

A RUDE AWAKENING

It is a river that tells many tales¹

REPORT

of the
Judicial Flood Inquiry Tribunal²
on the causes of major breaches³ in River Indus
during the “exceptionally high floods” of 2010

¹Shane Mountjoy, Rivers in World History, The Indus River, Chelsea House Publishers, Philadelphia (2005)

² For the Province of Punjab only.

³ See TORs in Chapter-2

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ABBREVIATIONS

C.E.	Chief Engineer
C.E. (D&F)	Chief Engineer (Drainage & Flood)
Cfs	Cubic feet per second
Cft	Cubic feet
D/S	Downstream
FFC	Federal Flood Commission
FFD	Flood Forecasting Division
FWC	Flood Warning Center
HFL	Highest Flood Level
I & P Department	Irrigation and Power Department
IRI	Irrigation Research Institute
MAF	Million Acre Feet
NDMA	National Disaster Management Authority
PCIW	Pakistan Commissioner for Indus Water
PIDA	Provincial Irrigation and Drainage Authority
PMD	Pakistan Meteorological Department
PMF	Probable Maximum Flood
PMO	Project Management Office
PMP	Probable Maximum Precipitation
RC	Relief Commissioner
RL	Reduced Level
S.D.O.	Sub Divisional Officer
S.ENG.	Superintending Engineer
U/S	Upstream
X.E.N.	Executive Engineer

GLOSSARY

<i>Abkalani Sindhi</i>	The inundation or flood season in Sind from 1st May to 15th October.
Acre foot	A unit of volume used in irrigation practice. It means the volume of water required to cover an area of one acre, to a depth of one foot. It amounts to 43,560 cubic feet. It will be noticed that a cusec day is equal to 1.98 acre feet ordinarily taken=2).
Active Flood Plains or Flood plains.	an area of low-lying ground adjacent to a river, formed mainly of river sediments and subject to flooding.
Apron	A floor or lining of concrete stone, etc., to protect a surface from erosion, such as the pavement below weirs, falls or at the toe of a bund.
Arid	A term applied to lands or climates that lack sufficient water for agriculture without irrigation.
Back water curve	A form of the surface curve of a stream of water caused by an obstruction in the channel such as a weir.
Banjar Jadid or new fallow and banjar qadim or old fallow.	If for four successive harvests land which once was cultivated has not been sown it is classed as banjar jaded. If it continues to be uncultivated for the next four harvests it is classed as banjar qadim.
Banjar qadim	Includes all culturable waste whether it has ever been under the plough or not.
Barrage	A structure of moderate height built across a river or a stream to control the river levels and to divert waters for irrigation, navigation, power or other purposes.
Bela	River forest
Beldar (Sindhi)	A labourer or workman.
Below-Out	An underground leak occurring through a sand stratum under the

	base or seat of a bund breaking out through the ground surface on the rear of the bund in the form of a bubbling spring, carrying with it a volume of sand. Also called a sand-boil.
Berm	(1) The space left between the upper edge of a cut and the toe of an embankment. (2) a horizontal strip or shelf built into an embankment to break the continuity of an otherwise long slope.
Breach	The pit excavated for obtaining the earth required for making up the section of the bund.
Breaching Section	Designated Section of an an embankment that has to be operated (removed or blown away) in case the pond level touches the critical level. This is when the Barrage is threatened.
Bund	An earthen embankment, built more or less parallel to the river banks and at a sufficient distance away, on either side of the river course, to protect the country from inundation by the river spill, when the river is in flood. In America called a "levee".
Canal	An artificial channel constructed to convey appreciable quantities of water
Canal Irrigation	A canal constructed primarily for conveying water from the source of supply to areas in which it can be used for irrigation
Channel Irrigation	(Commonly known as watercourse). A small channel taking its supply from a Government channel but owned and maintained by the cultivators.
Channel Perennial	A channel which is designed to irrigate all the year round
Coffer dam	A barrier built in water so as to form an enclosure from which water is pumped to permit free access to the area within. A cofferdam is a (usually temporary) barrier constructed to exclude water from an area that is normally submerged. Made commonly of wood, concrete or steel sheet piling, cofferdams are used to allow construction on the foundation of permanent dams, bridges, and similar structures. When the project is completed, the cofferdam may be demolished or removed.

Crest	(1) The top of a dam, dike, spillway or weir, frequently restricted to the overflow portion (2) the summit of a wave, peak of a flood.
Cusec (cs or cfs)	The unit of discharge used in irrigation practice and means a rate of flow of one cubic foot per second.
Cusec day	A unit of volume used in irrigation practice and means the volume of water resulting from a charge of one cuses for one (24 hours). It amounts to 86,400 cubic feet of water and is equal to nearly two acre feet.
Dam	a barrier, typically of concrete, constructed to hold back water and raise its level, the resulting reservoir being used in the generation of electricity or as a water supply
Discharge	The rate of flow at a stated site, i.e., the quantity of water passing in unit time.
Drainage	The natural lines of depression in an area, through which storm water escapes to the river.
Embankment	a wall or bank of earth or stone built to prevent a river flooding an area – also called a levee, dyke or bund.
Flash Flood	A flood that rises rapidly. With little or no advance warning is called flash flood.
Flood Plain	The entire area subject to overflow by the river course in flood. Much, if not all, of the flood plain may have been formed by the gradual deposition of sediments on lands, which were originally delta lands, causing the delta to advance further and further into the sea.
Free-board	(1) The distance between the designed full supply level and the top of the sides of an open channel or masonry work left to allow for wave action, floating debris, or any other condition or emergency without over-topping the banks of the channel sides of the structure. (2) When applied to a dam, it is the distance from the top of the dam to the water surface in the reservoir during maximum flood conditions.

	The vertical distance between the flood level (actual or designed, as stated in the context) and the top of the embankment, or other specified structure.
Glacis	The sloping floor below and in continuation of the raised crest of a weir
Groyne	<p>A spur constructed with more permanent materials.</p> <p>An obstruction of stone, timber, or brushwood constructed from the embankment of a river, for diverting or holding the flow. A stone groyne is called a spur. When the groyne is constructed parallel to the river flow, for the purpose of protection against wavewash, it is called a “longitudinal groyne,” or “muhari”</p>
Guide bank	<p>The embankments forming the upstream and downstream approaches of a weir. The nose of a guide bank is heavily armorial to withstand river action.</p> <p>A protecting and training bank constructed to guide the river through the waterway provided. A river bund may in effect, be a guide bank when it is at the edge of the river course, there being little or no foreshore between the river course and the toe of the bund, e.g., the Jamshoro Bund.</p>
Head	(1) The height of water above any point or plane of reference. Used also in various compounds, such as energy head, entrance head, friction head, static head, pressure head, lost head, etc.
Head race	A channel leading water to a waterwheel, a fore-bay
Headworks	The works constructed at the off-take of a main canal. It includes the weir on a river, the dam at storage site, etc.
High Flood Level	The highest recorded flood level a river has ever attained in any previous year (since 1914), at a given point. The bund is, however to be designed for, or maintained to, “the Designed High Flood Level, (D.H.F.L.) which is the assumed H.F.L.” or the “extrapolated H.F.L.”, whichever, is higher.
Histogram	A graph showing in rectangular areas, standing on each grouping interval, the frequency of observations in that interval.

Hydraulic gradient	The slope of hydraulic grade line. The slope of the surface of water flowing in an open conduit.
Hydraulic Gradient Line	In a bund, it is the same as the saturation line
Hydraulic jump	The sudden and usually turbulent passage of water from low stage below critical depth to high stage above critical depth during which the velocity passes from hyper critical to sub-critical. It represents the limiting condition of the surface curve wherein it tends to become perpendicular to the stream bed.
Hydraulics	the branch of science and technology concerned with the conveyance of liquids through pipes and channels, esp. as a source of mechanical force or control.
Hydrograph	<p>(1) The curve resulting from the plotting of discharges against each day of the year.</p> <p>(2) A graph showing the gauge (or discharge) with respect to time</p>
Embankment	a wall or bank of earth or stone built to prevent a river flooding an area – also called a levee, dyke or bund.
Hydrology	the branch of science concerned with the properties of the earth's water, esp. its movement in relation to land
Inundation Canal	A canal dependent upon the surface level of the water in the river for its supplies. It follows that inundation canals only run when the supply in the river rises to a level which permits of feeding the canals.
Irrigation	The artificial application of water to arid land for the purpose of growing crops.
<i>Khadir</i>	River valley, low alluvial lands.
<i>Khal</i>	A water course
<i>Kharif</i>	Summer crop

Loop Bund	When there are two lines of defence, the subsequently constructed bund line on the rear or land side generally, is called the Loop Bund and the first line is called the Front Bund. If the first line of defence is eroded or abandoned the Loop Bund may become the Front Bund; vice versa, if another line of defence is constructed on the river side, the Front Bund becomes the Loop Bund
Million Acre Feet (MAP)	Volume of water of one feet depth over an area of one million acres.
Marginal bund	An embankment constructed along the river at a short distance from the margin with the object of preventing inundation of the area behind the embankment.
Outlet	The term used to designate the work which passes water from a Government channel to a watercourse.
Overtopping	River water running over the top and washing out a portion or whole of the bund.
Piping	The flow of water under or round a structure built on permeable foundations, which if not prevented or stopped will remove material from beneath the structure and cause it to fail. The erosion of sub-soil by high velocities of flow of water through it, when such velocities exceed a certain limit, is also referred to as 'piping'. See also Creep.
Pitching	Stone, brick, brushwood, or mattress (i.e., composite brushwood and earth), or other similar materials, placed on earth surfaces for their protection against the action of flowing water. Also known as "Riprap".
Precipitation	The total measurable supply of water received directly from clouds, as rain, snow and hail, usually expressed as depth in inches in a day, month or year, and designated as daily, monthly or annual precipitation.
Rabi	Winter crop
Reach	A comparatively short length of a stream or channel.

Regulation	Is the process of distribution of supplies available in a river between different canals taking off it or between channels on a canal.
Regulator	A structure through which the discharge can be varied at will, also applied to a structure provided with means of varying the water surface level about it.
Retrogression	The lowering of the specific levels, i.e. of the level of bed of the channel for a given discharge.
Revetment	A pitching protection of stone, or brick or sand bags containing a certain proportion of cement or similar materials.
Riparian	of, relating to, or situated on the banks of a river
<i>Rod Kohi</i>	Hill torrents
Run-off	That part of precipitation that appears as flow in streams.
<i>Sailab</i>	Flood inundation
Sand	According to the American standard, it is taken as particles of soil 0.05 mm to 1 mm. Diameter. The standard adopted by the International Society of Soil Science is, however, 0.02 to 2 mm diameter.
Saturation Gradient	The slope of the top-most seepage line, or the surface of the percolating water, through the cross-section of the embankment. See also Hydraulic Gradient line.
Seepage	The percolation of water through the embankment or soil.
<i>Selabi</i>	Area irrigated by the river as opposed to the canal.
Side slopes	The slopes of the side of a bund embankment. The horizontal distance is named first, according to custom, for example 3 to 1 (or, frequently, 3:1) means a horizontal distance of three feet to one foot vertical.
Silt	(1) Water-borne sediment. The term is generally confined to fine earth, sand, or mud, but is sometimes broadened to include all material carried, including both suspended and bed load;

