2/6 Qadirpur Shank Bund, Shank project mile 0/0 to 0/3, Raising & Strengthening mile 0/0 to 1/2 Qadirpur Bund, Qadirpur Shank Bund mile 1/7 2/6 Qadirpur Shank Bund and Shank Projection mile 0/0 to 0/3 R/S (Breach Portion).	<u>279.472</u> 11-02-16	-	-	Tendering stage.
	Sub-Total	700.334	0.000		
	Total(Sindh):	1,484.148	559.138		
III	<u>KHYBER PAKHTUNKHWA (KP)</u>				
1	Improvement of marginal Bund from RD:55+000 to 85+000 in reaches District D.I. Khan	10.000	-	-	PC-I awaited
2	Construction of Flood Protection Bund on Takwar Nullah, village Yark District D.I. Khan	25.000	-	-	PC-I awaited
3	Providing flood protection works in Kurram River District Bannu	10.000	-	-	PC-I awaited
4	Providing flood protection works in different Nullahs, District Lakki Marwat	16.000	-	-	PC-I awaited
5	Construction of flood protection works for protection of village abadies and agriculture land on Pir Khel Totakan Khawar	6.000	-	-	PC-I awaited
6	Extension of existing flood protection work on left bank of Kalpani Nullah to protect village abadies and agriculture land and lift Irrigation schemes near Mayar Village, District Mardan	7.000	-	-	PC-I awaited
7	Extension of existing flood protection work for the protection work of agriculture land & graveyard in Tour area, District Mardan	7.000	-	-	PC-I awaited
8	Construction of flood protection works at Jaghur Kuru and Shoghore, District Chitral	10.000	-	-	PC-I circulated among the members of Scrutinizing Committee of FFC.
9	Construction of flood protection work in Siran River near Malik Pur village, District Manshera	2.000	-	-	PC-I awaited
10	Construction of flood protection work in Haro River Check Kamal Pur U/C Hattar District Haripur	2.000	-	-	PC-I awaited
11	Construction of flood protection work alongwith Indus River (left side) village Jammu Ghazi Area, District Haripur	3.000	-	-	PC-I awaited
12	Construction of flood protection work at Sawaldher Bakrai Khpa, District Mardan	7.000	-	-	PC-I circulated among the members of Scrutinizing Committee of FFC.

13	Construction of flood protection wall along Panjpir Madarassa & village on left Bank of Badri Nullah, District Swabi	7.000	-	-	PC-I awaited
14	Providing flood protection works in different Nullahs in District Dir (Lower)	10.000	-	-	PC-I awaited
Total (KP)		122.000	0.000		
IV	<u>BALUCHISTAN</u>				
NORTH ZONE					
DISTRICT PISHIN					
1	Flood Protection schemes of District Pishin		-	-	PC-I awaited
i	Construction of flood protection wall for the land of Karez Akhwanzada Killi Mughlian	1.500	-	-	PC-I awaited
ii	Construction of flood protection wall for the land of Ameer Jan Killi Dil Sora	1.500	-	-	PC-I awaited
iii	Construction of flood protection wall of Malik Rud Mulazai	1.500	-	-	PC-I awaited
Subtotal:		4.500	-		
DISTRICT NUSHKI					
2	Construction of Agha Haroon Flood Protection Bund Killi Sher Jan Agha	2.000	-	-	PC-I awaited
DISTRICT HARNAI					
3	Flood Protection schemes of District Harnai		-	-	PC-I awaited
i	Construction of flood protection wall of Dawood Muree Killi Ander Kach Soorwa Area	1.500	-	-	PC-I awaited
ii	Construction of flood protection wall of Killi Dargai Zardloo Area	1.500	-	-	PC-I awaited
Subtotal:		3.000	0.000		
DISTRICT KACHHI					
4	Flood Protection schemes of District Kachhi		-	-	PC-I awaited
i	Construction of flood protection Bund for agriculture lands of Sofi Allah Rakha S/o Rasool Bukhsh Kalwar and other Mouza Ganmb Tehsil Bhag	1.500	-	-	PC-I awaited
ii	Construction of flood protection Bund around the houses of Killi Dargha Sufi Ahmed Faqir Bhag town area	1.000	-	-	PC-I awaited
Subtotal:		2.500	0.000		
DISTRICT ZIARAT					
5	Flood Protection schemes of District Ziarat		-	-	PC-I awaited
i	Construction of flood protection Bund for agriculture lands of Yahya Khan and Sheryar Khan village Zindra (scheme already approved by S.C. of FFC on 06-03-2014)	2.000	-	-	Approved by DDWP on 7.1.2016.
ii	Construction of flood protection wall of Haji Muhammad Din Tareen Darag for protection of houses/agriculture land Kan Bunglow and Jangir Khan Zindra area	2.000	-	-	PC-I awaited

iii	Construction of flood protection wall for agriculture land of Abdul Rehman Killi Saleh Askhobi Ziarat	1.000	-	-	PC-I awaited
Sub Total:		5.000	0.000		
DISTRICT LORALAI					
6	Flood Protection schemes of District Loralai				
i	Construction of flood protection of agriculture land of Haji Dewan Tandawani Sinjawi area	1.000	-	-	PC-I awaited
ii	Construction of flood protection wall for agriculture land of Haji Abdul Raheem and others Chanali area Loralai	1.500	-	-	PC-I awaited
iii	Flood protection wall killi Kach sodozai Abdul Looni Tehsil Duki District Loralai	2.000	-	-	PC-I awaited
Subtotal:		4.500	0.000		
DISTRICT KOHLU					
7	Construction of flood protection wall Killi Noroz Khan and others	2.000	-	-	PC-I awaited
DISTRICT MUSAKHAIL					
8	Construction of flood protection wall killi Mohibullah Khan Matyan Malik Gul Jan & others Drug area District Musa Khel	2.000	-	-	PC-I awaited
DISTRICT KILLA SAIFULLAH					
9	Flood Protection schemes of District Qila Saifullah		-	-	PC-I awaited
i	Construction of flood protection schemes of Tarwal Kili Nawab Muhammad Khan and Umer Khitab and Khusro Jomezai	2.500	-	-	PC-I awaited
ii	Construction of flood protection wall in Bandat Musazai Murad Khan Palay & others	2.000	-	-	PC-I awaited
Sub-total:		4.500	0.000		
DISTRICT DERA BUGHTI					
10	Construction of flood protection Bund Maree Sui Area	2.500	-	-	PC-I awaited
DISTRICT QUETTA					
11	Construction of flood protection Nowai Killi Nohisar/Aghberg area	3.000	-	-	PC-I awaited
DISTRICT ZHOB					
12	Construction of flood protection for houses and agriculture land of Fateh Muhammad and others Killi Appozai Area	2.500	-	-	PC-I awaited
Sub-total (North Zone)		38.000	0.000		
SOUTH ZONE					
DISTRICT WASHUK					
13	Construction of flood protection Bund for Washuk town	3.000	-	-	PC-I awaited
DISTRICT KHARAN					
14	Construction of flood protection Bund for Rehmatullah Baloch Band band	2.500	-	-	PC-I awaited
DISTRICT KHUZDAR					

15	Construction of flood protection wall Kaftari Jhal Janat Khatoon Baghbana Bajoi area	3.500	-	-	
16	Construction of flood protection Bund for Bulanzer Kehan Zehri	3.000	-	-	PC-I awaited
DISTRICT KALAT					
17	Flood protection wall for agriculture land/houses in Iskalkoo area	2.500	-	-	PC-I awaited
18	Flood protection wall for agriculture land/houses in Johan area village Haji Muhammad Alam Bungulzai	2.500	-	-	PC-I awaited
DISTRICT MASTUNG					
19	Construction of flood protection wall Killi Sheikhan	3.000	-	-	PC-I awaited
DISTRICT LASBELA					
20	Construction of flood protection bund Sheenh Lakhi Bent Dureji Area	3.000	-	-	PC-I awaited
21	Construction of flood protection bund for agriculture lands & abadies of Goth Qazi Ghulam Muhammad Bela	5.000	-	-	PC-I awaited
MEKRAN IRRIGATION CIRCLE AT TURBAT					
DISTRICT KECH					
22	Construction of flood protection bund Gowaragani Bit Ginnah	3.000	-	-	PC-I awaited
DISTRICT PANGJOOR					
23	Construction of flood protection bund Chitkab Mainwar Gharibabad	3.000	-	-	PC-I awaited
DISTRICT GAWADAR					
24	Construction of flood protection bund Basool Kaur Ormara	4.000	-	-	PC-I awaited
Subtotal (South Zone):		38.000	0.000		
Total (North + South Zone)		76.000	0.000		
V	<u>Gilgit Baltistan</u>				
1	Const. of protective bunt at Ghursey Ph-IV District Ghanche	30.900	15.665	95%	Work in progress
2	Const. of flood protective bund at Sailing (Ph-II) District Ghanche	12.786	11.439	92%	Work in progress
3	Const. of protective bunt at Ghursey Ph-IV District Ghanche	24.113	2.542	50%	Work in progress
4	Const. of protective works District Ghanche.	16.428	3.792	60%	Work in progress
5	Construction of flood protection works at Pakora Hoto District Skardu	25.000	7.000	30%	Work in progress
Total (GB):		109.227	40.438		
VI	<u>FATA</u>				
<u>ONGOING SCHEMES</u>					
1	Construction of flood protection scheme of Nazar Jan S/o Ghazi Mar Jan village Mangleen area in FR Tank	5.294	4.596	100%	Physically Completed
2	Construction of flood protection work for the safety of village abadies and culturable land of Manri Kanri (Saif-ur-Rehman Kech) Tehsil Sararogha SWA	5.944	5.425	100%	Physically Completed

3	Flood protection bund at kacha Algad Morang valley FR Lakki	4.000	0.913	23%	Work in progress
4	Flood protection bund for protection of land Waheed Kach Haji Lawang Khawar in Bajaur Agency	2.980	-	100%	Physically Completed
Sub Total (Ongoing Schemes):		18.218	10.934		
<u>NEW SCHEMES</u>					
10	Construction of flood protection bund for the protection of Agriculture land of L/R sides of Dhana Algad in Sholam Birmal Tehsil SWA	4.933	-	-	Scheme approved by DDWP on 07-01-2016
12	Construction of flood protection bund for the protection of Tiarza Khulla Algad Tehsil WANA, SWA	3.900	-	-	Cleared by SC of FFC on 19-02-2016
13	Construction of flood protection bund for the protection of land of Ghazi Payaza Tehsil WANA, SWA	4.092	-	-	Cleared by SC of FFC on 19-02-2016
14	Construction of flood protection bund at Zam Kach Bangi Wala (Liaquat Ali Kach) Tehsil Sararogha, SWA	6.000	-	-	Scheme approved by DDWP on 07-01-2016
15	Construction of flood protection bund for the protection of land of Gulistan Kach on tank Zam Algad Sobati area FR Tank	6.934	-	-	
16	Construction of flood protection bund for the protection of Zaido Kach on R/S of Shuza Algad in FR Tank	6.689	-	-	
17	Construction of flood protection bund for the protection of land along Tank Zam Algad in FR Tank	7.203	-	-	
18	Construction of flood protection bund for protection of land & village abadies along Matarak Algad in FR Tank	7.112	-	-	
19	Construction of flood protection bund for the protection of agriculture land of Abdul Qayyum and Hasti Khan Kach in Ustarana area in FR DI Khan	6.862	-	-	
Sub Total (New Schemes):		53.725	-	-	
Total (Ongoing + New Schemes):		71.943	10.934		
VII	<u>AJ&K</u>				
1	Protecting & Checking of Erosion against flood on left bank of River Poonch at Buttle and Mondhole	14.501	-	-	Cleared by SC on 4.2.2016 subject to recommendation by FFC's monitoring team and compliance of certain observations. FFC's monitoring team visited the project site on 19.02.2016. Report under process for approval.