	<p>(2) deposits of water-borne material as in a reservoir, on a delta or on overflowed lands.</p> <p>According to the International Society of Soil Science, all particles of soil from 0.002 mm. to 0.02 mm. in diameter are classified as silt. Silty soils contain upto about 20 per cent. Clay, 0.002 mm. diameter and less; 45 per cent. Silt, 0.002 mm. diameter; and 35 per cent. Sand, 0.02 mm, diameter and above.</p>
Slope gauges	Gauges fixed above and below a discharge section line for the purpose of determining the water surface slope through that discharge section line.
Sluice	<p>A water channel that is controlled at its head by a gate.</p> <p>(also- A conduit for carrying water at high velocity; an opening in a structure for passing debris; to cause water to flow at high velocities for wastage for purposes of excavation, ejecting debris, etc.)</p>
Soil	Finely divided material composed of disintegrated rock mixed with organic matter; the loose surface material in which plants grow.
Spur	In irrigation practice, a projection into a stream, provided with an armoured head; the head may be of various shapes.
Storage Dead	Is the capacity of a reservoir below dead storage level.
Storage-Live	Is the capacity of the reservoir above Dead Storage Level.
Tail	This term is usually applied to the work constructed at the end of a channel for the distribution of the water e.g., tail cluster or tail regulator, etc.
Tail race	The channel that leads water away from a turbine or water wheel
Time lag	<p>Is the allowance that has to be made for time required for the effect of change in indent at one site reaching another indenting site.</p> <p>The time elapsing between the occurrence of any alternation of discharge or level at one point on the river and its occurrence at another point. Time lag is generally measured by timing the passage of a peak or trough between two points varies inversely with the magnitude of the discharge and, for even the same order of discharge, it is different on the falling stage from its value on the rising stage on account of the difference in the slopes of the river.</p>

Toe-wall	A shallow wall constructed below the foundation level to provide a footing for the pitching of the face of an embankment. When the Sub-soil water level is high the toe-wall takes the form of a series of shallow walls.
Under-sluices	Under shot gates- in irrigation practice generally confined to the openings in the weir, adjacent to the canal head regulator.
Velocity	The rate at which movement occurs and usually expressed in feet per
Wall-Toe	See Toe-wall
Water course	The term applied to an irrigators channel taking its supply from a Government channel, from which fields are irrigated directly.
Waterlogged	A condition of land where the ground water stands at a level that is detrimental to plants. It may result from over-irrigation, or seepage with inadequate drainage.
Watershed	(1) The area drained by a stream or stream system (2) The divide between drainage basins.
Wave-wash	The damage done to bunds when, on account of a strong wind velocity, the flood water forms waves which mount and strike and splash on their upstream face unless counteracted by jungle or other artificial device.
Weir	A fall extending across a river or canal, usually provided with a raised crest and glacis.
Wetting Channel.	A device used for soaking or preparing a bund in advance of the main rise of the river, for its task of holding back the river. It refers to both (a) a gravity channel from the river lip to the bund and (b) the channel between the trench bund and the main bund through which water is pumped to soak the main bund.
<i>Zaid Kharif</i>	Late summer crop
<i>Zaid Rabi</i>	Late winter crop



CHAPTER 1

....But for the most part, both in time and space, the Indus is cruel and as ruthless and cunning as any lion¹.

OVERVIEW

1. RIVER INDUS AND THE FLOODS IN THE PAST

1.1. “The Indus begins in Tibet, issuing from a small spring called 'the mouth of the Lion.' From its source, gathering water from innumerable glacier-fed streams and from several rivers as large as itself, the Indus rushes down a gutter running more or less directly north-west between the greatest mountain ranges in the world, the Karakoram and the Himalayas. Leaving Tibet in tears down to India. . . . from here on it is a Pakistan's river. Twisting and doubling through fearful gorges it finally breaks out of Himalayas. Then, for nearly a thousand miles, it winds and wanders across the flat plains of Pakistan to the Arabian sea.²”

1.2. River Indus (Sanskrit Sindu = River, Greek Sinthos, Latin Sindus, Arabic Sindi) known as Abbasin (“Father River”) to the Pushtoons of the North, Sind Sagar (“Ocean River”) to the people of Punjab and as Mehran or Sher Darya (“Lion River”) to the Sindhis in the south – flows through one of the most ancient stretches of the human globe, where fabled cities flourished more than sixty centuries ago³.

1.3. Indus is about 1,800 miles long with a drainage area estimated at 372,000 square miles. For the purpose of comparison, Mississippi river, USA in comparison is also 1800 miles long but has a drainage area of 1.25 million sq miles⁴.

1.4. “Floods in Indus basin are of common occurrence . . . The more common floods, which have a greater total effect on agriculture, are due to monsoon rains and can generally be reduced in intensity by bunds and storage reservoirs. The inadequacy of engineering works and inadequate inspection are man-made causes of floods⁵.”

1.5. Bunds are patrolled during the rising stages of the river. At all danger points materials to deal with leaks or breaches are stored for emergencies. Particular attention is paid to the distance between the river edge and the embankment, where ever there is active erosion

¹A prince once counted the variety of tulips near its banks, an emperor discussed God while he waited to cross it, a British general lunched on partridges on a bridge of boats and laughed to see his elephants enjoying their bathe. But for the most part, both in time and space, the Indus is cruel and as ruthless and cunning as any lion. **The Lion River** by Jean Fairly, 1975 (First Pakistani edition, 1979)

²Jean fairly in The Lion River.

³Samina Qureshi, *Legends of the Indus*.

⁴A.K.Snelgrove, *Geohydrology of the Indus River West Pakistan*, Sind University Press, 1967

⁵ ibid.

and the river approaches dangerously close to the embankment line, or within 1,500 feet of the toe of the embankment, a “retired embankment” (a supplementary or secondary bund) is planned at the end of the monsoon and the work is completed soon enough to ensure thorough wetting before the front bund is eroded.

1.6. “In general flood control problems are to be met by construction of reservoirs, embankments, diversion of flood waters into natural lakes (e.g. Manchar), swamps, or depressions to store and detain flood flow, and by soil conservation measures⁶”.

1.7. Statistically, every five years a flood of exceptionally high level occurs in the Chenab, which is the flashiest channel out of all the five major rivers. Every ten years a major flood or exceptionally high level passes through all the five rivers. Every 15 years a super flood of 1988 or 1992 type occurs⁷.

1.8. Design discharges⁸ of the reservoirs and barrages are as follows:

River Indus (at Tarbela)		
Sr. #	Design Discharge	2010
01.	1,800,000 Cusecs	835,000 Cusecs
River Indus (at Jinnah)		
02.	950,000 Cusecs	898,700 Cusecs
River Indus (at Chashma)		
03.	950,000 Cusecs	1,038,900 Cusecs
River Indus (at Taunsa)		
04.	1,100,000 Cusecs	934,100 Cusecs
River Indus (at Guddu)		
05.	1,200,000 Cusecs	1,148,738 Cusecs

1.9. Loss of life and property associated with flood has been colossal. In the year 1973 more than 3 million homes were destroyed and 160 persons lost their lives. The 1976 flood demolished over 10 million house while 425 lives were lost with losses amounting to Rs 6 billion. In 1988 an unprecedented flood occurred towards the end of September inflicting Rs 17 billion worth of damage to the country. The super flood of 1992 surpassed all previous records with the damage estimated at Rs 50 billion⁹.

⁶ ibid.

⁷ SOP regarding Hydro Meteorological Forecasting - FFD, PMD (Ex I.W. 3/2)

⁸ Mark 29 (Flood Report, 2010 Guddu Barrage)

⁹ SOP regarding Hydro Meteorological Forecasting - FFD, PMD (Ex I.W. 3/2)

2. THE DELUGE¹⁰ - FLOODS 2010

2.1. Exceptional and continuous rainfall¹¹ in the upper catchment of Indus River¹² resulted in exceptionally high floods into Punjab¹³ at Khairabad (Attock) on 29th July, 2010. This aqueous onslaught caught the provincial flood managers unprepared and ill equipped. Surprise turned into tragedy when the watery offensive started eroding the Left Guide Bund (LGB) of Jinnah Barrage¹⁴. As this critical training arm of the Barrage began to fall, Left Marginal Bund (LMB) stood threatened. Beyond this earthen embankment (LMB) lay a large human settlement of Districts Mianwali, Bhakkar and Layyah almost unaware of the devastation underway within the protected confines of the Barrage.

2.2. Flustered, inexperienced and ill equipped flood managers fought a losing battle till a local cement company¹⁵ came to their rescue and supplied them the basis tool required for flood fighting – boulders and stones. This fundamental flood fighting material was astonishingly missing in the arsenal of the flood managers at the Barrage and amounts to a criminal omission.

2.3. By the time the erosion was arrested, Left Guide Bund had been eaten up by the rapacious flood waves and nothing remained of it. For the first time in the history of the Barrage, Breaching Section located in the Right Marginal Bund (RMB) was blasted open under the stewardship of the Pakistan Army but it could not save the LGB.

2.4. Roaring River Kurram flows into Indus as it leaves Jinnah Barrage (Kalabagh) for Chasma Barrage, adding to its ferocity. As a result, exceptionally high flood of 10,38,000 Cfs, far above the design capacity¹⁶ of Chasma Barrage successfully passed through under the able supervision its flood managers (i.e., WAPDA). Chasma's performance must have temporarily allayed the fears of the nervous flood managers downstream at Taunsa. But the nightmare was yet to begin and the worst was still to come.

2.5. Indus charged downstream towards Taunsa Barrage¹⁷. Once again, it was received by the same breed of unprepared and ill equipped flood managers of the I & P Department. Before reaching the weir gates, the flood breached Left Marginal Bund (LMB), a partially pitched earthen embankment (bund), a rampart to protect District Muzzafragarh and its people, if ever Indus swell in anger. The breach in LMB took place at RD 32+000 (more popularly known as Abbaswala) unleashing 1,25,000 Cfs of roaring flood towards human settlement of District Muzzafragarh.

¹⁰ a severe flood - (**the Deluge**) the biblical Flood (recorded in Genesis 6–8)

¹¹ starting on 28th July, 2010.

¹² in KPK

¹³ Not to mention its devastating effects on KPK but as the Report pertains to Punjab, the starting point and focus has been portion of River Indus within the Province of Punjab.

¹⁴ District Mianwali – See Chapter-3

¹⁵ Maple Leaf Cement Company Limited, Mianwali.

¹⁶ i.e., 9,50,000 Cfs

¹⁷ District Muzzafragarh- see Chapter 4

2.6. The unkempt and poorly watched embankment (LMB), which sat on an old creek fell due to foundational failure, giving thundering Indus an opening to surge ahead. The unmaintained, abused and neglected Sunawan bund - the second line of defense, could hardly resist the angry Indus, which went marching down into District Muzzafargarh, breaching the retention walls of Taunsa Punjnad (TP) Link Canal, Muzzfargarh Canal and ruthlessly damaging structures that came in its way. The tragedy had begun.

2.7. As the mighty Indus got derailed, it dictated its own course through human habitation brutally displacing people and their livestock besides damaging crops and buildings. The remaining discharge passed through Taunsa Barrage without causing any damage. Shuddered out their slumber, the flood managers stated to have worked tirelessly to tame the heady waters. Before the breach of LMB, the team of flood managers at Taunsa put up a fight on the right side of the Barrage in defending Spur no. 5, while the relatively less attended LMB on the left side of the Barrage, gave in.

2.8. At the LMB, the inexperienced flood managers saw the boils come out in the bed of Tibba Minor – a channel flowing along side LMB in that reach (RD 32 to 44) but failed to read and assess the piping action that had been set in motion from right under the foundation of the bund. Instead of covering the entire reach of Tibba Minor that flowed alongside LMB, they simply attended to the earlier boils at RD 35-36. As a result, the boils at RD 32 could not be contained and the LMB gave way. Even the dream team sent by the Secretary I & P, a night before, could not read the connection between the boils, the Tibba minor and the LMB. Surely, a competent, experienced and a well prepared flood manager, who had read the Sind Bund Manual on boils coming out of the bed of an adjacent water course would have easily sensed that fatal piping action had begun right under the LMB and unless the entire reach of Tibba Minor was covered with sand and stones to shut down the exist gradient, LMB would fall.

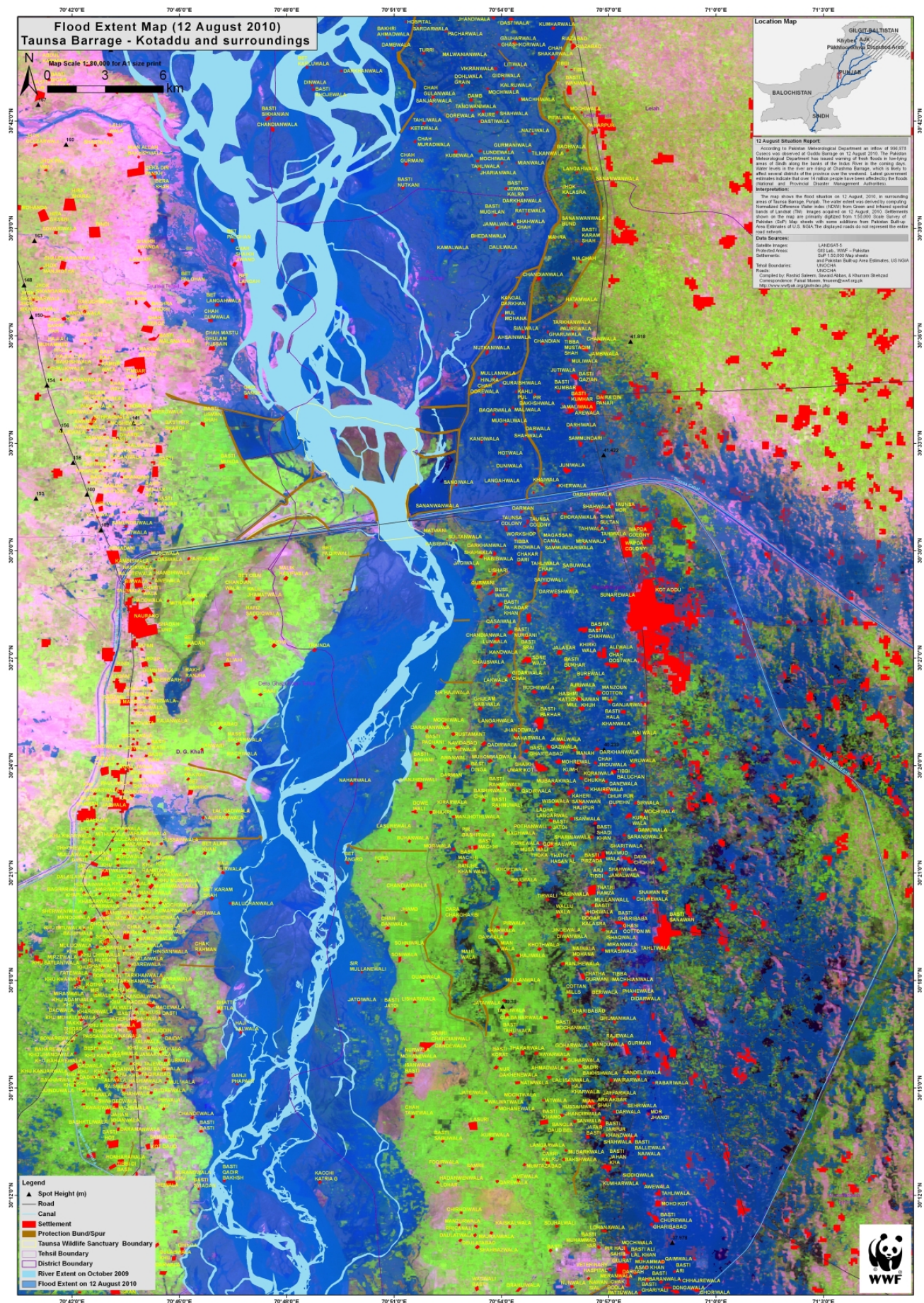
2.9. Never has Indus met Chenab before the confluence at Punjnad, but flood created history, as Indus met Chenab at Shehar Sultan much before Punjnad.

2.10. Downstream Taunsa the flood breached Jampur Flood Bund¹⁸ in District Rajanpur and overtopped Fakhar Flood Bund, leaving Mithankot unguarded. Once again the flood fighting team at these Bunds were of no consequence. [Their presence was as good as their absence.](#)

2.11. On the whole the flood managers of I & P Department saw the glorious Indus pass by, knowing little what to do. Even though they took pains to show us how zealously they had fought the flood – but to us it was no more that a bunch of inexperienced, incompetent, ignorant and nervous flood managers¹⁹, pirouetting and gyrating in meaningless frenzy - without any preparedness, plan, equipment or strategy. It appeared to us that the flood managers of the I & P Department had laid down their arms and given up on floods, thinking of them as a tale of the past. The failure in the recent floods and inability of the team of

¹⁸ See Chapter 5

¹⁹ Dealt in detail in the Main Report.



flood managers reminds us of a nursery rhyme called “Humpty Dumpty” which we read in our childhood:

“Humpty Dumpty had a great fall.
All the king's horses and all the king's men
Couldn't put Humpty together again.”²⁰

2.12. The ferocious flood left Punjab to play more havoc downstream.

3. THE FLOOD TRIBUNAL

3.1. To investigate the causes that turned this blessing (flood) into a tragedy, the Provincial Government constituted a Court of Inquiry referred to as the [Judicial Flood Inquiry Tribunal](#) in this Report. The investigation, analysis, findings and recommendations of the Tribunal are in the Main Report. This overview is just a flavour of what is to follow.

3.2. Flood Inquiry Tribunal was constituted on 1-9-2010 by the Government of the Punjab to inquire into the causes of breach of the major embankments namely: LGB at Jinnah Barrage, LMB at the Taunsa Barrage, Jampur Bund and the Fakhar Flood Bund and to fix responsibility on the delinquents besides giving other recommendations.

3.3. The Tribunal commenced proceedings on 15th of September, 2010 and concluded its Report after hearing the flood affectees, public complainants, the key departments, international experts and after carrying out field visits, detailed deliberations and inhouse research.

4. SCOPE OF THE TRIBUNAL

4.1. The Tribunal closely studied the construct of the “flood control” system in existence and its application in combating the recent floods besides evaluating the ability and capacity of the flood managers in coping with flood emergencies. The Tribunal stood removed from the popular departmental view that the recent exceptionally high floods were unprecedented, implying thereby, that breaches were a fait accompli and largely beyond human control.

4.2. The Report first zooms in to probe the immediate causes of breach and then zooms out to study the systemic flaws that have played a role in the recent chaos and failure. The Report concludes with policy recommendations for the way ahead in combating floods in future.

5. INQUIRY & FINDINGS

²⁰The Oxford Dictionary of Nursery Rhymes (Oxford: Oxford University Press, 1951, 2nd edn., 1997)

5.1. The immediate causes of breach have been a result of poor governance and mismanagement of the Barrages and Embankments by the I & P Department. At Jinnah Barrage the weir gates (right side) remained closed during medium flood generating pressure on the LGB. Absence of reserve stones made the flood fighting plan totally ineffective, till miraculously stones were provided by a local cement company and the erosion was arrested before reaching the LMB. At Taunsa Barrage, the confusing management structure under the PMO, violation of regulations and poor flood fighting resulted in collapse of LMB at RD 32-33 and then subsequently at RD 34-40. Jampur Bund breached at many places, once again due to poor maintenance, weak vigilance and shoddy pre flood preparedness. Fakhra Flood Bund breached due to over topping for similar reasons.

5.2. The popular notion that the breach of LMB at Taunsa Barrage was under political duress in order to save valuable land on the right side of the Barrage was not substantiated by evidence before us. Pond area on both sides, however, is encroached by influential locals²¹ of the area seemingly in collusion with the I & P Department.

5.3. Floods cannot be contained by artificial structures. Floods are to be considered as a natural bounty that brings agricultural fecundity and economic prosperity. They recharge the aquifers and enrich the soil. Flood Control is therefore a misnomer. Flood resilience, flood mitigation, flood risk assessment and management are the terms of the day - leading to an Integrated and holistic Flood Management Plan – which is the way ahead.

5.4. To our dismay, we found out that since independence, I & P Department, Federal Flood Commission (FFC) or the Planning Commission have not developed an Integrated Flood Management Plan for the country. FFC's National Flood Protection Plans I, II and III give a robust prefatory start but no more. These Plans are a huge misnomer- they are actually a compendium of flood schemes which are the brain child of the zonal irrigation chiefs and the local politicians. FFC has not injected any vision or drawn up a Plan of its own for the country – this is against its grain and the legal mandate it enjoys. FFC has, therefore, been a disappointment.

5.5. The closest the flood sector institutions got was to develop a [DRAFT National Water Policy](#)²² which simply carries a segment on flood management. Even the said Policy hangs in the air without legs of approval since 2005. Shameful neglect indeed.

5.6. The compendium of existing regulations²³ dealing with flood management, in some cases remained unread and in others, recklessly disregarded by the flood managers.

5.7. The flood managers besides being reckless and complacent, did not possess the requisite professional education or experience to merit posting on a barrage or an

²¹ One family is in possession on the basis of a stay order from the Hon'ble Lahore High Court (Multan Bench).

²² Mark 142

²³ Barrage Regulations, Flood Fighting Plans, MIP, Sind Bund Manual and FFC Manual.

embankment which demands best of the best. This questions the stewardship of the Department and its accountability mechanism by the Provincial Government. What germinates all this - mal governance, bureaucratic sluggishness, corruption, poor human resource, absence of research, lack of training, poor leadership, lack of political will - to mention a few.

5.8. While the official literature boasts our irrigation system to be world's best contiguous irrigation network – the main institution in existence for its management and supervision i.e., I & P Department, lacks the vibrance and the dynamism to lead the irrigation sector, in general, and the flood sector in particular. The reality gets more gruesome when we realize that the same department is incharge of managing, conserving and ensuring the sustainability of the world's most expensive resource – WATER, for us and our future generations.

5.9. I & P Department being the lead provincial department dealing with fresh water has little to show in the area of research and development (in the context of floods atleast)- We were surprised to note that the I & P Department had not factored in climate change or climate variability in the flood fighting strategy or in their future water management strategy. Similarly, PMD and FFD being the principal weather and flood forecasters displayed blunted alertness and rusted alacrity in reading the weather. At a deeper level PMD and FFD have no cutting edge research on monsoons or climate change and seem to make little of the changing weather patterns in the country. We found our flood guardians off guard.

5.10. In this new world of climate change and global warming, of extreme weathers and innovative irrigation techniques, Pakistan seems not to have made an appreciable advance. We have failed over the last 63 years to develop our irrigation system to meet the requirements of the 21st century, to develop our most important economic resource i.e., agriculture. Our hill torrents- a valuable fresh water resource, which if wisely harvested is a cornucopia- but the hill torrents remain untamed and cause havoc almost every flood season.

5.11. If the Governments²⁴ fail to develop integrated flood management plan in the coming years, monsoon rains coupled with glacial melt i.e., abundance of freshwater, will go to waste down the Arabian Sea- not to mention the ghastly havoc it will play when it flows downstream through the country. We need to store water for our sustainable development, for combating droughts and for the security of our future generations. This intergenerational equity is a scared trust. It is time to wake up and soon.

²⁴ Federal and Provincial Governments

6. RECOMMENDATIONS

6.1. The report provides three sets of recommendations preceded by detailed findings. First set recommends penalties for the flood managers in the shape of departmental proceedings under relevant service rules and initiation of criminal proceedings [under sections 166, 167, 283, 322, 427 and 431](#) of the Pakistan Penal Code (PPC) alongwith immediate suspension of all the concerned flood managers and replacement of Secretary from the I & P Department. Second set of recommendations deal with systemic deficiencies like absence of flood plain and hill torrents management, weak structure of the I & P Department, ineffectiveness of FFC and lack of coordination between other key departments in facing floods. The third set provides recommendations for developing an integrated flood management plan adapting to the vulnerabilities of climate change.