2	Protecting & checking of erosion against flood along left edge of River Mahl near Bhount Chowk in District Bagh (Ongoing/carry forward)	13.575	8.670	87%	Work in progress
3	Protecting & Checking of Erosion Against flood on River Kunhar Brarkot Distt. Muzaffarabad (Revised)	18.652	17.000	100%	PC-IV awaited
4	Restoring of Damages for Protection of Military Installation at Khandaq Post Near LOC on Right Bank of River Munawar Tawi District Bhimber, AJK	59.005	-	-	Contract awarded
Total (AJ&K)		106.333	25.670		
Grand Total:		2606.501	636.180		

Appendix-II

**MAJOR RIVERS FLOW DATA OF
MONSOON SEASON 2015**

Discharge in Cusec

DATE	TIME	INDUS			Kabul	INDUS						
		TARBELA			Nowshera	KALABAGH		CHASHMA			TAUNSA	
		Reservoir Level (Ft)	U/S	D/S	Flow	U/S	D/S	Reservoir Level (Ft)	U/S	D/S	U/S	D/S
1-Jul-15	600	1473.00	115300	150000	55100	154200	146000	645.40	213900	190000	189400	165400
2-Jul-15	600	1471.96	127400	150000	55600	175800	167600	646.50	218700	195000	188000	164000
3-Jul-15	600	1471.96	140600	140000	59400	179900	171700	647.40	218500	195000	179900	155900
4-Jul-15	600	1473.16	157500	130000	62700	177400	169200	648.50	221800	195000	179900	154900
5-Jul-15	600	1475.37	180300	130000	68300	197200	188700	648.50	215000	202900	178300	153300
6-Jul-15	600	1478.87	209200	130000	77800	165800	157300	648.50	210800	203600	178300	153300
7-Jul-15	600	1484.44	241900	112400	87800	204900	196400	648.50	214800	207600	175600	149900
8-Jul-15	600	1490.88	264400	112900	93500	165000	156600	648.50	218100	210900	187700	174700
9-Jul-15	600	1497.72	279700	113600	85100	182800	174300	648.50	212700	205500	189100	176100
10-Jul-15	600	1505.44	303300	114200	86100	190400	181900	648.50	210500	203300	199500	183000
11-Jul-15	600	1511.00	316300	178500	100700	232100	223600	648.50	213800	206600	194500	178000
12-Jul-15	600	1512.50	312000	273200	89300	358000	351700	647.80	225400	234500	194600	178100
13-Jul-15	600	1514.00	271500	232700	81700	339100	330900	645.60	322300	353300	196100	178100
14-Jul-15	600	1515.50	247200	208400	73600	284200	275700	644.00	369700	383200	196100	178100
15-Jul-15	600	1517.00	246100	207300	73800	285900	277400	644.00	340500	333300	281100	259100
16-Jul-15	600	1518.50	277500	238700	74800	282000	273500	644.00	310900	303700	333800	309800
17-Jul-15	600	1520.00	339300	301000	83100	310000	301500	644.00	298900	281900	321900	296900
18-Jul-15	600	1521.50	364400	324700	114000	405000	396800	643.00	348400	352500	305600	280600
19-Jul-15	600	1523.00	375600	335700	107300	415500	407300	641.00	445200	457700	296700	273200
20-Jul-15	600	1524.50	366800	326700	111300	445900	437900	641.00	484200	477200	328200	305700
21-Jul-15	600	1526.00	349200	309500	94600	392000	384000	641.00	478000	471000	410600	410600
22-Jul-15	600	1527.00	350100	323600	96900	406200	397900	641.00	470300	463300	459700	459700
23-Jul-15	600	1530.00	343200	263700	79500	397100	388800	641.00	457800	450800	457700	457700
24-Jul-15	600	1533.00	363000	279700	90500	311200	302900	641.00	438900	433700	447200	447200
25-Jul-15	600	1536.00	346200	262900	82600	327100	318800	641.00	393100	389100	447800	443800
26-Jul-15	600	1539.00	359700	276300	87800	318300	310000	642.00	389900	376600	432600	423100
27-Jul-15	600	1540.00	438500	410800	129600	466300	459100	642.00	415100	411100	390500	386000
28-Jul-15	600	1541.00	387800	358900	106000	474000	466800	642.00	511800	502200	393400	388900
29-Jul-15	600	1542.00	364300	335100	98100	440200	433000	642.00	547400	545500	450600	450600
30-Jul-15	600	1543.00	352300	323100	107600	415200	407600	642.00	500200	498000	531600	531600
31-Jul-15	600	1544.00	362200	333000	100400	395600	388000	642.00	466100	461600	526800	526800

Discharge in Cusec

DATE	INDUS						JHELM				
	GUDDU		SUKKAR		KOTRI		MANGLA			RASUL	
	U/S	D/S	U/S	D/S	U/S	D/S	Reservoir Level (Ft)	U/S	D/S	U/S	D/S
1-Jul-15	197900	160900	142700	87400	49100	8400	1227.55	61900	60000	54800	35300
2-Jul-15	197400	164600	145700	90400	50600	9900	1227.65	63700	60000	51800	31400
3-Jul-15	194600	161800	147500	92200	50600	9900	1227.75	63700	60000	55700	35300
4-Jul-15	187800	155200	148100	92200	52000	11300	1227.80	61900	60000	55700	35300
5-Jul-15	178900	144900	141600	85700	53500	12800	1227.95	65600	60000	51800	31400
6-Jul-15	172800	138000	137800	81800	56800	16200	1228.20	69300	60000	51900	31400
7-Jul-15	166900	131600	128000	72100	62800	22100	1228.50	71100	60000	63600	43100
8-Jul-15	167400	134900	128000	72100	62800	22100	1229.15	74100	50000	52000	31400
9-Jul-15	175300	143800	118300	62300	62800	22100	1229.30	65600	60000	59800	39200
10-Jul-15	184000	149700	120700	64800	62800	22100	1229.75	76700	60000	59800	39200
11-Jul-15	192300	155200	128500	72500	57900	17200	1230.60	92700	60000	59800	39200
12-Jul-15	213400	192400	137700	81800	56800	16200	1230.85	69800	60000	56000	35300
13-Jul-15	205200	164100	152500	96700	50600	9900	1230.90	62000	60000	56100	35300
14-Jul-15	212400	178200	152500	96700	47600	6900	1231.05	69800	60000	48300	27500
15-Jul-15	215600	178200	162800	106600	46100	5400	1231.10	62000	60000	56100	35300
16-Jul-15	231100	195300	163000	106900	46100	5400	1231.25	65900	60000	52200	31400
17-Jul-15	277100	243600	177300	121200	50600	9900	1231.75	79500	60000	60500	43100
18-Jul-15	316100	289100	200100	144400	55000	14400	1232.40	85400	60000	64700	45000
19-Jul-15	336300	310700	252300	197000	65600	25200	1233.00	83500	60000	61200	43100
20-Jul-15	353400	326200	269600	214000	69600	28900	1233.40	75600	60000	60800	43100
21-Jul-15	353100	325500	283200	227600	78800	38100	1233.70	71700	60000	60800	43100
22-Jul-15	353100	323500	286600	231900	92100	54000	1234.60	95200	60000	68600	50900
23-Jul-15	396100	370000	295200	242400	107800	80600	1234.90	71700	60000	54700	43100
24-Jul-15	445000	426600	335800	301100	137100	129100	1235.90	99100	60000	54400	43100
25-Jul-15	499900	479000	366500	325100	144200	129600	1236.70	91300	60000	54500	43100
26-Jul-15	513600	491100	400800	358600	149200	129600	1236.60	76100	80000	76900	65700
27-Jul-15	513600	510500	466400	439500	161400	157900	1236.60	102700	102700	89600	78500
28-Jul-15	570800	568200	508000	500700	169000	167600	1236.30	77000	88800	93400	82400
29-Jul-15	550900	548400	538200	528500	182500	182000	1236.15	79500	85400	93600	82400
30-Jul-15	524600	519800	538600	523300	190400	188900	1236.20	62000	60000	65200	54100
31-Jul-15	585900	582200	540300	523300	203500	200900	1236.35	65900	60000	55900	44800

Discharge in Cusecs

DATE	CHENAB								RAVI			
	MARALA		QADIRABAD		TRIMMU		PANJAND		BALLOKI		SIDHNAI	
	U/S	D/S	U/S	D/S	U/S	D/S	U/S	D/S	U/S	D/S	U/S	D/S
1-Jul-15	61400	28900	46400	24400	49400	33900	49000	33900	36800	4400	16600	5900
2-Jul-15	53400	20700	39800	17800	48400	33900	51500	36500	36200	3800	16800	6600
3-Jul-15	48900	16100	38500	16500	48400	33900	57800	43300	36200	3800	16000	5300
4-Jul-15	58300	25300	41200	19200	55500	41000	49700	35200	38300	5900	15200	2600
5-Jul-15	67500	34500	46400	24400	57000	41000	42200	27500	37400	5000	16500	3300
6-Jul-15	85900	52800	64400	42400	51000	34900	38100	23200	37400	5000	16200	3300
7-Jul-15	90600	57400	80100	58100	51000	34900	38100	23300	36200	4200	17500	4600
8-Jul-15	81500	48200	70500	48500	56000	42400	50000	37300	35400	5000	17000	12000
9-Jul-15	86200	52800	64400	42400	73700	57700	44600	30600	36400	5900	17100	10700
10-Jul-15	109200	75900	138500	116500	81000	64900	45800	31300	34500	5000	16800	8800
11-Jul-15	121100	87800	136300	114300	76900	54900	46700	32200	37300	6200	19700	13100
12-Jul-15	87000	56800	96300	74300	103500	87500	53200	38600	44200	12700	18600	10600
13-Jul-15	145700	115600	170000	151000	118400	102400	63000	48200	47900	16400	18900	10200
14-Jul-15	112800	82800	120600	106800	110300	94200	84100	69400	43300	11800	23600	14000
15-Jul-15	92300	62200	87900	68800	129700	113600	84100	69400	41600	9900	26700	16600
16-Jul-15	97800	65600	82100	60100	123200	107200	95300	80500	46200	14500	23600	12900
17-Jul-15	129500	97300	94600	72600	106000	89900	96100	81300	47400	16400	19000	7900
18-Jul-15	123400	91400	125900	103900	101700	85700	120000	105300	47800	17300	23700	14100
19-Jul-15	98400	66600	96100	74100	108200	92200	111300	96700	63500	33000	24800	14700
20-Jul-15	104400	72500	78100	56100	124100	108000	82900	68700	66000	35500	27800	18200
21-Jul-15	108500	76500	88200	66200	105900	89800	88300	77100	65900	34200	34600	24300
22-Jul-15	123400	91400	88200	66200	106000	89800	106600	94800	62600	30600	40600	29200
23-Jul-15	100200	68200	96900	74900	106000	85800	112500	100500	58700	26700	42000	30400
24-Jul-15	124000	91900	113000	104600	106000	89800	116700	105600	57800	25700	43300	33000
25-Jul-15	120200	91900	91200	80600	129000	112900	114600	103500	58900	26900	40300	29200
26-Jul-15	128700	100400	96600	86600	122900	106700	109300	101400	53500	22000	41800	33300
27-Jul-15	115800	87800	108400	98400	139000	122900	109700	101400	51500	22000	39600	35400
28-Jul-15	91000	62900	76200	66200	145400	129200	132200	127400	49300	20800	43900	38500
29-Jul-15	94800	66600	70100	60100	145400	129200	131400	127400	45900	17100	40500	35600
30-Jul-15	98200	69900	70100	60100	146400	134700	136100	132100	44100	14700	38800	33400
31-Jul-15	110700	82400	74500	64500	145900	134700	139400	135900	45300	15900	34800	33800