6.2. [The summary of the recommendations has not been provided, intentionally. We would like that the Provincial Government and especially the I & P Department to read this Report in full.](#) During the proceedings we noted that Government Departments think and plan on the basis of generic POWER POINT PRESENTATIONS and pay little attention to detail, depth and analysis. It is axiomatic that “devil is in the detail.” The Departments will have to change-good planning requires far more detail, deliberation and thought. [Government Departments and I & P Department in particular will have to move from generic to specific. Let this Report be a start!](#)

6.3. We hope that this labour of love is taken as the second awakening. We could have conveniently concluded our Report after addressing the technical causes of breach, but then, we sensed the gravity and seriousness of the issue at hand (flood resilience) and the corresponding fragility and feebleness of the flood sector department and authorities. We, therefore, decided to go the extra mile to find the right construct, which can provide a permanent fix. We think this Report points in that direction. It is now for the provincial and national leadership, the policy makers and the flood managers to take up the challenge and up the ante.

7. PUBLIC ACCESS

7.1. We do not expect that this Report will be wrapped in secrecy and shelved in some dark confidential record room of the Provincial Government. What we wish and hope is that this Report will be widely circulated and boldly put out in the press and uploaded on government websites so that the flood affectees and public at large, who so eagerly participated in the flood inquiry get to know of the outcome of the JUDICIAL FLOOD INQUIRY TRIBUNAL. This Report might not heal their wounds but might provide some succour and relief.

7.2. It needs to be underlined that FREEDOM OF INFORMATION is now a fundamental right under article 19-A of the Constitution of the Islamic Republic of Pakistan, 1973. Therefore, this Report cannot be denied public access.

7.3. A copy of the Report shall be retained at the Judges' Library at the Lahore High Court, Lahore along with attached documents which spread over 91 appendices. After the Report is duly released to public by the Provincial Government, any person desirous of getting a copy of the Report or attached documents can apply to the Lahore High Court for a copy in accordance with law.

7.4. This Report is officially handed over to the Secretary, Home Department, Government of the Punjab by the Registrar of the Tribunal today in an open assembly at the Judges' Library at the Lahore High Court, Lahore.

7.5. Before parting, we would like the flood managers to remember that:

افراد کے ہاتھوں میں ہے اقوام کی تقدیر
ہر فرد ہے ملت کے مقدر کا ستارا
(اقبال)

(Justice Syed Mansoor Ali Shah)
Chairman

(Abdul Sattar Shakir)
Member

(Shafqat Masood)
Member

Dated: _____



CHAPTER 2

Without the Indus....the country's history might read as a dull narrative of a people living and dying in a harsh climate surrounded by rugged mountains and unforgiving arid lands¹.

CONSTITUTION OF THE TRIBUNAL & ITS TERMS OF REFERENCE (TORs)

1. CONSTITUTION OF THE JUDICIAL FLOOD INQUIRY TRIBUNAL

1.1. Tribunal of Inquiry was constituted vide notification² dated 1-9-2010 issued by the Home Department, Government of the Punjab [under the West Pakistan Tribunals of Inquiries Ordinance, 1969](#) (II of 1969)³ (“Ordinance”) with the following [Terms of Reference](#):

- i) To inquire into the causes of breaches at main Bunds including Jinnah Barrage, Taunsa Barrage, Jampur and Mithan Kot and to ascertain whether prescribed procedure was followed by I & P Department with regard to the induced breaches.
- ii) To inquire into the causes of consequent breaches in Canal Network, Roads, Bunds and Drains and to furnish detailed report with regard to cases of malfeasance⁴, if any, on part of I & P Department, others agencies or locals.
- iii) To fix responsibility on the delinquent(s) in cases of malfeasance.
- iv) Any other recommendations that the Tribunal of the Inquiry may deem appropriate to make in the facts and circumstances of the cases.

1.2. The Tribunal of Inquiry (initially) comprised the following:

- i. [Mr. Justice Syed Mansoor Ali Shah](#), Hon'ble Judge, Lahore High Court, Lahore.
- ii. [Mr. Mansoor Ali Zaidi](#), (Retd) Secretary, I&P Department.
- iii. [Mr. Abdul Sattar Shakir](#), Dean (Civil Engineering), UET, Lahore.

¹ Shane Mountjoy, *The Indus River – Rivers in World History*. Chelsea House Publishers, Philadelphia 2005.

² Schedule -1

³ Schedule-2

⁴ the performance by a public official of an act that is legally unjustified, harmful, or contrary to law; wrongdoing (used esp. of an act in violation of a public trust)- see: Dictionary.com

The Tribunal met for the first time on 4-9-2010 and commenced formal proceedings on 14.09.2010 under Section 8 of the Ordinance.

2. RE-CONSTITUTION OF THE TRIBUNAL.

2.1. On 21.09.2010, Mr. Mansoob Ali Zaidi (Member) stepped down from the Tribunal on the pretext of pressing prior commitments⁵. As a replacement, Mr. Shafqat Masood, Ex-Chief Engineer, I&P Department and ex-Chairman and ex-Member, Indus River System Authority (IRSA), was appointed as the new Member of the Tribunal, vide notification dated 25-9-2010⁶,

3. PROCEDURE OF THE TRIBUNAL

3.1. The Tribunal of Inquiry (during the hearings and) for this Report shall be referred to as the JUDICIAL FLOOD INQUIRY TRIBUNAL, 2010 ("Tribunal").

3.2. The Tribunal decided to keep the hearings private (as opposed to open hearings) in order to encourage and provide confidence to the flood affectees and other concerned persons to come forward and boldly depose before the Tribunal, without the risk and fear of being exposed or influenced by stronger elements of the society. Private hearing was also more suitable for carrying out cross examination of the witnesses.

3.3. Quorum of the Tribunal was fixed as two members inclusive of the Chairman. This was only when the third member was unable to attend due to any disability including resignation from the Tribunal. It is for this reason that the Tribunal continued as a Two Members Tribunal when Mr. Mansoob Ali Zaidi stepped down on 21.09.2010 till Mr. Shafqat Masood (the new member) joined the Tribunal on 03.10.2010. On 24-11-2010 the Tribunal completed its scheduled hearings and authorized the Chairman to call additional witnesses or seek clarification on the evidence already on the record without the constitution of the Tribunal, hence redefining the quorum to be the Chairman for the above limited purpose. The Members were duly informed of all the hearings held after 24-11-2010.

4. SCOPE OF THE TERMS OF REFERENCE OF THE TRIBUNAL

4.1. Inquiry unfolded that the "causes" of breach were at several involving failure of public responsibility at multiple levels by different public officers in different public institutions. It transpired that this overt failure was merely symptomatic of a chronic dysfunctional institutional structure. Inquiry of the "Causes" of breaches could not be complete if restricted to merely regulatory and technical reasons that circulated around the event but required a "thinking behind floods" approach, a deeper probe to discern if there

⁵ Schedule- 3

⁶ Schedule-4

was more than met the eye. Without probing into the architecture of flood governance this inquiry would have been half-baked, inchoate and cosmetic.

4.2. The TORs were further qualified by the Tribunal to setup a meaningful roadmap for its investigation into the causes of the breaches. They are;

4.2.1. “Area under Inquiry” (AUI) to mean: Portion of River Indus within the Province of Punjab i.e., starting from Jinnah Barrage down to upstream Guddu Barrage.

4.2.2. Breaches to mean breach of LGB at Jinnah Barrage, LMB at Taunsa Barrage, Jampur Bund and Fakhar Flood Bund in District Rajanpur. Breaches in Canal Network, Roads, Bunds and Drains were a direct consequence of the breach of LMB at Taunsa Barrage and hence are not discussed separately.

4.2.3. To fully investigate whether there are technical, administrative and institutional causes of breach and to also discern if there is any political intervention or pressure that might have triggered administrative or institutional failure.

4.2.4. To fix responsibility on the delinquent(s) in cases of malfeasance. Malfeasance shall mean wrong doing of a public official or breach of trust by a public official.

4.2.5. Under “any other recommendations,” the Tribunal has formulated fundamental recommendations for the future of flood resilience and flood risk management in the Province.

5. PROCEEDINGS OF THE TRIBUNAL.

5.1. Tribunal ensured to provide best possible public access to the flood affectees, so that they could conveniently reach out to the Tribunal and make their submissions.

5.2. In order to hear the grievances of the flood affectees/public complainants⁷, the Tribunal decided to hold hearings in the affected Districts of Area Under Inquiry. For this purpose public notices⁸ were issued in the national dailies and local newspapers of the respective districts giving a detailed programme of the Tribunal and its visit to the said districts with the additional facility of registering or submitting their grievances with the local learned Civil Judges.

5.3. Concerned District and Sessions Judges were directed to nominate learned civil judge from every district (namely: Mianwali, Bakkar, Layyah, Muzzafrgarh, DG Khan and Rajanpur) to receive complaints on behalf of the Tribunal from the general public. The list of learned civil judges and the complainants are as under;

⁷ Schedule-5

⁸ Schedule-6

Sr. #	Names of Judicial Officer with Designation	District
01.	Mr. Fayyaz Ahmad Zaheer Senior Civil Judge, D.G. Khan	D.G. Khan
02.	Mr. Ghulam Mujataba Civil Judge, Ist Class Taunsa Sharif	D.G. Khan
03.	Mr. Asad Ullah Siraj Civil Judge, Ist Class Jalalpur Pirwala	Multan
04.	Mr. Razaqat Ali Gondal Sr. Civil Judge, Muzaffargarh	Muzaffargarh
05.	Mr. Muhammad Zubair Chughtai Civil Judge, Ist Class, Kot Addu	Muzaffargarh
06.	Mr. Aasim Mansoor Civil Judge, Ist Class Ali Pur	Muzaffargarh
07.	Syed Farrukh Hussain Shamsi Civil Judge, Ist Class Jatoi	Muzaffargarh
08.	Rana Nasir Javed Civil Judge, Ist Class, Rajanpur	Rajanpur
09.	Mr. Hassan Iqbal Civil Judge-cum-judicial Magistrate Jampur	Rajanpur
10.	Malik Safdar Ali Jasra Senior Civil Judge, Bhakkar	Bhakkar
11.	Ch. Javed Iqbal Saif Addl. District & Session Judge, Kallurkot	Bhakkar
12.	Mr. Muhammad Tariq Jasra Civil Judge, Ist Class Darya Khan	Bhakkar
13.	Mr. Javed Iqbal Ranjha Magistrate Section-30 Mankera	Bhakkar
14.	Mr. Zahid Hussain Bakhtiar Civil Judge-cum-Judicial Magistrate Rahim Yar Khan	Rahim Yar Khan
15.	Mr. Iftikhar Ahmad Civil Judge, Sadiqabad	Rahim Yar Khan

Sr. #	Names of Judicial Officer with Designation	District
16.	Mr. Fayyaz Hussain Civil Judge, Khanpur	Rahim Yar Khan
17.	Mr. Muhammad Jehangir Ashraf Civil Judge, Liaqat Pur	Rahim Yar Khan
18.	Mr. Khadim Hussain Superintendent o/o District & Session Judge Mianwali	Mianwali
19.	Mr. Muhammad Ismail Jasra Civil Judge, Piplan	Mianwali
20.	Mr. Khalid Yaqoob Civil Judge Isa Khel	Mianwali
21.	Mr. Imran Muhammad Khan Civil Judge, Layyah	Layyah

Sr.No.	Names of public complainants.
1.	Ch. Muhammad Yousuf, Advocate, Kot Adu (IW-24).
2.	Mr. Muhammad Younus Chandia s/o Ghulam Rasool, r/o Mauza Bhabar Ghair Mustaqil, Kot Adu (IW-25).
3.	Mr. Asghar Ali Khan Pachar, Advocate, r/o Village Chaudhry, Tehsil Kot Adu (IW-26)
4.	Syed Allah Bukhsh Shah r/o Tasneem Chah Basti Wazir Gadiwala, Mauza Tibba Mustaqil Sharqi, Kot Adu. (IW-27)
5.	Malik Munir Ahmad, Advocate, Kot Adu. (IW-28)
6.	Mr. Muhammad Ashraf Khan Rind s/o Manzoor Hussain Rind, former Nazim Union Council Bate Wala r/o Taunsa Barrage Colony, Tehsil Kot Adu. (IW-29)
7.	Mr. Ghulam Abbas s/o Muhammad Bukhsh, r/o Ward No.14-C, Mohallah Khokhar Abad, Kot Adu (IW-31)
8.	Mr. Rafique Ahmad Khan s/o Sardar Khan r/o Ward No.14-C, Kakkay Wala, Kot Adu. (IW-32)

9.	Mr. Khalid Hussain Khan s/o Lal Muhammad Khan r/o Mauza Bate Qaim Wala, Tehsil Kot Adu. (IW-33)
10.	Mr. Ghulam Abbas s/o Dost Muhammad r/o Chah Abbas Wala Mauza Hanjrai Ghair Mustaqil, Sharqi, Kot Adu.(IW-34)
11.	Mr. Qadir Bukhsh s/o Hamid Khan, r/o Basti Nutkani, Mauza Hanjrai Ghair Mustaqil, Daira Deen Panah near LMB Abbas Wala, Kot Adu (IW-35)
12.	Mr. Wahid Bukhsh s/o Ghulam Haider r/o Chah Abbas Wala, Mauza Hanjrai Ghair Mustaqil Sharqi, Kot Adu. (IW-36)
13.	Mr. Muhammad Mahiwal s/o Fateh Muhammad r/o Ward No.14-A, Mohallah Mandi Mawashian, Kot Adu (IW-37)
14.	Mr. Muhammad Bukhsh s/o Qadir Bukhsh r/o Chah Abbas Wala, Hanjrai Ghair Mustaqil Sharqi, Kot Addu. (IW-38)
15.	Malik Muhammad Ibrahim Hanjra s/o Muhammad Ismail, Ex-Nazim, Union Council Hanjra and News Reporter Nawa-e-Waqt, r/o Daira Deen Panah, Kot Adu. (IW-39)
16.	Mr. Sabir Hussain s/o Ghulam Sarwar r/o Mauza Tapal, Tehsil Kot Adu (IW-40).
17.	Mr. Ejaz Hussain s/o Ghulam Hassan r/o Chah Kandhi Wala, Mauza Kacha Patal, Tehsil Kot Adu. (IW-41)
18.	Malik Muhammad Zaman s/o Peer Bukhsh r/o Daira Deen Panah, Tehsil Kot Adu. (IW-42)
19.	Mr. Sabir Hussain s/o Manzoor Hussain r/o Mauza Janoon, Tehsil Kot Adu. (IW-43)
20.	Mr. Muhammad Rafique s/o Azeem Bukhsh r/o Chah Bukhi Wala, Mauza Patal Ghair Mustaqil, Kot Adu. (IW-44)
21.	Mr. Riaz Ahmad s/o Rahim Bukhsh r/o Daira Deen Panah, Tehsil Kot Adu. (IW-45)
22.	Mr. Ghulam Mustafa s/o Ghulam Hussain r/o Daira Deen Panah, Kot Adu. (IW-46)
23.	Syed Nadeem Hussain Shah s/o Syed Zamir Hussain Shah r/o Ward No.3, Daira Deen Panah, Kot Adu. (IW-47)
24.	Mr. Ghulam Farid s/o Wahid Bukhsh r/o Daira Deen Panah, Kot Adu. (IW-48)

24.	Mr. Ghulam Farid s/o Wahid Bukhsh r/o Daira Deen Panah, Kot Adu. (IW-48)
25.	Mr. Kamran Yasin s/o Ghulam Yasin r/o Tibba Mustaqil Gharbi, Daira Deen Panah, Kot Adu. (IW-49)
26.	Mr. Ghulam Shabbir s/o Muhammad Kaloo r/o Daira Deen Panah, Kot Adu. (IW-50)
27.	Mr. Ghulam Shabbir s/o Jawar Khan r/o Mauza Khai Doim Ghair Mustaqil, Tehsil Kot Adu. (IW-51)
28.	Mr. Ghulam Abbas s/o Qadir Bukhsh r/o Mauza Khai Chak Awal, Chah Ghumni Wala, Tehsil Kot Adu. (IW-52)
29.	Mr. Abdul Wahid Khan s/o Abdul Karim Khan r/o Railway Road, Daira Deen Panah, Kot Adu. (IW-53)
30.	Mr. Muhammad Hanif s/o Khadim Hussain r/o Basti Samundri, Daira Deen Panah, Kot Adu. (IW-54)
31.	Mr. Ahmad Khan s/o Muhammad Khan r/o Ward No.14-C, Kot Adu. (IW-55)

32.	Mr. Muhammad Akram s/o Qadir Bukhsh r/o Mauza Chaudhry Kot Adu. (IW-56)
33.	Mr. Zafar Iqbal s/o Malik Mitha Thathal r/o Mauza Chaudhry, Kot Adu.(IW-57)
34.	Mr. Muhammad Ayyub Khan s/o Mirza Abdullah Khan r/o Daira Deen Panah, Kot Adu.(IW-58)
35.	Mr. Zia Javed Khan s/o Muhammad Bukhsh, r/o Mauza Faqir Wali, Tehsil Kot Adu. (IW-59)
36.	Mr. Muhammad Imran Hassan s/o Riaz Hussain r/o Qureshi Town, Ward No.10 near Tehsil Headquarter Hospital, Kot Adu. (IW-61)
37.	Malik Shahid Hussain Barar s/o Malik Allah Dewaya Barar, r/o Ward No.2, Faisal Colony, Kot Adu. (IW-62)
38.	Mr. Shahid Hussain, Advocate, r/o City Tehsil Kot Adu. (IW-63)
39.	Mr. Manzoor Hussain s/o Khuda Bukhsh r/o Ward No.4 Basti Ara, Daira Deen Panah, Kot Adu. (IW-64)
40.	Mr. Muhammad Ishaq s/o Ghulam Haider r/o Basti Janoo, Daira Deen Panah, Kot Adu. (IW-65)
41.	Mr. Muhammad Yousuf s/o Ghulam Hassan, r/o Mauza Bate Qaim Wala, Tehsil Kot Adu. (IW-66)
42.	Mr. Nazir Ahmad s/o Karam Hussain r/o Mauza Wan Pattaifi, Muzaffargarh. (IW-68)
43.	Malik Kausar Abbas, Advocate, District Courts, Muzaffargarh.(IW-69)
44.	Ch. Abdul Qayyum Kamboh, Advocate, Muza ffargarh. (IW-70)
45.	Mr. Muhammad Iftikhar Qureshi, Advocate, District Courts, Muzaffargarh (IW-71).
46.	Sh. Iftikhar ul Hassan, Advocate, District Courts, Muzaffargarh.(IW-72)
47.	Mr. Sanaullah Khan s/o Shair Ali Khan r/o Pai Khel, Tehsil & District Mianwali. (IW-113)
48.	Mr. Habib Ullah Khan Niazi, Advocate, Muslim Colony, Mianwali.(IW-114)
49.	Mr. Taj Muhammad Jora s/o Ali Muhammad, Caste Jora, age 44 years, Reporter, r/o Mianwali. (IW-115)

Sr. #	Names of Voluntary Witnesses
1.	Dr. Zulifqar Ali, Professor, Hydraulic / Hydropower Engineering, Civil Engineering Department, UET, Lahore (IW-1)
2.	Mr. Sultan Barq, s/o Mian Muhammad Ibrahim Barq, r/o Ali Pur, Muzaffargarh (IW-2)
3.	Mr. Aurangzeb Shaafi Burki, s/o Abdul Shaafi Khan Burki, r/o 215-GG, D.H.A. Lahore (IW-83)

5.5. The Tribunal held hearings in following places:

District	Location
i. District Mianwali	Irrigation Rest House & Wapda Rest House in Chasma
ii. District Muzaffargarh	Taunsa Barrage, District and Sessions Court & Court of Senior Civil Judge, Kot Addu.
iii. District D.G. Khan	Circuit House
iv. District Rajanpur	Court of Senior Civil Judge.

The Tribunal was always open to receive walk in complaints while visiting the affected districts.

5.6. The Tribunal traveled through Districts Mianwali, Bakkhar, Layyah, Muzaffargarh, D G Khan and Rajanpur inspecting the Bunds, examining departmental representatives and granting hearings to the complainants. Pictorial travelogue of the Tribunal has been documented and made a part of this Report⁹.

5.7. Thereafter, notices were issued to a number of departments, authorities and officers¹⁰ to submit written position papers and to personally appear before the Tribunal. Departments were mostly heard at the, Lahore High Court¹¹, Lahore, which formed the permanent seat of hearing of the Tribunal. At Lahore the hearing commenced at 9:30am and continued till late afternoon everyday (except holidays or outstation travel days).

5.8. Tribunal has placed reliance on evidence tendered by the witnesses including their oral depositions, written positions papers, power point presentations, maps, drawings and photographs¹². Tribunal also relied on the expert opinion given by two international experts, local experts¹³/voluntary witnesses¹⁴ including technical inputs from PRO, Irrigation Research

⁹ Chapter-10 of the Report.

¹⁰ Schedule-8

¹¹ The New Library

¹² List of Exhibits and Marks is at Schedule 9 & 10

¹³ namely: Mr. John Briscoe (Harvard University) and Mr Adil Najam (Boston University)- see Schedule-11

¹⁴ Schedule-12

Institute, I & P Department, reports of three local Commissions¹⁵ constituted by the Tribunal

5.9. Tribunal has also placed reliance on Books¹⁶ and international research articles¹⁷. Assistance in this regard by research clerks¹⁸ (student volunteers), especially Syed Azeem Ali Shah¹⁹ (a Phd student) from the Lahore University of Management Sciences (LUMS) under the tutelage of Mr Rafay Alam, Advocate and materials from WWF and LEAD, Islamabad are also acknowledged with thanks. The efficient management of the affairs of the Tribunal by Mr. Irfan Saeed (Additional District and Sessions Judge), Registrar of the Tribunal, laborious proof reading of the Report by Mr. Shahid Shafi, Staff Officer (Reader at the Lahore High Court) of the Tribunal, the indefatigable typing skills of Syed Zahid H. Shah, Iqbal Hanif and Muhammad Tahir and the valuable assistance rendered by each and every member of the Secretariat of the Tribunal is acknowledged with thanks.

5.10. Tribunal constituted three Local Commissions; (i) to assess the status of pond area/ belas at Taunsa Barrage, (ii) for technical evaluation of the breach of LMB at Taunsa Barrage and (iii) for a factual report on the status of the control room at Taunsa Barrage.

5.11. Irrigation Research Institute, I & P Department was directed to run a physical model of Jinnah Barrage at their Nandipur Research Station to get a qualitative analysis on the breach of LGB²⁰. The report of the IRI is on the record and discussed in this Report.

5.12. The travel, lodging and secretarial expenses of the Tribunal incurred during the inquiry were settled by the I & P Department. Summary of the total expenditure incurred has been placed on the record²¹.