Discharge in Cusec

DATE	SUTLEJ				LINKS/ CANAL				SKARDU	
	SULEMANKI		ISLAM		C.J	CRBC	Q.B	T.P	Temperature °C	
	U/S	D/S	U/S	D/S	Flow	Flow	Flow	Flow	Max	Min
1-Jul-15	18400	5100	2300	NIL	3000	4200	22000	NIL	22.7	12.6
2-Jul-15	18400	5100	2300	800	3000	4200	22000	NIL	28.5	13.0
3-Jul-15	18500	5300	1700	NIL	3000	4200	22000	NIL	32.2	13.3
4-Jul-15	18500	5300	2300	NIL	3000	4200	22000	NIL	33.4	12.5
5-Jul-15	18300	8100	2300	NIL	3000	4200	22000	NIL	35.0	13.5
6-Jul-15	18400	5900	2000	NIL	3000	4200	22000	NIL	36.0	16.5
7-Jul-15	18600	7100	2000	NIL	3000	4200	22000	NIL	35.0	11.0
8-Jul-15	18400	7100	3200	2200	3000	4200	22000	NIL	35.0	16.5
9-Jul-15	18300	5800	3200	1200	3000	4200	22000	NIL	36.0	17.0
10-Jul-15	18500	5800	2300	NIL	3000	4200	22000	NIL	35.0	18.5
11-Jul-15	18600	8400	5200	4900	3000	4200	22000	NIL	29.0	14.4
12-Jul-15	18900	8000	5500	4200	3000	4200	22000	NIL	26.0	15.5
13-Jul-15	19800	9000	6000	4200	3000	4200	19000	NIL	20.0	12.5
14-Jul-15	20200	8600	6100	4200	3000	4200	13800	NIL	26.0	11.5
15-Jul-15	20200	8000	6900	4900	3000	4200	18100	NIL	33.0	16.5
16-Jul-15	20200	8000	7200	4900	3000	4200	22000	NIL	37.0	20.5
17-Jul-15	21400	9900	6500	4200	3000	4100	22000	NIL	37.0	18.0
18-Jul-15	21600	10600	6500	4200	3000	4200	22000	NIL	33.0	21.0
19-Jul-15	19800	8000	7000	5600	3000	4000	22000	NIL	29.0	15.2
20-Jul-15	16600	4600	7400	6400	3000	4000	22000	NIL	25.6	16.0
21-Jul-15	17000	4300	6100	4900	3000	4000	22000	NIL	28.8	16.0
22-Jul-15	17900	5000	3400	2200	3000	4000	22000	NIL	21.6	13.0
23-Jul-15	20200	7300	2400	1200	3000	4000	22000	NIL	28.7	18.0
24-Jul-15	25100	13500	2700	1200	1200	4000	22000	NIL	31.6	17.4
25-Jul-15	27700	15500	2700	1200	-	4000	10600	NIL	33.6	19.4
26-Jul-15	25800	16000	4300	3400	-	4000	10000	NIL	34.3	17.5
27-Jul-15	26000	15800	7300	6400	-	4000	10000	NIL	31.0	13.1
28-Jul-15	26800	16700	12700	11800	-	3600	10000	NIL	30.6	15.2
29-Jul-15	29800	19000	13800	12700	-	2000	10000	NIL	29.4	18.0
30-Jul-15	30600	19500	14900	13800	700	1500	10000	NIL	29.6	15.4
31-Jul-15	31000	21000	15900	14800	3000	1500	10000	NIL	34.4	20.5

Discharge in Cusec

DATE	TIME	INDUS			Kabul	INDUS						
		TARBELA			Nowshera	KALABAGH		CHASHMA			TAUNSA	
		Reservoir Level (Ft)	U/S	D/S	Flow	U/S	D/S	Reservoir Level (Ft)	U/S	D/S	U/S	D/S
1-Aug-15	600	1545.00	366500	337200	89000	428800	420200	642.00	455700	451500	526300	526300
2-Aug-15	600	1546.00	373500	344200	165800	642000	502200	642.00	502200	498700	477500	477500
3-Aug-15	600	1547.00	363800	334600	142400	507400	504100	642.00	595100	592500	483800	483800
4-Aug-15	600	1548.00	356100	327200	111500	478600	476600	642.00	610900	608300	538400	538400
5-Aug-15	600	1549.00	375000	345800	101800	455100	453700	642.00	551500	548500	597700	597700
6-Aug-15	600	1550.00	406400	377200	95400	466900	465900	642.00	492200	489200	573100	573100
7-Aug-15	600	1549.00	407400	436000	84400	471900	471900	642.00	491200	488200	526200	526200
8-Aug-15	600	1549.00	377900	377600	77100	476600	476600	642.00	504400	501100	495900	495900
9-Aug-15	600	1550.00	360900	331300	74100	430000	430000	642.00	520900	517400	496500	496500
10-Aug-15	600	1550.00	353500	352800	71100	362100	362100	642.00	457400	453600	515000	512000
11-Aug-15	600	1550.00	343600	343100	68600	363100	363100	642.00	461800	457100	489500	484500
12-Aug-15	600	1550.00	322000	321600	61200	370000	370000	642.00	457800	453100	455700	449700
13-Aug-15	600	1550.00	300500	299800	55500	357600	357600	642.00	437300	432400	454500	447500
14-Aug-15	600	1550.00	286000	285400	54300	345400	345400	642.60	408900	397700	424600	416600
15-Aug-15	600	1550.00	271800	217200	48700	324600	323800	643.60	383500	367800	398000	380000
16-Aug-15	600	1550.00	250700	250700	49200	315300	314300	644.00	365000	355700	368100	348100
17-Aug-15	600	1550.00	242400	242400	45400	286800	285300	644.00	351600	346800	341000	321500
18-Aug-15	600	1550.00	227000	227000	45600	281100	279100	645.60	333300	307700	314700	291200
19-Aug-15	600	1550.00	218800	218800	40700	266100	262600	646.60	310400	289800	288400	281400
20-Aug-15	600	1550.00	204000	203300	39100	264800	262300	647.60	292000	267700	260000	235500
21-Aug-15	600	1550.00	202500	201800	43900	245900	242400	648.00	282100	268200	240700	215700
22-Aug-15	600	1550.00	210800	210300	47600	251200	246400	648.00	285000	279200	251800	226800
23-Aug-15	600	1550.00	201600	201000	42000	239600	234600	648.00	295000	289200	247900	222400
24-Aug-15	600	1550.00	207100	206500	40300	239600	234600	648.00	286000	280200	277600	259600
25-Aug-15	600	1550.00	193400	192800	44800	251500	245500	648.00	292200	286200	248400	230400
26-Aug-15	600	1550.00	175200	174600	39100	241200	235200	648.00	295200	288800	251200	234200
27-Aug-15	600	1550.00	152000	151300	30800	218800	211900	648.00	270200	261900	254600	234100
28-Aug-15	600	1550.00	140900	140500	29000	188600	181600	648.00	225200	211300	239500	220500
29-Aug-15	600	1550.00	141000	140800	30000	165500	158500	648.00	206300	192300	189300	169800
30-Aug-15	600	1550.00	134200	133700	27300	157100	150100	648.00	215400	201900	171400	151400
31-Aug-15	600	1550.00	141600	141100	27100	156000	149000	648.00	197700	184100	178000	153700

Discharge in Cusec

DATE	INDUS						JHELMUM					
	GUDDU		SUKKAR		KOTRI		MANGLA			RASUL		
	U/S	D/S	U/S	D/S	U/S	D/S	Reservoir Level (Ft)	U/S	D/S	U/S	D/S	
1-Aug-15	722900	719200	584900	569300	218000	212700	1236.50	54900	49000	55900	44800	
2-Aug-15	726500	719200	640300	616000	233700	228400	1236.70	59700	51900	52300	41600	
3-Aug-15	745200	729300	680800	643500	285400	278300	1237.00	69100	57300	52300	41600	
4-Aug-15	729600	710800	703700	660300	325600	318000	1236.80	68900	76700	67000	56700	
5-Aug-15	722400	700600	709300	660300	371400	359300	1236.70	69300	73200	73200	63100	
6-Aug-15	657600	634800	699600	650000	388800	365700	1236.55	58700	64600	67100	56700	
7-Aug-15	657600	634800	688900	639700	434300	412100	1236.70	53400	47600	55400	44700	
8-Aug-15	696000	671600	667000	618000	480000	456100	1236.95	51300	41500	44700	34100	
9-Aug-15	725300	701900	675500	625600	509400	483300	1237.30	50500	36800	37100	26600	
10-Aug-15	685400	665600	698400	647300	552600	522500	1237.60	48500	36800	30000	19000	
11-Aug-15	659300	636500	698600	647300	570100	540300	1237.85	46600	36800	34600	23600	
12-Aug-15	650900	628400	671100	619000	584500	554500	1238.70	48200	15000	16100	5300	
13-Aug-15	640900	613900	658100	604600	597600	565700	1239.00	41700	30000	26600	15800	
14-Aug-15	609100	582900	631600	577200	597600	565700	1239.10	33900	30000	30000	19700	
15-Aug-15	585300	558100	600700	546500	601600	569700	1239.25	32800	26900	30200	19700	
16-Aug-15	544000	517700	533300	482700	634900	603100	1239.80	36500	15000	15700	5300	
17-Aug-15	525200	499400	499200	448200	635000	603100	1240.20	31000	15000	15600	5300	
18-Aug-15	472200	446800	488400	343400	634900	603100	1240.65	33500	15000	11800	5300	
19-Aug-15	406700	379300	444500	389500	634900	603100	1241.05	28400	12000	7400	5200	
20-Aug-15	391400	363300	391800	336500	611400	579600	1241.45	28400	12000	9900	8000	
21-Aug-15	362900	335900	359000	303800	590800	558900	1241.80	29400	15000	7500	5300	
22-Aug-15	323100	293800	337900	282400	582300	550500	1242.00	29600	21400	17900	15800	
23-Aug-15	303100	272800	295700	240100	526400	494500	1242.00	27000	27000	22700	8000	
24-Aug-15	290400	263300	255400	199900	500200	468300	1242.00	25300	25300	22600	5300	
25-Aug-15	290200	263400	255500	199900	496900	463800	1242.00	26300	26300	29100	11900	
26-Aug-15	308400	283200	255400	199900	485500	450700	1242.00	23200	23200	22500	5300	
27-Aug-15	300000	272800	275600	220100	446700	411500	1242.00	20400	20400	22900	5300	
28-Aug-15	287000	259900	276200	220100	422500	387100	1242.00	22200	22200	16100	NIL	
29-Aug-15	287000	259900	249600	193400	382700	347200	1242.00	23300	23300	23700	5300	
30-Aug-15	271200	243100	239900	183700	340500	304800	1242.00	21600	21600	16600	-	
31-Aug-15	219800	191700	231300	175100	293000	257100	1242.00	19200	19200	16100	-	

Discharge in Cusec

DATE	CHENAB								RAVI			
	MARALA		QADIR ABAD		TRIMMU		PANJAND		BALLOKI		SIDHNAI	
	U/S	D/S	U/S	D/S	U/S	D/S	U/S	D/S	U/S	D/S	U/S	D/S
1-Aug-15	105300	76900	72700	62700	143400	132600	135100	135100	43100	17100	33000	32400
2-Aug-15	99400	76900	72700	62700	137000	126500	129400	129400	34800	12300	30600	30000
3-Aug-15	98400	75800	90500	83000	139600	129800	127900	127900	33200	14700	32800	32500
4-Aug-15	97100	76400	77400	67400	131100	120400	127900	127900	30400	17900	29100	26800
5-Aug-15	97200	73100	87700	77200	131600	120400	130800	128800	30400	17900	27900	23200
6-Aug-15	96700	71800	74000	64000	131700	120400	131100	129100	29500	15500	26700	19600
7-Aug-15	98700	73600	81400	71400	133200	121900	133600	129100	30500	15500	27500	17800
8-Aug-15	98000	72900	77400	68900	133200	121900	130400	125200	38100	17900	21200	10800
9-Aug-15	92200	71100	77500	67500	129800	118500	125000	119900	43800	21400	20500	9400
10-Aug-15	99000	77900	112600	102600	137300	125800	121500	116300	42600	20200	25300	13600
11-Aug-15	96900	75700	69300	59300	124000	112500	123500	114400	48000	25000	27800	15300
12-Aug-15	94000	75700	77500	67500	128000	116500	119500	108500	46600	28600	28000	15300
13-Aug-15	94300	77600	77500	67500	104700	93200	120800	108500	39400	21400	27000	13900
14-Aug-15	84600	66300	74000	64000	104700	93200	117600	105800	43000	25000	30900	19100
15-Aug-15	79300	61000	72400	63800	88700	77200	117200	105800	47800	29700	29400	17000
16-Aug-15	85900	64400	69500	59500	102600	91400	107800	96000	47900	28500	25700	18300
17-Aug-15	79600	54300	64000	54000	81400	69900	107400	95400	47000	27400	36500	26300
18-Aug-15	69000	43600	49800	39800	72700	61200	106800	94100	44800	25000	35600	23400
19-Aug-15	65600	38300	37500	27500	66700	55100	120000	106800	42400	22600	35900	23400
20-Aug-15	67300	38200	30600	20600	48100	36500	118500	104200	39200	19100	36500	23400
21-Aug-15	75000	43600	30600	20600	36400	24800	95400	81700	39200	19100	36500	23400
22-Aug-15	75000	43600	33400	23400	29800	18100	95800	81700	40000	20200	31500	18500
23-Aug-15	64200	32900	46100	32800	29800	18100	89900	75700	40400	20200	31500	18500
24-Aug-15	58900	27600	43800	28800	29800	18100	77200	62900	46400	26200	30800	17700
25-Aug-15	53500	22200	35600	20600	34300	22600	75400	60900	45000	25000	30900	17700
26-Aug-15	43800	11500	28800	13800	31000	19300	69500	55100	43800	23800	32500	19200
27-Aug-15	44800	11500	23300	8300	31000	19300	69700	55100	39300	19100	34100	20500
28-Aug-15	50200	16900	13300	4700	24700	13000	68200	53500	40400	20200	34200	20500
29-Aug-15	55500	22200	26900	6900	21300	9600	64700	50000	39500	15500	31100	17500
30-Aug-15	48600	15300	26900	6900	21300	9600	62600	47500	40500	14300	29500	15800
31-Aug-15	48600	15300	24200	4200	19100	7400	62600	47500	41700	13100	26600	13100

Discharge in Cusec

DATE	SUTLEJ				LINKS/CANAL				SKARDU	
	SULEMANKI		ISLAM		C.J	CRBC	Q.B	T.P	Temperature °C	
	U/S	D/S	U/S	D/S	Flow	Flow	Flow	Flow	Max	Min
1-Aug-15	33100	24800	17000	15900	3000	1200	10000	NIL	32.6	16.0
2-Aug-15	37400	33400	17400	17000	3000	500	10000	NIL	30.6	17.4
3-Aug-15	39700	38700	19400	19400	2400	200	10000	NIL	27.4	17.2
4-Aug-15	39700	38600	21800	21600	2600	NIL	10000	NIL	26.6	18.5
5-Aug-15	40000	39000	24000	24000	3000	-	10000	NIL	26.4	17.3
6-Aug-15	32400	29400	30900	30500	3000	-	10000	NIL	29.8	15.2
7-Aug-15	32900	28600	32600	31900	3000	-	10000	NIL	32.0	15.5
8-Aug-15	30000	22500	34100	33200	3000	300	10000	NIL	35.0	16.4
9-Aug-15	27200	18500	25100	24000	3000	500	10000	NIL	34.6	16.2
10-Aug-15	29100	18800	20300	19200	3000	800	10000	NIL	34.4	18.0
11-Aug-15	30200	18800	18200	17000	3000	1700	10000	NIL	31.0	16.0
12-Aug-15	30800	18800	18500	17000	3000	1800	10000	NIL	33.4	15.5
13-Aug-15	38700	26700	17000	15900	3000	1900	10000	NIL	33.6	15.2
14-Aug-15	40800	28300	17000	15900	3000	2000	10000	NIL	33.4	17.4
15-Aug-15	46500	34200	17600	15900	3000	2000	10000	NIL	30.6	16.4
16-Aug-15	52800	41800	20200	18700	3000	1900	10000	NIL	29.6	14.2
17-Aug-15	61000	49500	23400	22300	3000	1800	10000	NIL	31.4	15.4
18-Aug-15	60900	47000	28100	26100	3000	1900	10000	NIL	26.6	11.6
19-Aug-15	57400	44900	30800	28800	3000	2300	10000	NIL	32.4	11.4
20-Aug-15	46100	33300	36300	34300	3000	2600	10000	NIL	34.6	11.2
21-Aug-15	40900	28100	43900	41700	3000	2800	10000	NIL	35.4	14.0
22-Aug-15	38900	26100	42400	40200	3000	2800	10000	NIL	31.6	14.0
23-Aug-15	36400	23300	37900	35700	3000	2800	13300	NIL	31.4	12.6
24-Aug-15	33000	20400	29900	27400	3000	2800	15000	NIL	28.4	13.0
25-Aug-15	33400	20400	21000	18700	3000	3000	15000	NIL	22.6	11.4
26-Aug-15	36800	23600	19800	17500	3000	4500	15000	NIL	26.0	9.3
27-Aug-15	30900	17800	18800	16500	4500	3800	15000	NIL	30.4	11.0
28-Aug-15	18600	5300	17600	15300	9800	4100	15000	NIL	28.6	12.2
29-Aug-15	13800	400	13400	11100	10000	4000	20000	NIL	29.0	12.0
30-Aug-15	13500	-	7400	5000	10000	3500	20000	NIL	28.4	11.4
31-Aug-15	14700	1200	2800	400	10000	3600	20000	NIL	31.6	13.2

Discharge in Cusec

DATE	TIME	INDUS			Kabul	INDUS						
		TARBELA			Nowshera	KALABAGH		CHASHMA			TAUNSA	
		Reservoir Level (Ft)	U/S	D/S	Flow	U/S	D/S	Reservoir Level (Ft)	U/S	D/S	U/S	D/S
1-Sep-15	600	1550.00	134200	133700	28300	166900	159900	648.00	203100	189200	156700	132400
2-Sep-15	600	1550.00	129000	128500	24600	155700	148200	648.00	193200	179200	155300	131000
3-Sep-15	600	1550.00	115800	115400	21000	142200	134700	647.70	188100	180000	155300	131000
4-Sep-15	600	1549.27	104200	125000	21200	162800	156300	647.00	167300	170000	149800	125600
5-Sep-15	600	1548.65	107400	125000	22700	154100	146600	646.60	170600	170000	148300	123700
6-Sep-15	600	1547.55	104000	135000	20300	172000	164500	646.00	167000	170000	142600	118000
7-Sep-15	600	1546.30	99600	135000	19400	164300	156800	644.70	159400	165000	150300	126600
8-Sep-15	600	1544.64	97700	145000	20000	149900	142400	644.40	168300	165000	152900	129200
9-Sep-15	600	1542.72	90300	145000	18700	182900	175100	644.60	174500	165000	150900	126000
10-Sep-15	600	1540.70	82300	140000	17300	173700	165700	645.00	176900	163000	144100	121000
11-Sep-15	600	1538.40	76200	140000	15900	164800	156800	645.50	177000	163000	149300	125500
12-Sep-15	600	1535.97	73400	140000	16700	164700	156400	645.20	165800	163000	142300	119500
13-Sep-15	600	1533.40	69600	140000	17300	167400	159100	645.00	167300	163000	142700	120800
14-Sep-15	600	1530.87	70700	140000	15300	145800	137500	644.80	167700	163000	144400	122400
15-Sep-15	600	1528.40	74300	140000	14900	148600	140300	644.20	162800	163000	142600	120900
16-Sep-15	600	1525.96	76100	140000	16600	174000	165700	644.70	171400	158000	142600	121200
17-Sep-15	600	1523.38	72400	140000	16300	148100	139800	644.80	166400	158000	140900	119700
18-Sep-15	600	1520.79	72100	140000	15600	171200	162900	644.60	162700	158000	136200	115800
19-Sep-15	600	1518.14	72100	140000	15300	153100	144800	644.90	168900	158000	136200	115800
20-Sep-15	600	1515.85	74000	132000	14400	174800	166500	645.00	166400	158000	142300	121000
21-Sep-15	600	1513.30	67600	132000	14400	164100	155800	645.60	164300	149000	115700	96100
22-Sep-15	600	1510.88	66000	127000	16700	154600	146300	645.90	159000	149000	140200	119300
23-Sep-15	600	1509.46	65000	100000	14500	165900	157600	646.40	158200	144000	131200	109600
24-Sep-15	600	1508.71	72200	90000	14100	158000	150000	646.30	149000	144000	133100	111200
25-Sep-15	600	1507.94	71600	90000	13700	94800	86800	645.40	133400	140000	132800	115400
26-Sep-15	600	1507.02	68000	90000	13900	83400	75400	645.70	122900	112000	132800	114900
27-Sep-15	600	1506.22	60900	80000	13600	91400	83400	646.10	112500	100000	109900	94700
28-Sep-15	600	1505.45	56600	75000	13600	71200	63200	646.70	116500	100000	95900	77700
29-Sep-15	600	1504.56	53700	75000	11100	64900	56900	646.40	101800	100000	87800	68300
30-Sep-15	600	1503.77	51100	70000	13300	77800	69800	645.80	87400	90000	87800	68300

Discharge in Cusec

DATE	INDUS						JHELUM					
	GUDDU		SUKKAR		KOTRI		MANGLA			RASUL		
	U/S	D/S	U/S	D/S	U/S	D/S	Reservoir Level (Ft)	U/S	D/S	U/S	D/S	
1-Sep-15	200500	174400	198200	142000	263400	228000	1242.00	22000	22000	18500	NIL	
2-Sep-15	173800	165800	170000	113700	230400	195200	1241.65	18100	32400	32700	11900	
3-Sep-15	161000	151700	155000	97700	208500	173600	1241.20	16500	35000	33400	11900	
4-Sep-15	156500	135800	129300	73900	181600	147000	1240.80	18600	35000	33400	11900	
5-Sep-15	148400	122800	126300	69200	157800	123200	1240.35	16500	35000	33400	11900	
6-Sep-15	140600	114000	126000	68700	136100	101600	1239.80	17800	40000	32600	11900	
7-Sep-15	134400	107500	108200	52500	131800	97400	1239.25	18500	40000	32800	11900	
8-Sep-15	132700	106600	101900	47500	111100	76700	1238.60	14600	40000	32300	11900	
9-Sep-15	121700	93200	94300	39900	98900	64400	1237.70	14800	50000	32500	11900	
10-Sep-15	126300	100400	89000	34600	87600	53100	1236.85	16800	50000	32400	11900	
11-Sep-15	128600	102100	89700	34600	81000	46900	1235.95	41800	50000	43900	23600	
12-Sep-15	132000	108800	100600	46900	72100	37800	1235.00	12900	50000	37000	15800	
13-Sep-15	123800	95500	98000	41400	68500	34200	1234.15	16800	50000	41100	19700	
14-Sep-15	122300	95500	88800	32200	67100	32800	1233.20	12900	50000	40900	19700	
15-Sep-15	122300	95500	88000	32200	62500	28400	1232.20	15900	55000	40800	19700	
16-Sep-15	120400	93800	87900	32200	50100	16800	1231.15	14000	55000	40900	19700	
17-Sep-15	120400	93800	87700	32200	44200	11300	1230.15	15900	55000	44900	23600	
18-Sep-15	118300	93800	88400	33400	39600	9900	1229.10	15700	55000	41100	19700	
19-Sep-15	117400	96100	90600	39200	33500	6900	1228.00	14100	55000	41100	19700	
20-Sep-15	116700	96100	92600	40400	32200	6900	1226.95	16000	55000	45000	23600	
21-Sep-15	115700	96100	92600	40400	25400	4900	1225.75	10400	55000	41300	19700	
22-Sep-15	111100	96100	87400	35800	18500	NIL	1224.65	14100	55000	48900	27500	
23-Sep-15	122800	105400	93300	40400	18500	-	1225.30	69100	45000	62200	47000	
24-Sep-15	123500	105400	100200	46700	19200	-	1226.85	72600	15000	20000	11900	
25-Sep-15	123500	105400	100100	46700	23900	-	1227.35	33600	15000	14100	11900	
26-Sep-15	110500	92400	100200	46700	24600	-	1227.00	28000	15000	7500	5300	
27-Sep-15	117100	100400	87700	34600	24700	-	1227.95	24300	15000	13700	11900	
28-Sep-15	121000	103900	88200	34600	24700	-	1228.20	24300	15000	7600	5300	
29-Sep-15	122800	103900	88200	34600	24700	-	1228.45	24300	15000	11900	-	
30-Sep-15	136700	111500	101000	46700	26100	-	1228.40	23100	25000	17000	5300	