5.13. Complete Order Sheet of the Tribunal, Statements of Witnesses and the documents (exhibits or marks) filed before or collected by the Tribunal are placed on the record in 91 APPENDICES to this Report duly stamped. Copy of this Report alongwith the Appendices will be placed in the Judges' Library at the Lahore High Court. Any person desirous of obtaining a copy can apply to the copy branch in accordance with law after the Report has been released to the public by the Government of the Punjab.

¹⁵ Marks 78, Ex I.W. 77/1 & Ex I.W./110/1 - (see also Appendices 3, 4 & 5)

¹⁶ Schedule-13

¹⁷ Schedule-14

¹⁸ Schedule-16

¹⁹ He traveled with the Tribunal and assisted in compiling and indexing the soft copies of the evidence submitted before the Tribunal.

²⁰ Opinion was also sought on the breach of LMB at Taunsa Barrage.

²¹ Schedule-17





CHAPTER 3

The Indus River has served as a border, a vital source of agricultural irrigation, and the stage on which a diverse group of peoples, languages, and religions have gathered for more than 4,000 years.¹

JINNAH BARRAGE



¹ Shane Mountjoy, *Rivers in World History, The Indus River*, Chelsea House Publishers, Philadelphia (2005)



1. INTRODUCTION

1.1. Jinnah Barrage (also referred to as the “Kalabagh Headworks”) is situated on River Indus about three miles downstream of Kalabagh town, District Mianwali. It is managed, regulated and maintained by Kalabagh Headworks Division of the Sargodha Zone of I & P Department. The Barrage was completed in 1943 and commissioned in 1947. Thal Canal (capacity 10,000 Cfs) off takes from the left flank of the Jinnah Barrage and for irrigation purposes is split into Main Line Upper (MLU) and Main Line Lower (MLL). Thal Canal has a length of 57.73 miles and irrigates 21 lac² acres of land in Mianwali, Khushab, Bhakhar, Layyah and Muzaffargarh districts³.

1.2. Normal pond level at the Barrage is maintained at R.L. 692.50 by manually operating regulation gates. The Barrage is designed to pass normal flood discharge of 9.50 lac Cfs and an ultimate capacity to pass a flood discharge of 11 lac Cfs. The last maximum flood at the Barrage was in 1976, when 8.62 lac Cfs of flood passed without causing damage to any component of the Barrage. This year a total discharge of 9,36,453 Cfs passed through the barrage and alleged 1,51,392 Cfs through the designated breaching section operated during

² One Lac= 100,000

³ Flood Fighting Plan, 2010 (Ex I.W.6/1)

the floods. Breaching section at the Barrage was operated for the first time ever during the recent floods (2010)⁴. We were informed that Jinnah Barrage has been declared as a sick barrage and is now up for rehabilitation by the PMO.

1.3. According to the histogram of highest flood at Jinnah Barrage⁵, exceptional high flood passed the Barrage on 02.08.1976 with a downstream discharge of 8,61,965 Cfs and then after 16 years with a downstream discharge of 8,46,040 Cfs on 10-9-1992. Since 1992 the Barrage has faced one very high flood and one high flood. Extract of the histogram from 1992 to-date is re-produced hereunder.

Histogram of Highest Floods at Jinnah Barrage

Year	Date	U/S guages	D/S guages	D/S discharge	Remarks
1992	10/9/1992	692.50	688.40	846040	Exceptional High
1993	23/7/1993	692.50	680.60	355569	Low
1994	13/7/1994	692.50	683.40	491375	Medium
1995	27/7/1995	692.50	684.00	544663	High
1996	16/8/1996	692.50	682.00	441410	Medium
1997	28/8/1997	692.50	684.90	654179	Very High
1998	14/7/1998	692.50	682.10	473221	Medium
1999	10/8/1999	692.50	682.10	456146	Medium
2000	02/8/2000	692.50	678.30	261141	Low
2001	24/7/2001	693.00	681.70	412238	Medium
2002	14/8/2002	693.00	681.30	395589	Medium
2003	3/8/2003	692.50	683.00	399352	Medium
2004	11/7/2004	693.00	679.70	245067	Low
2005	2/7/2005	693.00	685.80	515073	High
2006	6/8/2006	692.00	684.50	489606	Medium
2007	16/8/207	693.00	682.10	359912	Low
2008	5/8/2008	693.00	681.00	336530	Low
2009	17/8/2009	693.50	681.20	348320	Low
2010	30/7/2010	692.50	689.90 ⁶	936453 ⁷	Exceptionally High
2010	1/8/2010	693	689.55	870000	Exceptionally High

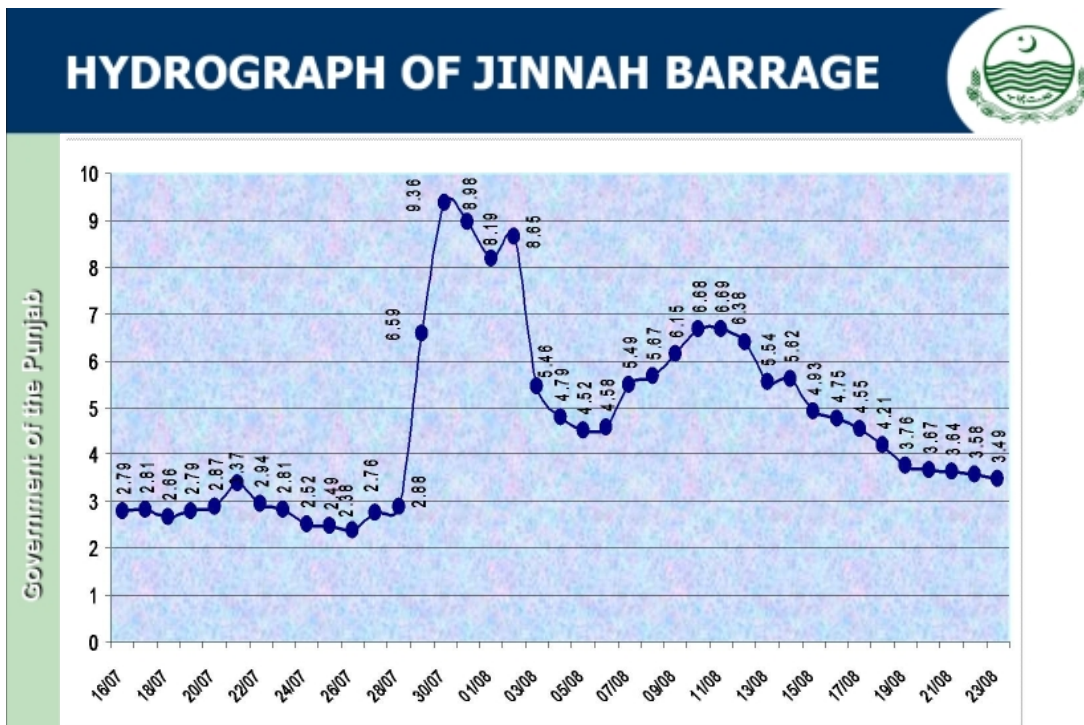
Table : Source: Flood Fighting Plan , 2010 & Presentation of C.E. Sargodha Zone (Ex I.W 119/1).

⁴ Flood Fighting Plan 2010, Sargodha Irrigation zone, Sargodha (Ex I.W. 6./1) and statement of I.W. 6.

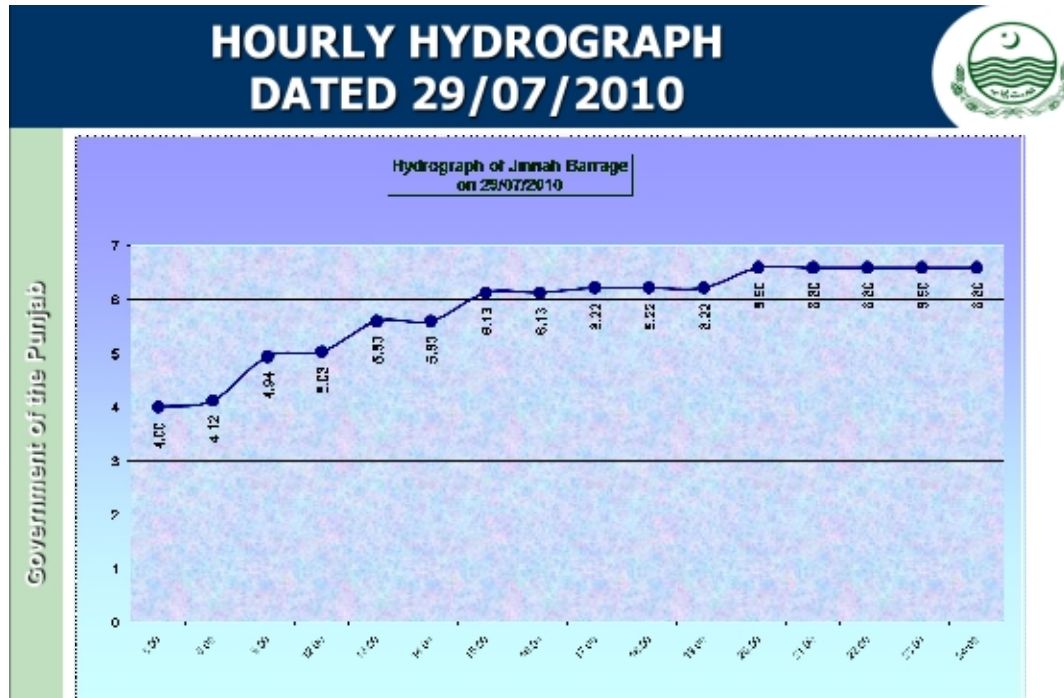
⁵ Annexure B of Flood Fighting Plan, 2010

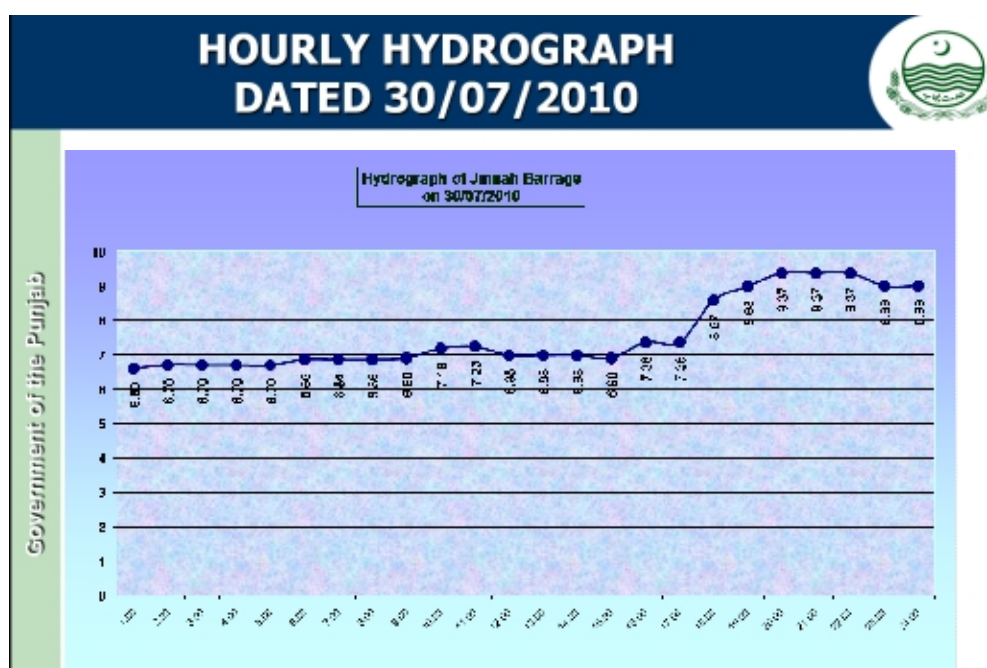
⁶ Ex I.W. 5/3

⁷ Ex I.W. 5/3



Hydrograph at Jinnah Barrage - source I & P Department





1.4. It is the first barrage after Tarbela Dam on Indus River. The time lag of water flow from Tarbela down to Taunsa is as follows:

RIVER INDUS TIME LAG OR TRAVEL TIME (normal flow i.e., below low flood level) ⁸	
<u>Tarbela to Attock (Khairabad)</u>	
32 Km	2.0 Hours ⁹
<u>Attock to Kalabagh (Jinnah Barrage)</u>	
168 Km	14 Hours ¹⁰ 26 Hours ¹¹
<u>Kalabagh (Jinnah Barrage) to Chashma</u>	
59 Km	4 Hours ¹² (or 12 Hours ¹³)
<u>Chashma to Taunsa Barrage</u>	
256 Km	16.5 Hours ¹⁴ (72 hours ¹⁵)
Taunsa to Mithankot	48 Hours ¹⁶

Table : Source: C.E. Sargoha Zone, I & P Department and PMD

⁸ Ex I.W. 119/1

⁹ I & P Department

¹⁰ I & P Department

¹¹ SOP of FFD, PMD

¹² I & P Department

¹³ SOP of FFD, PMD

¹⁴ I & P Department

¹⁵ ibid

¹⁶ ibid

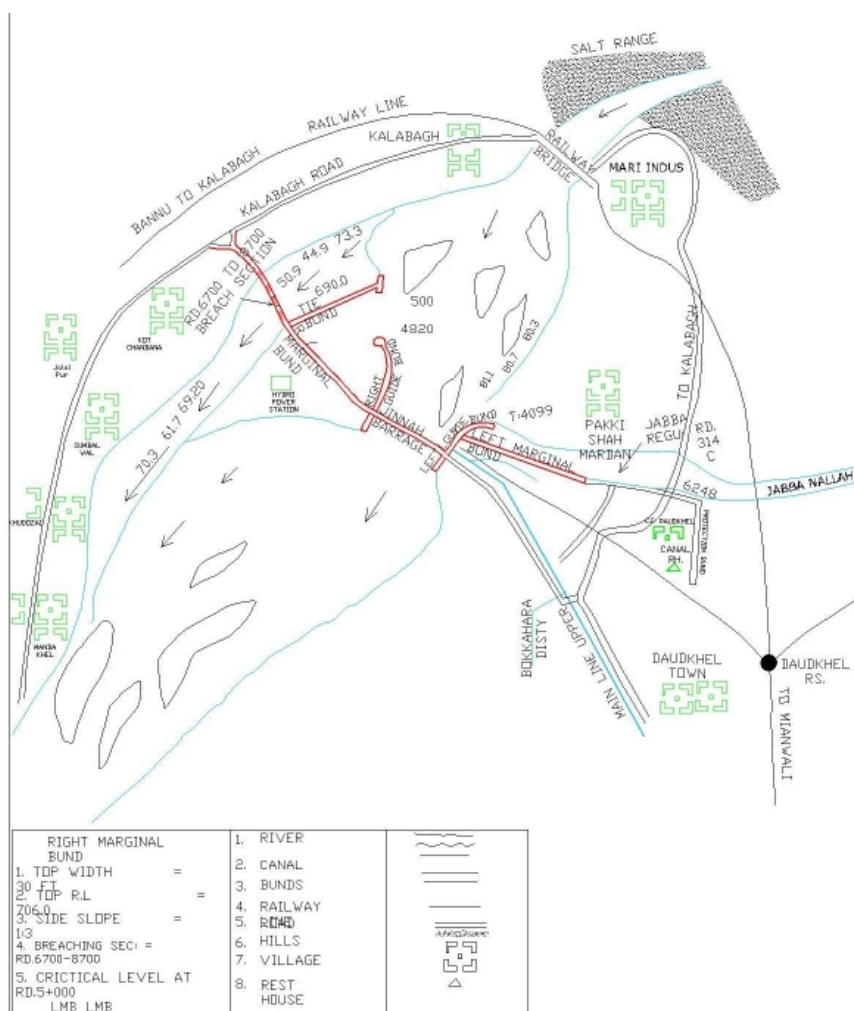
Time Lag of Flood 2010 in River Indus¹⁷

Reach	Distance (KM)	Normal Time (in hours)	Flood 2010 Time (in hours)
Tarbela to Kalabagh	209	33	27
Kalabagh to Chasma	68	12	10
Chashma to Taunsa	237	60	50
Taunsa to Guddu	270	84	74

Table 3: source- I & P Department (Jan, 2010)

1.5. The categories of floods have been described as follows;

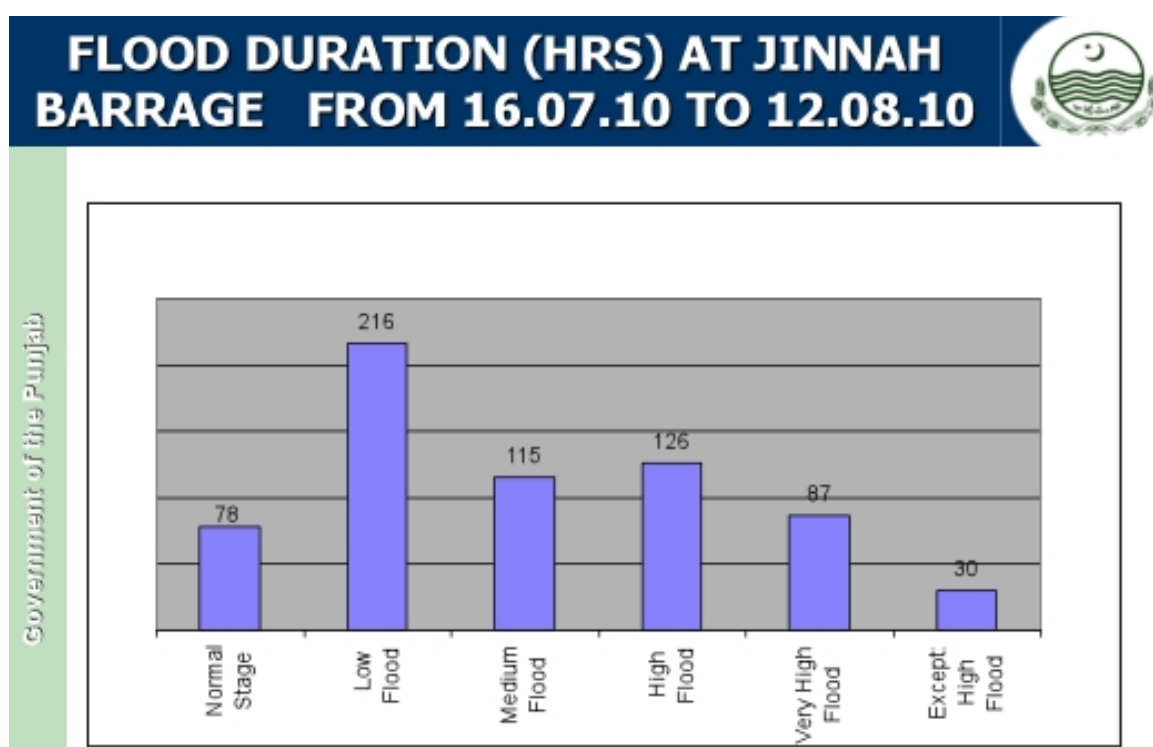
INDEX PLAN OF KALABAGH HEADWORKS



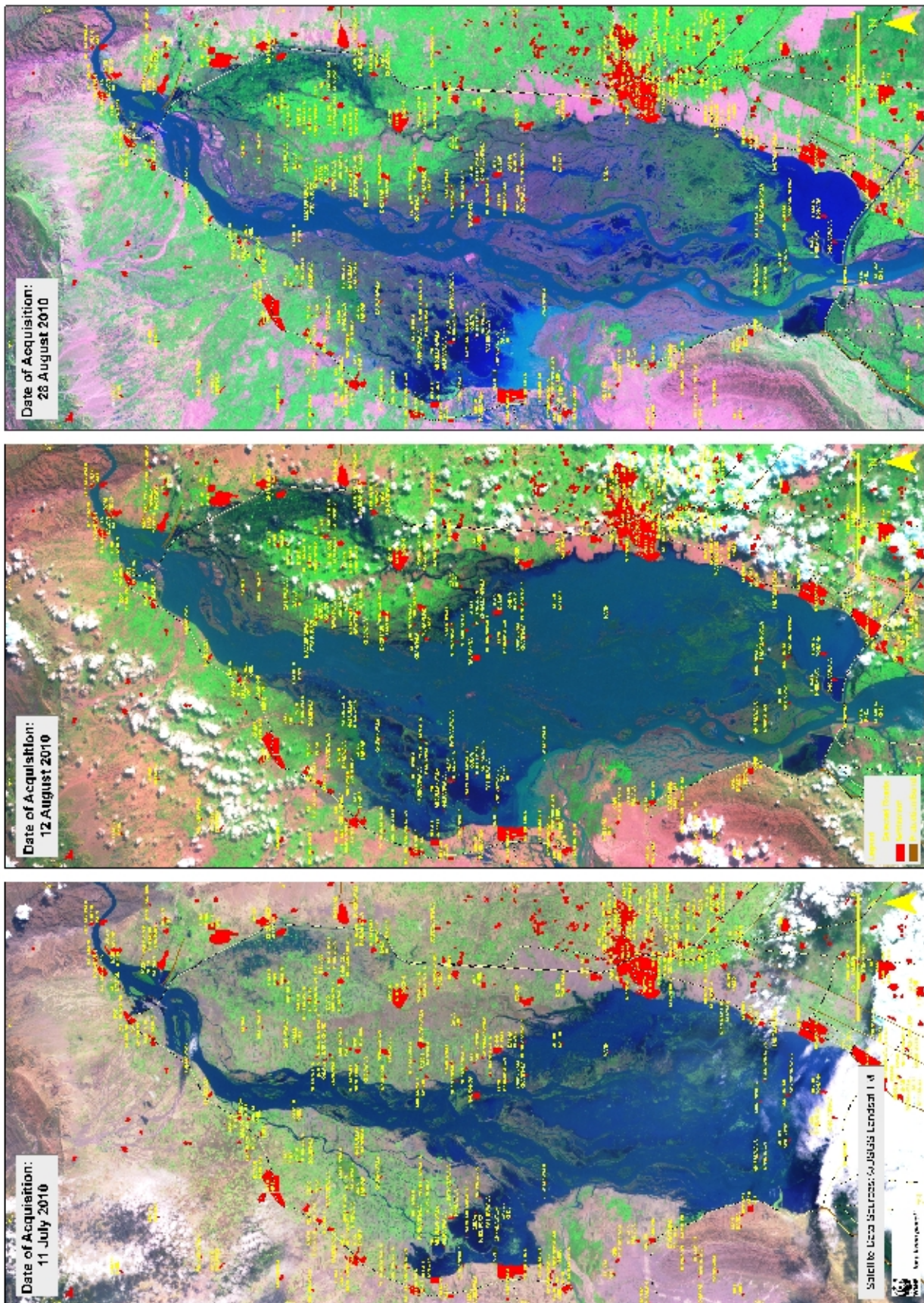
¹⁷ Mark 148

RIVER INDUS D/S KALABAGH	
LOW FLOOD	2.50 Lac Cfs to 3.75 Lac Cfs
MEDIUM FLOOD	3.75 Lac Cfs to 5.00 Lac Cfs
HIGH FLOOD	5.00 Lac Cfs to 6.50 Lac Cfs
VERY HIGH FLOOD	6.50 Lac Cfs to 8.00 Lac Cfs
EXCEPTIONALLY HIGH FLOOD	Above 8.00 Lac Cfs