Discharge in Cusec

DATE	CHENAB								RAVI			
	MARALA		QADIR ABAD		TRIMMU		PANJAND		BALLOKI		SIDHNAI	
	U/S	D/S	U/S	D/S	U/S	D/S	U/S	D/S	U/S	D/S	U/S	D/S
1-Sep-15	52300	19100	24200	4200	20100	7400	46400	31300	41700	13100	26600	12800
2-Sep-15	41000	7700	26900	6900	23800	10100	44300	28900	41100	10700	26700	12800
3-Sep-15	42800	11500	21500	1500	23800	10100	36500	20900	42300	11900	23100	9000
4-Sep-15	46600	15300	24200	4200	20800	7000	36000	20400	42300	11900	21400	7000
5-Sep-15	39100	7700	24200	4200	19300	5500	34300	18600	40000	9600	21400	7000
6-Sep-15	38100	7700	21500	1500	23600	9800	23000	7400	42300	11900	19000	4600
7-Sep-15	37200	8000	21500	1500	21200	7400	22800	7100	41100	10700	17600	3300
8-Sep-15	34800	8000	20000	NIL	21200	7400	20900	5100	41100	10700	17700	3300
9-Sep-15	28700	8000	20000	-	21200	7400	22500	6700	38800	8400	17800	3300
10-Sep-15	26500	8000	20000	-	21200	7400	22500	6700	37600	7100	18500	4300
11-Sep-15	27500	9000	20000	-	21700	7900	22500	6700	31600	1200	17600	3300
12-Sep-15	29500	9000	20000	-	16800	-	21000	5100	31000	600	17000	2700
13-Sep-15	28500	9000	22000	-	25400	8600	20000	4100	29500	NIL	17000	2700
14-Sep-15	29600	9000	21000	-	25400	8600	20000	4100	29800	-	15100	700
15-Sep-15	31100	9000	21900	-	28500	11200	17900	2100	31000	600	13700	NIL
16-Sep-15	31100	9000	22000	-	28500	11200	17900	2100	30400	-	1370	-
17-Sep-15	30600	9000	22000	-	28500	11200	17500	1700	31300	900	13700	-
18-Sep-15	29500	9000	22000	-	28500	11200	17500	1700	31000	600	13200	-
19-Sep-15	29000	9000	22000	-	28500	11200	17900	2000	30400	NIL	13200	-
20-Sep-15	28300	9000	22000	-	32800	15500	17500	1600	29500	-	13300	-
21-Sep-15	26900	9000	22000	-	34100	16800	16600	1100	28400	-	13300	-
22-Sep-15	26200	9000	22000	-	34100	16800	14500	5000	28000	-	13600	300
23-Sep-15	180700	163400	22000	-	32500	16800	21800	8800	31900	11900	16100	7600
24-Sep-15	97600	80200	166100	148100	33700	22300	21000	6500	45700	29700	11100	700
25-Sep-15	45500	27600	44800	34900	35400	22000	24600	10800	70700	54700	13500	2600
26-Sep-15	33200	15300	31300	22300	116100	105700	25500	11600	48400	32400	31300	20900
27-Sep-15	29400	11500	15900	6900	62900	52500	35200	21300	34100	15100	38600	28200
28-Sep-15	27600	9700	15900	6900	15900	6900	86100	71700	30600	11600	44400	32700
29-Sep-15	25300	9000	9000	-	34400	24000	94200	79400	28300	9300	32800	21000
30-Sep-15	24600	9000	15900	6900	30200	18100	83900	69000	25400	5900	24900	12700

Discharge in Cusec

DATE	SUTLEJ				LINKS/CANAL				SKARDU	
	SULEMANKI		ISLAM		C.J	CRBC	Q.B	T.P	Temperature °C	
	U/S	D/S	U/S	D/S	Flow	Flow	Flow	Flow	Max	Min
1-Sep-15	15900	2300	2100	NIL	10000	3900	20000	NIL	24.6	10.4
2-Sep-15	15900	2300	500	-	10000	4100	20000	NIL	25.6	8.5
3-Sep-15	16600	3100	500	-	10000	4200	20000	NIL	30.4	12.4
4-Sep-15	16700	3100	1700	-	7400	4200	20000	NIL	25.6	8.4
5-Sep-15	16700	3100	2400	-	3300	3800	20000	NIL	28.4	9.4
6-Sep-15	17800	9600	2400	-	3000	3700	20000	NIL	26.6	13.2
7-Sep-15	15800	6600	2400	-	3000	4000	20000	NIL	21.6	11.0
8-Sep-15	15000	4300	4200	1800	3000	4000	20000	NIL	24.5	9.0
9-Sep-15	15100	3400	4700	2300	3000	4000	20000	NIL	18.6	5.4
10-Sep-15	14700	2000	5300	2900	3000	4000	20000	NIL	25.2	7.4
11-Sep-15	14700	2000	4200	1800	3000	4000	20000	NIL	25.6	9.4
12-Sep-15	15000	1800	2400	NIL	3000	4000	20000	NIL	28.5	7.4
13-Sep-15	15000	1800	2000	-	3000	4100	22000	NIL	29.3	8.4
14-Sep-15	13900	500	1700	-	3000	4200	21000	NIL	29.6	9.4
15-Sep-15	14100	500	1200	-	3000	4200	21900	NIL	26.5	9.2
16-Sep-15	14600	1000	1200	-	3000	4200	22000	NIL	27.6	10.4
17-Sep-15	14600	1000	700	-	3000	4200	22000	NIL	26.5	10.4
18-Sep-15	14600	1000	700	-	3000	4200	22000	NIL	25.6	8.2
19-Sep-15	15400	1900	1200	-	3000	4200	22000	NIL	27.6	7.4
20-Sep-15	14400	1000	1500	-	3000	4200	22000	NIL	28.6	10.4
21-Sep-15	14200	2500	1200	-	3000	4000	22000	NIL	22.6	7.2
22-Sep-15	16100	7500	1000	-	3000	3300	22000	NIL	25.7	11.2
23-Sep-15	15900	14100	2100	1800	3000	3300	22000	NIL	13.6	6.0
24-Sep-15	19800	1700	3000	1800	3000	3600	18000	NIL	13.6	6.0
25-Sep-15	21000	1700	8700	7500	3000	3700	9900	NIL	20.6	5.2
26-Sep-15	19700	14100	12600	11100	3000	3700	9000	NIL	23.3	8.4
27-Sep-15	21800	15500	13800	12100	3000	3700	9000	NIL	18.6	6.3
28-Sep-15	21700	14000	13200	11100	3000	3700	9000	NIL	18.5	6.4
29-Sep-15	21400	13100	12300	10700	3000	3700	9000	NIL	20.5	8.4
30-Sep-15	14600	6300	12300	10700	3000	3700	9000	NIL	20.2	5.4

Discharge in Cusec

DATE	TIME	INDUS			Kabul	INDUS						
		TARBELA			Nowshera	KALABAGH		CHASHMA			TAUNSA	
		Reservoir Level (Ft)	U/S	D/S	Flow	U/S	D/S	Reservoir Level (Ft)	U/S	D/S	U/S	D/S
1-Oct-15	600	1502.95	50500	70000	13300	66200	58200	646.10	101300	90000	87800	68300
2-Oct-15	600	1502.00	47300	70000	12200	74000	66000	646.50	98400	85000	80600	62300
3-Oct-15	600	1501.13	44300	65000	12200	82000	74000	646.50	91900	85000	74800	56500
4-Oct-15	600	1500.21	43100	65000	12100	72500	64500	646.30	88600	85000	77700	62200
5-Oct-15	600	1499.26	42500	65000	11700	78500	70500	646.10	88600	85000	70700	56500
6-Oct-15	600	1498.26	41400	65000	11600	78500	70500	645.60	81000	82000	71400	59600
7-Oct-15	600	1497.25	41900	65000	11900	72300	64300	645.90	92100	82000	71500	60100
8-Oct-15	600	1496.31	42100	65000	12900	76200	68200	645.00	75300	82000	72000	56200
9-Oct-15	600	1495.27	40400	65000	13300	74200	66000	644.90	86700	82000	72000	56200
10-Oct-15	600	1494.37	38800	60000	12500	76400	68900	644.20	79300	82000	72000	56200
11-Oct-15	600	1493.72	39900	55000	12400	79900	72400	643.90	79100	77000	76700	59800
12-Oct-15	600	1493.06	39600	55000	12700	67600	60100	643.70	79000	77000	73500	57300
13-Oct-15	600	1492.41	40000	55000	11600	66200	55700	643.30	68500	69000	70200	53300
14-Oct-15	600	1491.77	40100	55000	12000	68900	61400	642.90	68500	69000	70200	53300
15-Oct-15	600	1491.22	42400	55000	12500	67400	59900	642.20	65700	69000	66800	56800
16-Oct-15	600	1491.00	40400	45000	13600	75500	68000	641.70	62900	64000	66800	55800
17-Oct-15	600	1490.74	39400	45000	13600	64400	56900	641.70	62600	59000	66700	54800
18-Oct-15	600	1490.51	40000	45000	12800	73700	66200	641.90	55400	50000	63800	52100
19-Oct-15	600	1490.32	41000	45000	13600	58000	50500	642.10	55100	50000	61500	49100
20-Oct-15	600	1490.48	44500	40000	12700	67800	60300	643.40	60500	44000	58700	58700
21-Oct-15	600	1491.30	45300	25000	20100	68000	62300	645.00	55800	34000	54100	54100
22-Oct-15	600	1491.88	39500	25000	14100	58200	52200	645.00	43800	34000	51800	51800
23-Oct-15	600	1492.75	36700	15000	11900	55700	49700	645.90	38200	30000	44900	44900
24-Oct-15	600	1493.58	35600	15000	11600	36500	30500	646.20	37200	30000	41400	41400
25-Oct-15	600	1494.50	37900	15000	12200	37800	31800	646.00	29200	30000	39100	39100
26-Oct-15	600	1495.74	45600	15000	16600	40000	34500	645.80	29500	30000	34300	34300
27-Oct-15	600	1497.33	54100	15000	18100	48100	42600	646.30	39900	30000	34300	34300
28-Oct-15	600	1498.42	42000	15000	18800	50600	44600	647.40	51800	30000	34300	34300
29-Oct-15	600	1499.34	37900	15000	16400	47500	41500	647.90	47400	35000	32000	32000
30-Oct-15	600	1500.17	35400	15000	16000	46800	40800	648.00	39200	35000	32000	32000
31-Oct-15	600	1500.95	34400	15000	15300	44200	38200	647.80	33100	35000	33200	32000

Discharge in Cusec

DATE	INDUS						JHELM				
	GUDDU		SUKKAR		KOTRI		MANGLA			RASUL	
	U/S	D/S	U/S	D/S	U/S	D/S	Reservoir Level (Ft)	U/S	D/S	U/S	D/S
1-Oct-15	130400	106600	106800	53200	26400	NIL	1228.15	20700	30000	27500	15800
2-Oct-15	118300	93600	104800	53200	26600	-	1227.90	20700	30000	31500	19700
3-Oct-15	94400	71400	79800	33200	25800	-	1227.50	19800	34600	35200	23600
4-Oct-15	93700	70900	69300	24500	25800	-	1226.80	19000	45000	35300	23600
5-Oct-15	88100	66400	667000	23500	27800	3200	1226.10	19000	45000	31800	15800
6-Oct-15	75200	55600	60100	19200	30500	6900	1225.40	19000	45000	36400	19700
7-Oct-15	67900	49000	58500	17900	3090	6900	1224.50	16600	50000	35800	15800
8-Oct-15	65500	47300	53000	15000	27100	3200	1223.50	12900	50000	40800	19700
9-Oct-15	63900	46500	49000	13900	23900	NIL	1222.60	16600	50000	44800	23600
10-Oct-15	60900	46500	45800	12900	22000	-	1221.65	14700	50000	44700	23600
11-Oct-15	60100	46200	45800	12900	21600	-	1220.65	12900	50000	44600	23600
12-Oct-15	56800	45000	45800	12900	14400	-	1219.65	13600	50000	44600	23600
13-Oct-15	56800	45000	45600	12900	13400	-	1218.65	14900	50000	44600	23600
14-Oct-15	58400	46600	44300	12000	11300	-	1217.60	13100	50000	36800	15800
15-Oct-15	57100	48400	45000	12000	11300	-	1216.60	14900	50000	44900	23600
16-Oct-15	55800	47400	47300	14100	11300	-	1215.50	11400	50000	44000	23600
17-Oct-15	54800	46700	46700	15900	11300	-	1214.60	13400	45000	43700	27500
18-Oct-15	57200	49200	47500	15600	11300	-	1213.65	11600	45000	36000	19700
19-Oct-15	65300	57100	49500	16700	11100	-	1212.65	9900	45000	42800	27500
20-Oct-15	65200	57100	53300	21500	10700	-	1211.75	13400	45000	39600	23600
21-Oct-15	68600	60500	58700	24500	12000	-	1211.25	22400	40000	39200	23600
22-Oct-15	73600	65600	58700	24500	12500	-	1210.75	17400	35000	35000	19700
23-Oct-15	74600	64000	59500	27500	12500	-	1210.40	17700	30000	34700	19700
24-Oct-15	72600	64000	61100	29600	13300	-	1210.00	15900	30000	26900	11900
25-Oct-15	71100	62500	61100	29600	16200	-	1209.55	15100	30000	26900	11900
26-Oct-15	65700	57200	60500	29600	16900	-	1209.75	36600	30000	26900	11900
27-Oct-15	62200	53600	55100	24900	17200	-	1210.60	59300	30000	30800	15800
28-Oct-15	58800	50200	52100	21300	18300	-	1211.00	44100	30000	26900	11900
29-Oct-15	55700	47100	49300	19100	19000	-	1210.90	26500	30000	26900	11900
30-Oct-15	55700	47100	47300	18200	19000	-	1210.80	26500	30000	26900	11900
31-Oct-15	55700	47100	46300	16300	19000	-	1210.70	26500	30000	26900	11900

Discharge in Cusec

DATE	CHENAB						RAVI					
	MARALA		QADIR ABAD		TRIMMU		PANJAND		BALLOKI		SIDHNAI	
	U/S	D/S	U/S	D/S	U/S	D/S	U/S	D/S	U/S	D/S	U/S	D/S
1-Oct-15	20700	9000	15900	6900	21800	8400	62400	47400	21900	2400	22800	10300
2-Oct-15	18800	9000	15900	6900	14900	NIL	54800	39800	21900	2400	21500	8100
3-Oct-15	19000	9000	11800	2800	15400	-	42800	27800	18500	NIL	17200	3700
4-Oct-15	17900	8000	12500	1500	20400	4500	34300	19300	15600	-	17000	2700
5-Oct-15	15600	8000	14800	NIL	20900	4500	21400	6400	14800	-	14700	1300
6-Oct-15	15900	8000	15000	-	20900	4500	15000	NIL	16200	-	13800	700
7-Oct-15	16600	7000	21600	-	22100	6000	14900	-	17500	-	13200	NIL
8-Oct-15	16300	7000	22000	-	24900	8800	14400	-	19300	-	12700	-
9-Oct-15	16400	7000	22000	-	22100	6000	14400	-	21200	-	12400	-
10-Oct-15	15400	6000	22000	-	22100	6000	14000	-	21400	-	12400	-
11-Oct-15	14400	5000	22000	-	22600	6000	14000	-	20200	-	12100	-
12-Oct-15	14300	5000	22000	-	22600	6000	14000	-	21400	1600	12500	-
13-Oct-15	13000	5000	21000	-	22600	6000	15500	1900	21400	1200	12500	-
14-Oct-15	13000	5000	21000	-	22600	6000	15400	1900	20300	NIL	12800	-
15-Oct-15	14100	5000	21000	-	22600	6000	15100	1600	19500	-	12500	-
16-Oct-15	16100	8800	22000	-	23200	14000	13100	8600	19000	3500	12700	4500
17-Oct-15	16100	8800	22000	-	25700	16500	20000	15500	21400	7900	10500	4000
18-Oct-15	12300	5000	19800	2800	25700	16500	15900	11400	20500	4500	10800	4300
19-Oct-15	12300	5000	18100	4100	30500	21300	22500	18100	17700	1700	10800	4300
20-Oct-15	18700	11400	18100	4100	30500	21300	28300	27800	15900	-	13100	6600
21-Oct-15	21500	15500	16400	5400	30500	21300	28500	24000	15200	1200	13700	8200
22-Oct-15	14700	8700	24300	13300	30500	21300	28500	24000	14000	NIL	13700	8200
23-Oct-15	11400	5400	24300	13300	30300	21300	26100	21600	14000	-	10700	5200
24-Oct-15	14700	8700	20400	9400	30300	21300	26000	21500	13000	-	10700	5200
25-Oct-15	14700	8700	20400	9400	32000	23000	26000	21500	13000	-	9700	4200
26-Oct-15	16700	10300	24300	13300	31800	23000	25800	21500	13000	-	9700	4600
27-Oct-15	23500	17100	20400	9400	18400	9600	26000	21500	13500	-	9700	4200
28-Oct-15	20100	13700	31600	20600	18100	9600	26000	21500	14000	-	10100	4600
29-Oct-15	17300	10300	28900	17300	18400	9600	24000	19500	14000	-	10100	4600
30-Oct-15	17300	10300	21700	6700	18400	10000	21600	17100	14000	-	10100	4600
31-Oct-15	17300	10300	21700	6700	17300	10300	19600	15100	17200	-	10100	4600

Discharge in Cusec

DATE	SUTLEJ				LINKS/CANAL				SKARDU	
	SULEMANKI		ISLAM		C.J	CRBC	Q.B	T.P	Temperature °C	
	U/S	D/S	U/S	D/S	Flow	Flow	Flow	Flow	Max	Min
1-Oct-15	13600	8100	9400	7500	3000	3800	9000	NIL	22.2	5.4
2-Oct-15	8100	2500	8600	6600	3000	3900	9000	NIL	23.6	4.4
3-Oct-15	9100	2900	7000	5000	3000	3900	9000	NIL	17.8	6.1
4-Oct-15	6700	500	7000	5000	3000	3900	11000	NIL	23.6	5.4
5-Oct-15	6400	4000	4900	2900	3000	3900	14800	NIL	23.7	4.6
6-Oct-15	6400	4000	4900	2900	2300	3900	15000	NIL	25.4	5.4
7-Oct-15	6000	NIL	1900	NIL	2000	3900	21600	NIL	24.2	6.2
8-Oct-15	6400	-	2000	-	2000	3900	22000	NIL	22.6	6.1
9-Oct-15	6900	500	1100	-	2000	3900	22000	NIL	23.6	4.0
10-Oct-15	7000	500	500	-	2000	3900	22000	NIL	24.6	3.4
11-Oct-15	7600	1100	500	-	2000	3900	22000	NIL	24.7	4.7
12-Oct-15	8100	1700	1100	-	300	3900	22000	NIL	25.6	4.3
13-Oct-15	7700	1100	1400	-	NIL	3900	21000	NIL	24.5	3.4
14-Oct-15	7600	1100	1700	-	-	3900	21000	NIL	25.5	5.4
15-Oct-15	7600	1100	1700	-	-	3900	21000	NIL	20.3	4.7
16-Oct-15	9100	3300	1900	800	-	3700	22000	NIL	22.8	8.9
17-Oct-15	9000	4500	1900	800	-	3600	22000	6900	21.7	8.3
18-Oct-15	7100	2500	2300	1300	-	3500	17000	6700	22.2	8.3
19-Oct-15	7100	2500	3200	1300	-	3200	14000	7400	21.7	7.8
20-Oct-15	7000	2500	3200	1300	-	2800	14000	NIL	21.1	7.2
21-Oct-15	7000	2500	3200	1300	-	2800	11000	-	18.3	6.7
22-Oct-15	6200	1700	3200	1800	-	2800	11000	-	17.8	5.6
23-Oct-15	6800	2300	3000	1300	-	2600	11000	-	13.9	4.4
24-Oct-15	6800	2300	3000	1300	-	2500	11000	-	15.0	5.6
25-Oct-15	6200	1700	3000	1300	-	2500	11000	-	13.9	7.8
26-Oct-15	6200	1700	2700	1300	-	2300	11000	-	10.0	-1.1
27-Oct-15	6200	1700	1200	-	-	2200	11000	-	11.1	5.6
28-Oct-15	6800	2300	1600	500	-	2200	11000	-	12.8	4.4
29-Oct-15	7300	2900	1800	400	-	2200	11600	-	13.9	2.2
30-Oct-15	7800	3300	2000	400	-	2200	15000	-	13.9	1.7
31-Oct-15	7300	2800	2000	400	-	2200	15000	-	14.4	2.2

Appendix-III

**MONTHLY RAINFALL DATA
(JULY-SEPTEMBER 2015)
(SOURCE: PMD)**

RAINFALL (MM) STATEMENT FOR THE MONTH OF JULY-2015																																				
Stations		Rainfall Recorded in mm during past 24 hours (0800 to 0800 HRS PST)																										Stations								
PUNJAB		RAINFALL IN 24 HOUR														ABOVE NORMAL RAINFALL										PUNJAB										
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Total Since	Monthly	Current	July Historical	PUNJAB	
1	BAHAWALNAGAR	0	1	0	0	0	37	3	0	0	63	0	0	0	0	0	0	6	0	0	0	0	1	0	15	0.1	2	0.1	0	26	154.2	70.8	63.0	75.0	BAHAWALNAGAR	
2	BAHAWALPUR CITY	0.1	8	0	0	0	13.2	21	0	0	49	2	0	0	0	0	0	0	0	0.1	0	0	0	0.1	8	2	2	8	0.1	20	133.6	40.4	49.0	67.0	BAHAWALPUR CITY	
3	BAHAWALPUR A/P	0	5	0	0	0	15.2	15	0	0	37	1	0	0	0	0	0	0.1	2	0	0	0	7	0	3.5	3	6	2	0	8	104.8	**	37.0	**	BAHAWALPUR A/P	
4	BHAKKAR	0	0	0	0	0	0	0	0	0	9	0	0	0	0	0	0	0	0	0	0	0	2	10	0.2	10	0	0.1	2	1.4	34.7	**	10.0	**	BHAKKAR	
5	CHAKWAL	0	0.1	0.1	0	0	22	0	0	1.3	10	2.2	0	0	0	0	12.1	2	8.6	0.6	17	0	0	0	2.2	3.2	3	3	0	0	87.4	**	22.0	**	CHAKWAL	
6	D.G.KHAN	0	19	0.1	0	0	41	1	0	0	0.1	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	16.4	21	4	5	2.8	110.5	**	41.0	**	D.G.KHAN	
7	FAISALABAD	0	0	0	0	0	45.4	0	0	0	4	18	0	6.2	0	0	18.8	0	0	0	0	4	0	0	0	0	0	0	0	0.1	96.5	100.8	45.4	180.3	FAISALABAD	
8	ISLAMABAD A/P	0	30	0.1	0	0	6	8	0.1	41	60	1	0.1	0	0	110	57	110	0	49	12	0.1	0	0	0	3	5	1	0.1	0	493.5	307.8	110.0	200.0	ISLAMABAD A/P	
9	ISLAMABAD ZP	0	24	0.6	0	0	7.2	66	0	31.8	41	8	0.1	0	0	66	28	19	0	51.5	8	0	0	2	23	3	1	0	0	380.2	368.6	66.0	591.9	ISLAMABAD ZP		
10	ISB. SD. PUR	0	0	0	0	0	154	0	35	24	11	0	0	0	0	33	23	53	98	34	6	0	0	1	13	37	0	0	0	522	**	154.0	**	ISB. SD. PUR		
11	ISB.SHABAD	0	0	0	0	0	10	13	0	19	42	1	0	0	0	72	25	42	1	81	3	0	0	0	4	2	1	0	0	316	**	81.0	**	ISB.SHABAD		
12	ISB. GOLRA	0	0	0	0	0	156	0	27	78	18	0	0	0	0	64	33	0	0	62	2	0	0	10	9	1	1	0	0	461	**	156.0	**	ISB. GOLRA		
13	ISB.BOKRA	0	0	0	0	0	3	120	0	20	71	2	0	0	0	67	46	7	0	43	7	0	0	0	8	1	1	0	0	396	**	120.0	**	ISB.BOKRA		
14	JHANG	0	0	0	0	0	6.4	0	0	0	8	0	0	0	0	0	70	1	0	0	0	0	32	0	4.2	0	0	0	0	121.6	**	70.0	**	JHANG		
15	JOHARABAD	0	0	0.1	0	0	33	0	0	0.1	5	6	0	0	0	0	4	0	0.1	15	7.4	0	6	0	0	0	21	0	1	98.7	**	33.0	**	JOHARABAD		
16	JHELUM	0	0	0	0	0	2.2	3	0	0	45	0.1	9.8	2.2	0	0	26.6	30.6	0	0	0	17	8.8	0	3.8	14	11.3	1	0	0.1	5.6	181.1	243.1	45.0	242.2	JHELUM
17	KASUR	0	0	0	0.1	0	9	0	0	0.1	6	1	9	0.1	0	0	0.1	2	2	0	0	0.1	1	21	6	5	0	0	0	62.5	**	21.0	**	KASUR		
18	KHANPUR	0	21	0	0	0	2	0	0	0	4.8	0.1	0	0	0	0	5	51.4	0	0	0	0	0	0	54.2	33	7	1	124	4.4	307.5	33.3	123.6	81.3	KHANPUR	
19	LAHORE A/P	0	0	1.6	0	0	9	0	0	0.1	0.1	42	4	0.1	0	119	0.1	75	5	2	0.1	2	17	0.1	17	2	0	0	0	1	297.2	196.8	119.0	168.0	LAHORE A/P	
20	LAHORE PBO	0	0	19.6	0	0	67	0	0	0.1	0.1	14.2	3.9	0.1	0	10.4	30.7	44.8	29.8	0.1	61	0.1	5.2	9.4	27.4	3.6	0	0	0	1.4	328.9	190.9	67.0	136.8	LAHORE PBO	
21	LHR. SHAHI QILLA	0	0	0	0	0	68	0	0	0	0.4	0	0	0	0	0.1	74	0	20	0	78	0	0	8	13	0	0	0	0	0	261.5	**	78.0	**	LHR. SHAHI QILLA	
22	LHR. MISRI SHAH	0	0	0	0	0	61	0	0	0	0.1	0	0	0	0	0.1	68	0	12	0	92	0	0	0.1	14	0	0	0	0	0	247.3	**	92.0	**	LHR. MISRI SHAH	
23	LHR. UPPER MALL	0	0	0	0	0	59	0	0	0	0	16	2	0	0	8	56	0	20	0	66	0	0	2	3	2	0	0	0	234	**	66.0	**	LHR. UPPER MALL		
24	LHR. SHAHDARA	0	0	0	0	0	57	0	0	0	0.1	0	0	0	0	0.1	60	0	10	0	96	0	0	5	17	0	0	0	0	0	245.2	**	96.0	**	LHR. SHAHDARA	
25	MANDI-BAHU-DIN	0.1	0	0	0	0	0.3	0	0	20	2.2	12	2.3	0	0	59	27	0	0.1	0	73	0	0	0	0.1	7	0.1	1	0	0	204.2	**	73.0	**	MANDI-BAHU-DIN	
26	MIANWALI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	38	144.6	38.0	**	MIANWALI		
27	MULTAN	0.1	0.1	0	0	0	52.2	7.2	0	0	3.5	0	0	0	0	0	6	0	0	0	0	0	4	0	21.8	0.1	0	0.1	2	42.2	139.3	49.6	52.2	83.4	MULTAN	
28	MANGLA	0	0.1	0.5	0	0	6.5	0	1	0	34.5	1.2	11	5	0.5	0	27.8	34.2	0	0	0	48	0.1	0	4	20	8	45	4	0	1	252.4	**	48.0	**	MANGLA
29	MURREE	0	3.3	17	0	0	7	49	35	10.4	26	3.8	26.8	25	0	0	55	0	4	22	37	40	13	40	15	40	36.2	9	7	0	0	521.5	339.5	55.0	83.4	MURREE
30	NOORPUR THAL	0	0	63.3	0	0	10.5	0	0	0	38.5	0	0	0	0	0	3.4	0	0	21	0	0	0	0	0	0	0	0	0	0	136.7	**	63.3	**	NOORPUR THAL	
31	OKARA	0	0	0	0	0	62.4	0	0	0	18.4	0	0	0	0	0	3	0	0	0	0	3	9	0	9.2	2.2	0	0	0	11	118.2	**	62.4	**	OKARA	
32	RAHIM YAR KHAN	0	55	0	0	0	3	0	0	0	0	0.1	0	0	0	0	0	0	4.4	0	0	0	0	0	2	13.2	4	0.1	31.8	4.6	118.2	**	55.0	**	RAHIM YAR KHAN	
33	GUJRANWALA	0	0	0	0	0	5.8	0	0	21	0	6.2	5	0	0	12.5	26.4	0.4	17	0	3	0	82	0.1	13.8	3	0	0	0	0	196.2	**	82.0	**	GUJRANWALA	
34	GUJRAT	0	0.4	0	0	0	8.6	0	0	15.4	0.1	17.6	0.1	0.1	0	1.4	1.2	0	1	0	2	0.5	0.1	0	16	3	0	0	0	0	67.5	**	17.6	**	GUJRAT	
35	SAHIWAL	0	0	0	0	0	24	0.1	0	0	37	0	0	0	0	0	62	2	0	0	0	7	0	0	6	3	0	0	0	22	163.1	**	62.0	**	SAHIWAL	

SINDH																																												
71	BADIN	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8	0.1	4	0.1	0	13	135	47	0	0	207.2	79.5	135.0	150.4	BADIN								
72	CHHOR	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	47	0	2	2.5	0	47	28	4	0	0	130.5	82.2	47.0	137.2	CHHOR								
73	HYDERABAD	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	28.9	57	15	0	0	100.9	47.9	57.0	102.2	HYDERABAD									
74	JACOBABAD	0	0.1	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	6	0	25	3	18	0	0	55.1	39.0	25.0	133.0	JACOBABAD							
75	KARACHI AIRPORT	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0.1	0	0	0	1	14.4	1	0.1	0	0	47.1	60.0	28.0	142.3	KARACHI AIRPORT							
76	LARKANA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	0	0	61	0.1	1	0	4.5	72.6	48.6	61.0	165.5	LARKANA						
77	MITHI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	42	1	18	82	4	5	199	38	0	0	389	**	199.0	**	MITHI				
78	SHAHHEB BENAZIRABAD	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	25	0.1	0	24.9	18	1	0	0	69	58.3	25.0	99.0	SHAHHEB BENAZIRABAD						
79	PADIDAN	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	23	0	0	0	0	0	104.2	41.8	43.1	138.0	PADIDAN								
80	ROHRI	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	38	22	3	0	0	63.2	39.7	38.0	173.7	ROHRI						
81	SUKKUR	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	64	37	4	0	0	105.2	20.8	64.0	51.0	SUKKUR						
82	MOIN-JO-DARO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	52	2	3	0	0	61	39.9	52.0	69.0	MOIN-JO-DARO						
83	THATTA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	56	27	10	0	0	93	**	56.0	**	THATTA						
84	DADU	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	111	**	45.0	**	DADU								
85	MIRPUR KHAS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0.1	0	6	34	38	0	0	80.1	**	38.0	**	MIRPUR KHAS		
BALOCHISTAN																																												
86	BARKHAN	6	10	0	0	0	0	10	0	0	0	27	0	0	0	0	0	0	0	0	0	0	0	0	0	25	0	0	0	0	0	5	17	0	8	11	9	128	98.7	27.0	88.0	BARKHAN		
87	DALBANDIN	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4.0	0.0	83.8	DALBANDIN
88	GAWADAR	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**	0.0	**	GAWADAR	
89	JIWANI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3.1	0.0	35.2	JIWANI
90	KALAT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	21.9	0.0	40.0	KALAT	
91	KHUZDAR	0	0	0	2.8	0	0	0	0	0	0	0	12	0	0	0	0	0	0	0	0	7	7	0	0	0	0	0	0	0	0	0	0	0	0	0	3.4	32.2	58.3	12.0	223.0	KHUZDAR		
92	LASBELA	0	0	0	0	0	0	0	0	0	0	2	5	0	0	0	0	0	0	0	0	4	1	26	0.1	0.1	0	0	4	0.1	0	0	42.3	51.4	26.0	135.6	LASBELA							
93	NOKKUNDI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.7	0.0	10.0	NOKKUNDI	
94	PANJGUR	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	11.9	0.0	42.5	PANJGUR	
95	PASNI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6.9	0.0	43.0	PASNI		
96	QUETTA (SH MANDA)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	1	1	0	0	0	0	0	0	0	0	0	0	0.1	7.1	11.2	5.0	**	QUETTA (SH MANDA)
97	QUETTA (SAMUNGLI)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0.2	11.2	0.1	42.0	QUETTA (SAMUNGLI)					
98	SIBBI	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0.1	3	22.1	38.4	13.0	81.0	SIBBI					
99	TURBAT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8.1	0.0	36.6	TURBAT	
100	ORMARA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	5	10.7	5.0	44.0	ORMARA						
101	ZHOB	5	5.2	0	0	0	0	0	0	0	1.1	2	0	3	0	0	0	23	3	9	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	8	0	63.3	66.4	23.0	73.0	ZHOB	

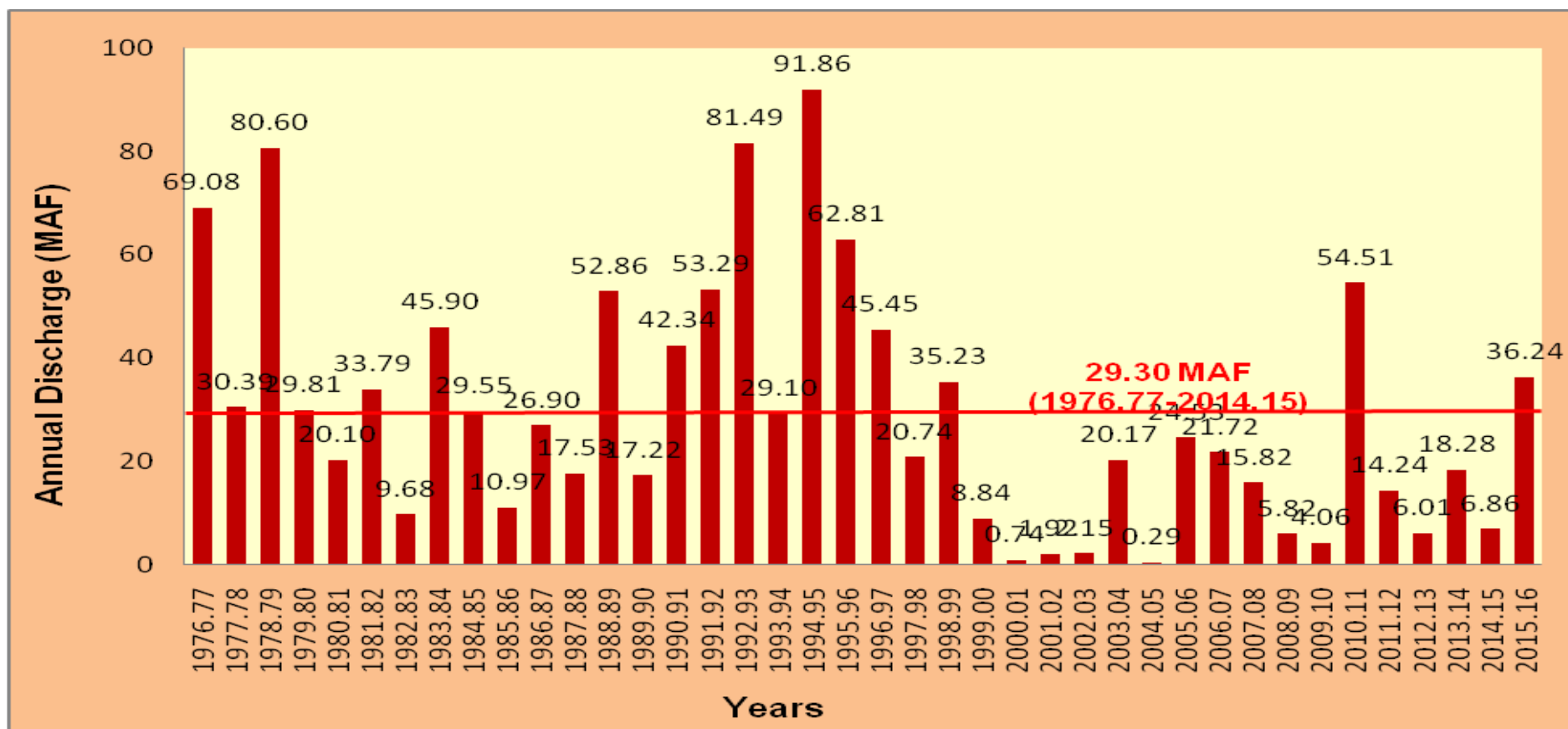
NOTE: ** not available

RAINFALL (MM) STATEMENT FOR THE MONTH OF AUGUST-2015																																			
Stations		Rainfall Recorded in mm during past 24 hours (0800 to 0800 HRS PST)																										Stations							
PUNJAB		RAINFALL IN 24 HOUR												ABOVE NORMAL RAINFALL												PUNJAB									
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Total Since	Monthly	Current	august Historical	35
BAHAWALNAGAR	4	41	2	0	1	0	0	0	0	0	0	0	0	0	6	0	0	0	0	0	0	0	7	0	0	0	0	0	0	61	34.2	41.0	109.0	BAHAWALNAGAR	
BAHAWALPUR, CITY	5	18	0	0	1	0	0	0	0	0	0	0	32	0	30	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	86.1	39.1	32.0	79.0	BAHAWALPUR, CITY	
BAHAWALPUR, AIRPORT	18	58	0	0	0	0	0	0	0	0	0	0.1	10.8	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	89.9	**	58.0	**	BAHAWALPUR, AIRPORT	
BHAKKAR	42	38	2	0	0	0	0	0	0	0	0	0	0	0	13	0	0	0	0	10	0	0	3	0	0	0	4	0	9	121	**	42.0	**	BHAKKAR	
CHAKWAL	4.6	11	27.4	22	0	0	0	0	0.6	0	0	2	0	0	0.1	0	0	0	10.4	0	12	12	0	0	0	13.4	0	17.5	133	**	27.4	**	CHAKWAL		
D.G.KHAN	28	57	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	16	0	0	0	2.4	0	106.4	**	57.0	**	D.G.KHAN		
FAISALABAD	12.6	12	13.9	22.4	0	0.1	0	0	0	24.8	0	0	0	0	18	0	0	0	0	0	0	24.9	0	0	0	0	0	0	128.7	87.0	24.9	136.0	FAISALABAD		
ISLAMABAD, AIRPORT	2	7	0.1	0	0	0.1	0	30	76	0	7	0	5	21	0	0	0	0	32	0.1	0.1	1	0	0	0	5	0	2	188.4	340.3	76.0	200.0	ISLAMABAD, AIRPORT		
ISLAMABAD, ZEROPOINT	0.1	7	2	1.4	0	0.1	0.1	4	30	48	0	17	0	3.4	29	0	0	0	0	43.8	0.1	2	0.1	0	0	0	4.4	0	6	198.5	334.7	48.0	199.8	ISLAMABAD, ZEROPOINT	
ISLAMABAD, SAIDPUR	0	12	0	0	0	0	0	0	10	0	0	26	0	0	0	0	0	0	7	0	1	0	0	0	0	4	0	0	60	**	26.0	**	ISLAMABAD, SAIDPUR		
ISLAMABAD, SHAMSABAD	1	4	0	0	0	0	0	0	55	0	0	10	0	0	0	0	0	0	29	0	0	0	0	0	0	3	0	0	102	**	55.0	**	ISLAMABAD, SHAMSABAD		
ISLAMABAD, GOLRA	0	8	0	0	0	0	0	0	0	0	0	7	0	0	0	0	0	0	1	5	3	0	0	0	0	4	0	0	28	**	8.0	**	ISLAMABAD, GOLRA		
ISLAMABAD, BOKRA	0	15	0	0	0	0	0	8	0	0	17	0	0	0	0	0	0	0	5	1	0	0	0	0	0	5	0	0	51	**	17.0	**	ISLAMABAD, BOKRA		
JHANG	7	8	10	0	0	0	0	0.1	0	0	0	0	0	0	46	0	0	0	0	0	0	19.6	0	0	0	1.2	0	0	91.9	**	46.0	**	JHANG		
JOHARABAD	7	45	43	50	0	0	0.1	0	0.1	0.2	0	0	3	4	0	47	0	0	0	0.1	0	0	0	0	0	28	0	0.1	227.6	**	50.0	**	JOHARABAD		
JHELUM	0.4	0	0.1	0	0	0.1	0	0	0	0	128	0.1	0.1	0.1	0.1	0	0	0	25.4	0.5	0	0	0	0	0	3	0	0	16.6	174.5	231.6	128.0	167.9	JHELUM	
KASUR	15	5	2	0	0	0.1	0.1	0	0.1	0	0	1	0	0	0	0	0	1	0	0	14	0	16	0	0	0	0.1	0	0	54.4	**	16.0	**	KASUR	
KHANPUR	1.6	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	2.6	33.2	1.6	125.0	KHANPUR		
LAHORE, AIRPORT	7	6	1.4	4.6	1	6.2	2	0	0	0	0.1	17.2	20	0	0.1	1	0.1	0	37	2.8	0	80	0	8	0	0	0	0	194.5	182.9	80.0	221.0	LAHORE, AIRPORT		
LAHORE, PBO	1.4	18	0.4	8.3	0	0.1	1.4	0	0	0	4	0	0.1	2.6	16.2	0.1	0	0	0.1	1.6	0	39.4	0	0	0	0	0.1	0	93.8	179.4	39.4	189.7	LAHORE, PBO		
LAHORE, SHAHI QILLA	3	12	4	42	0	0	0.1	0	0	0	20	0	0	0	17	0	0	0	0	0	0	20	0	0.1	0	0	0	0	118.2	**	42.0	**	LAHORE, SHAHI QILLA		
LAHORE, MISRI SHAH	4	19	6	17	0	0	0	0	0	0	11	0	0	0	18	0	0	0	0	0	0	15	0	0.1	0	0	0	0	90.1	**	19.0	**	LAHORE, MISRI SHAH		
LAHORE, UPPER MALL	0	11	2	0.1	0	0.1	0.1	0	0	0	17	0	0	0	15	0	0	0	0	0	0	26	0	0	0	0	0	0	71.3	**	26.0	**	LAHORE, UPPER MALL		
LAHORE, SHAHDARA	1	16	0.1	24	0	0	0	0	0	0	15	0	0	0	23	0	0	0	0	0	0	23	0	8	0	0	0	0	110.1	**	24.0	**	LAHORE, SHAHDARA		
LAHORE, GULBERG	0	14	2	0	0	1	2	0	0	0	4	0	0	0	25	0	0	0	2	0	55	0	2	0	0	0	0.1	0	107.1	**	**	**	LAHORE, GULBERG		
LAHORE, LUCKSHAMI	0	2	1	0	0	0	0	0	0	0	2	0	0	0	8	0	0	0	0	0	0	21	0	0.1	0	0	0	0	34.1	**	**	**	LAHORE, LUCKSHAMI		
LAHORE, GULSHAN RAVI	0	0	9	10	0	0	2	0	0	0	24	0	0	0	34	0	0	0	0	0	0	14	0	0	0	0	0	0	93	**	**	**	LAHORE, GULSHAN RAVI		
LAHORE, IQBAL TOWN	0	6	6	0.1	0	0	0	2	0	0	0.1	0	0	0	35	0	0	0	0	0	0	54	0	0	0	0	0	0	103.2	**	**	**	LAHORE, IQBAL TOWN		
LAHORE, SAMANABAD	0	5	0	4	0	0	4	0	0	0	0.1	0	0	0	34	0	0	0	0	0	0	25	0	0	0	0	0	0	72.1	**	**	**	LAHORE, SAMANABAD		
LAHORE, JOHAR TOWN	0	5	2	4	0	12	0	0	0	0	0	0	0	0	31	0	0	0	0	0	0	180	0	16	0	0	0	0	250	**	**	**	LAHORE, JOHAR TOWN		
LAHORE, TOWNSHIP	0	3	4	0	0	21	0	0	0	0	0	0	0	0	7	0	0	0	0	0	0	100	0	9	0	0	0	0	144	**	**	**	LAHORE, TOWNSHIP		
LAHORE, MUGHAL PURA	0	4	0.1	0	0	11	0	0	0	0	12	0	0	0	0.1	0	0	0	0	0	0	4	0	0.1	0	0	0	0	31.3	**	**	**	LAHORE, MUGHAL PURA		
LAHORE, TAJ PURA	0	5	0.1	0	0	3	0	0	0	0	7	0	0	0	0.1	0	0	0	0	0	0	28	0	0	0	0	0	0	43.2	**	**	**	LAHORE, TAJ PURA		
MANDI-BAHU-DIN	0.1	0	17	0	0	0	1	0	0.1	0	0	9	0	0	0	0.1	0	0	0.1	0	16	1.6	0	0.1	0	0	11	0	10	66.1	**	17.0	**	MANDI-BAHU-DIN	
MIANWALI	38	204	136	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	378	115.9	204.0	**	MIANWALI		

RAINFALL (MM) STATEMENT FOR THE MONTH OF SEPTEMBER-2015																																					
Stations		Rainfall Recorded in mm during past 24 hours (0800 to 0800 HRS PST)																										Stations									
PUNJAB		RAINFALL IN 24 HOUR														ABOVE NORMAL RAINFALL										PUNJAB											
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	Total Since	Monthly	Current	september Historical		
1	BAHAWALNAGAR	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	32	78	32	0	0	0	3	0	0	0	145	14.9	78.0	82.0	BAHAWALNAGAR	
2	BAHAWALPUR, CITY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	65	0.5	0	0	0	0	0	0	65.6	16.5	65.0	86.0	BAHAWALPUR, CITY		
3	BAHAWALPUR, AIRPORT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	87	0	0	0	0	0	0	0	88	**	87.0	**	BAHAWALPUR, AIRPORT		
4	BHAKKAR	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	0.5	0	0	0	0	0	0	1	**	0.5	**	BHAKKAR			
5	CHAKWAL	0	0	16.1	0	0	7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3.8	27.4	0.1	0	0	0	2.6	57	**	27.4	**	CHAKWAL			
6	D.G.KHAN	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0.2	**	0.1	**	D.G.KHAN			
7	FAISALABAD	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	22.2	35.6	0	0	0	0	0	0	57.9	42.5	35.6	82.0	FAISALABAD			
8	ISLAMABAD, AIRPORT	0	0	8	0	0	4	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0.1	0.1	3	46	7	0	5	20	0	0.1	93.4	110.7	46.0	168.4	ISLAMABAD, AIRPORT		
9	ISLAMABAD, ZEROPOINT	0	0	4	0	0	0.1	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0.1	0	3	79.4	14	0	11	23	0	0.1	134.8	123.3	79.4	207.7	ISLAMABAD, ZEROPOINT		
10	ISLAMABAD, SAIDPUR	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	18	0	4	81	4	0	2	40	0	0	149	**	81.0	**	ISLAMABAD, SAIDPUR		
11	ISLAMABAD, SHAMSABAD	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	51	3	0	6	11	0	0	76	**	51.0	**	ISLAMABAD, SHAMSABAD			
12	ISLAMABAD, GOLRA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	5	66	2	0	1	46	0	0	124	**	66.0	**	ISLAMABAD, GOLRA		
13	ISLAMABAD, BOKRA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	55	1	0	1	26	0	0	87	**	55.0	**	ISLAMABAD, BOKRA			
14	JHANG	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	15	26.8	0	0	0	0	0	0	41.8	**	26.8	**	JHANG			
15	JOHARABAD	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	8	0	0	0	1	0	5	15	**	8.0	**	JOHARABAD			
16	JHELMUM	0	0	0.1	0	0	19	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6.2	111	1	0	0	0	0	0	136.8	65.4	110.8	81.5	JHELMUM			
17	KASUR	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	15	25	20	0.1	0	0	0	0	0	60.1	**	25.0	**	KASUR			
18	KHANPUR	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.7	0	0	0	0	0	0	0	1.7	12.0	1.7	69.8	**	KHANPUR			
19	LAHORE, AIRPORT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	93	51	2	0.1	0	0	12	0	0	189.2	74.6	93.0	95.0	LAHORE, AIRPORT		
20	LAHORE, PBO	0	0	0	0	0	0	0	0	0	0	0	0	14.2	0	0	0	0	0	1	0	26.6	37	47	0.1	1	0	0	0.1	127	60.4	47.0	114.6	LAHORE, PBO			
21	LAHORE, SHAHI QILLA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	36	46	48	0	0	0	0	0	130	**	48.0	**	LAHORE, SHAHI QILLA				
22	LAHORE, MISRI SHAH	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	37	42	49	0	0	0	0	0	128	**	49.0	**	LAHORE, MISRI SHAH				
23	LAHORE, UPPER MALL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	33	76	0	0	0	0	8	0	127	**	76.0	**	LAHORE, UPPER MALL			
24	LAHORE, SHAHDARA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	48	40	0	0	0	0	0	0	88	**	48.0	**	LAHORE, SHAHDARA			
25	LAHORE, GULBERG	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	7	37	41	0	0	0	0	0	88	**	41.0	**	LAHORE, GULBERG			
26	LAHORE, LUCKSHAMI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	49	40	65	0	0	0	0	0	154	**	65.0	**	LAHORE, LUCKSHAMI				
27	LAHORE, GULSHAN RAVI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	26	34	0	0	0	0	0	70	**	34.0	**	LAHORE, GULSHAN RAVI				
28	LAHORE, IQBAL TOWN	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	3	32	53	0	0	0	0	0	89	**	53.0	**	LAHORE, IQBAL TOWN			
29	LAHORE SAMANABAD	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	6	30	50	0	0	0	0	0	87	**	50.0	**	LAHORE SAMANABAD			
30	LAHORE, JOHAR TOWN	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	18	0	1	21	50	0	0	0	0	0	90	**	50.0	**	LAHORE, JOHAR TOWN			
31	LAHORE, TOWNSHIP	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	25	40	0	0	0	0	0	67	**	40.0	**	LAHORE, TOWNSHIP			
32	LAHORE, MUGHAL PURA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	21	20	0	0	0	0	0	0	47	**	21.0	**	LAHORE, MUGHAL PURA			
33	LAHORE, TAJ PURA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	23	67	0	0	0	0	0	0	90	**	67.0	**	LAHORE, TAJ PURA			
34	MANDI-BAHU-DIN	0	0	0.1	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	6	7	73	0	0	0	0	0	0	88.1	**	73.0	**	MANDI-BAHU-DIN			
35	MIANWALI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.1	0	0	0	1	0	25	27.1	53.1	25.0	**	MIANWALI			

ESCAPAGE BELOW KOTRI

HYDROLOGICAL YEAR FROM APRIL TO MARCH



Note: - Based on data supplied by Irrigation Department, Govt. of Sindh
 - Year 2015-16 (April 01 to September 30, 2015)