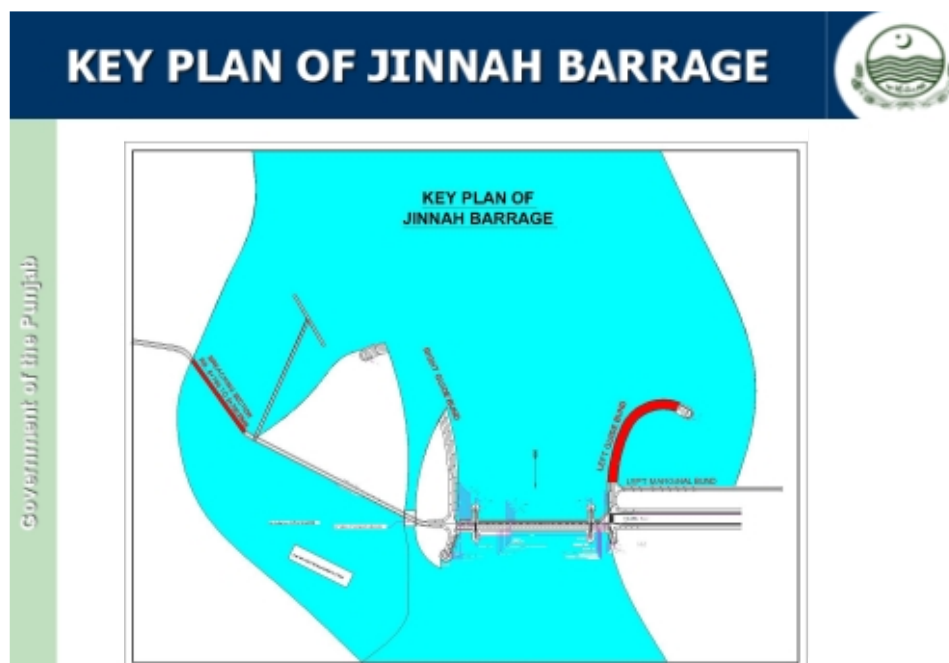
Source: Flood Fighting Plan, 2010 Sargodha Irrigation Zone¹⁸.



¹⁸ Ex I.W.6/1



1.6. Left Marginal Bund [“LMB”] and Left Guide Bund [“LGB”]) (Protection and Training Works)



1.7. Left Marginal Bund is 7410-feet long with a design top of RL 706. The top width is 30 feet and designed side slopes are 1:3 to 1:5 on the right side and 1:3 to 1:8 on countryside. Left Guide Bund (U/S) is 4099 ft long with a design top of RL 706 with top width between of 30 to 60 feet and design side slopes of 1:3 on both sides. Highest flood level recorded in the year 1992 was RL 693 and the design pond level for 10,000 Cfs in Thal Canal is 694 RL¹⁹.

2. NATURE OF BREACHES

2.1. According to the I & P Department, breach in LGB was spotted at 7pm on 29-7-2010 at RD 3-4 by the Sub Engineer (Headworks). This breach finally resulted in the total erosion of the LGB. It was only in the evening of 2-8-2010 that the breach was contained at the junction of LGB and LMB. LGB having almost totally disappeared except the nose at the extreme front end. The breaching section was also operated in the evening of 30-7-2010 on the orders of the C.E. Sargodha Zone²⁰. Four different sections of the designated breaching section were operated upon i.e., blasted with explosives. Details of the breaches according to the I & P Department are as under:

¹⁹ Flood Fighting Plan 2010, Sargodha Irrigation Zone, Sargodha.

²⁰ As opposed to the order of the Breaching Operation Committee.

List of breaches at Jinnah Barrage.

Sr. No	Location	Date	Time	Nature	Duty Officer	Officers of other Deptt. Present at Site	Cause of Breach	Area inundated
JBS-1	Breaching Section on R.M.B. Jinnah Barrage (RD.6700-8700). 4 No. Cuts were made through Pak Army with explosive & machinery.	30-7-2010	07:15 P.M. 10:15 P.M.	Self made breach	CE Irrigation Sargodha SE Thal Canal Circle XEN Kalabagh SDO H/Works Sub Engr: H/works	Commissioner Sargodha RPO Sargodha DCO Mianwali DPO Mianwali Capt: Mujtaba	As per SOP (Aproved Flood Fighting Plan) when the critical gauge at RD. 5000 LMB reached at 701 reading, RMB. Breaching Section (RD. 6700-8700) was operated to save the barrage and LMB.	150 Acres.
		31-7-2010	02:00 A.M. 05:00 A.M.					
JB-B1	Breach in L.G.B. Jinnah Barrage.	29-7-2010	07.00 P.M.	Breach	XEN Kalabagh SDO H/works Sub Engr: H/works	NIL	Mis-regulation	Nil

Table 5: Source- I & P Department

2.2. No breach occurred in Thal Canal since it was reduced to 1000 Cfs on 30.7.2010 and later on totally closed for safety measures up to 11.08.2010.

3. COMPLAINTS OF THE LOCAL RESIDENTS/ FLOOD AFFECTEES.

3.1. Mr. Taj Muhammad Jora²¹ submitted²² that Officials of Irrigation Department, **have raised a bogus claim of one contractor amounting to Rs.83,00,000/- (eighty three lacs)**. It was due to the **negligence of these Irrigation officers** that 4500 ft of Guide Bund has been washed away which has an approximate costs of Rs 50 crores. Mianwali was saved by the cement company on the behest of the Chief Minister.

3.2. Habib Ullah Khan Niazi²³, Advocate, submitted²⁴ that Chief Engineer Irrigation

²¹ IW.115

²² His application is addressed to Chief Justice of Pakistan, Islamabad and Chief Minister, Punjab and was filed by Muhammad Asim Mecan, and Taj Muhammad Jora, however, one of the Petitioners, namely, Taj Muhammad Jora appeared as IW.115.

²³ I.W. 114

²⁴ His application is addressed to Mian Muhammad Shahbaz Sharif, Chief Minister, Punjab

Sargodha Zone in his statement published in Daily Nawa-i-Waqat, Lahore on 26-8-2010 stated that in Sargodha Zone no bund has been breached, except minor damage caused to Channel of Kalia Division. He further stated that due to timely control over LMB, they have saved Mianwali and Khushab. He submitted that the **Chief Engineer is telling lies through newspapers and deceiving the rulers**. Apparently the damage caused to the Barrage is approximately Rs.80 to 90 Crore. 4000 ft **LGB has been completely washed away** and 2000 to 2500 ft of **RGB has also been washed away**, the damage to tie bund and cut to Isa Khel – Bannu metal road are not included. He further submitted that when the water subsides **damage caused to Down Stream Apron due to mis-regulation** will also surface. He further submitted that on 28/29.07.2010 when erosion of LGB started the Chief Engineer remained present for about two days, **but did not take any step to stop the erosion**. The whole irreparable loss / damage caused to the structure of Jinnah Barrage is due to negligence and inefficiency of the Officers.

3.3. Mr. Sana Ullah Khan²⁵ submitted²⁶ that during High/Medium Flood, all gates of the barrage are opened and repair work (upstream or downstream) is stopped so that the water may pass through the barrage without causing any damage to the structure of the barrage. During recent floods, it has been observed that **20 gates of right side remained closed for about one month for stone dumping towards down stream, which continued for one year and four months**. In the 3rd week of July Medium flood arrived in the river, however, neither the gates were opened nor stone dumping work was stopped. On 27.07.2010, high flood was observed. On 29.07.2010 till noon the water discharge was noted as 6,25,000 Cfs. When the information was received from Tarbela Dam that 2,00,000 Cfs was heading to the Barrage the Officers opened the barrage gates, but due to high pressure of water, the gates were opened with difficulty. Consequently, LMB was completely washed away which caused damage of 80 to 90 crores to the national exchequer. C.M. Punjab arranged heavy machinery from the Cement Factories of Districts Khushab, Chakwal and Minawali and stone from the nearest hills to control the erosion of river. It is astonishing that incompetent and corrupt officers due to their personal greed caused loss to the Barrage Structure and LMB (4500 ft), out of which only 50 ft remained intact and the remaining portion of the LMB completely washed away. Had the remaining portion of LMB been washed away the flood flow would have endangered villages Daud Khel, Thathi, Dhair Umeed Ali Shah, Pai Khel, Duliwali, Rokhari and even Mianwali City. He continued to submit that the emergent work should have been completed before (June 2009) flood season, however, the estimates were revised. On this project a loss of about Rs.1.5 crore (i.e., Rs 15 million) has been caused to the national exchequer, but work has not yet been completed.

3.4. **SUMMARY OF ALLEGATIONS** raised by the complainants:

- i. Negligence of the irrigation officers.
- ii. Closures of gates during flood.

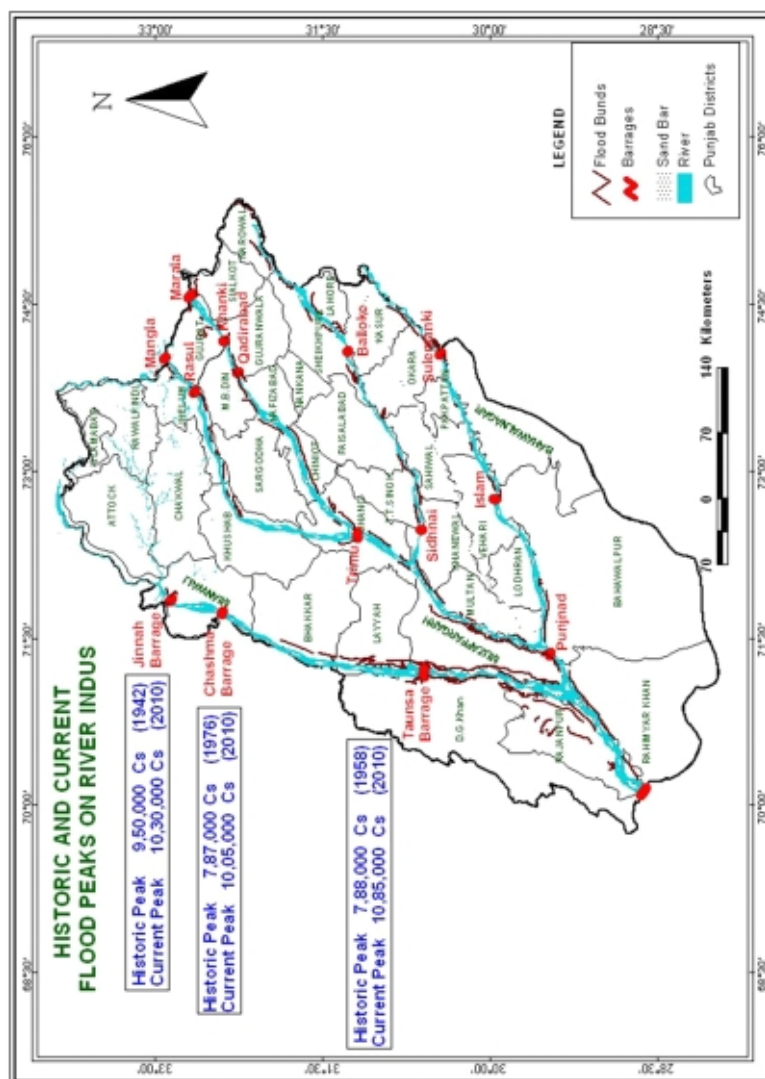
²⁵ I.W.113

²⁶ The application was addressed to Chief Minister, Punjab and was filed by Sana Ullah Khan and Haji Habib Ullah Khan, Advocate District Courts Mianwali, however, one of the Petitioners, namely, Sana Ullah Khan appeared as IW.113

- iii. Continuance of emergent work on downstream loose apron during flood.
- iv. Heavy loss to the exchequer due to erosion of LGB and breach of RMB (breaching sections) and the possibility of damage to the downstream work on the loose apron.
- v. No effort by the Irrigation Department except the timely help by the cement company.

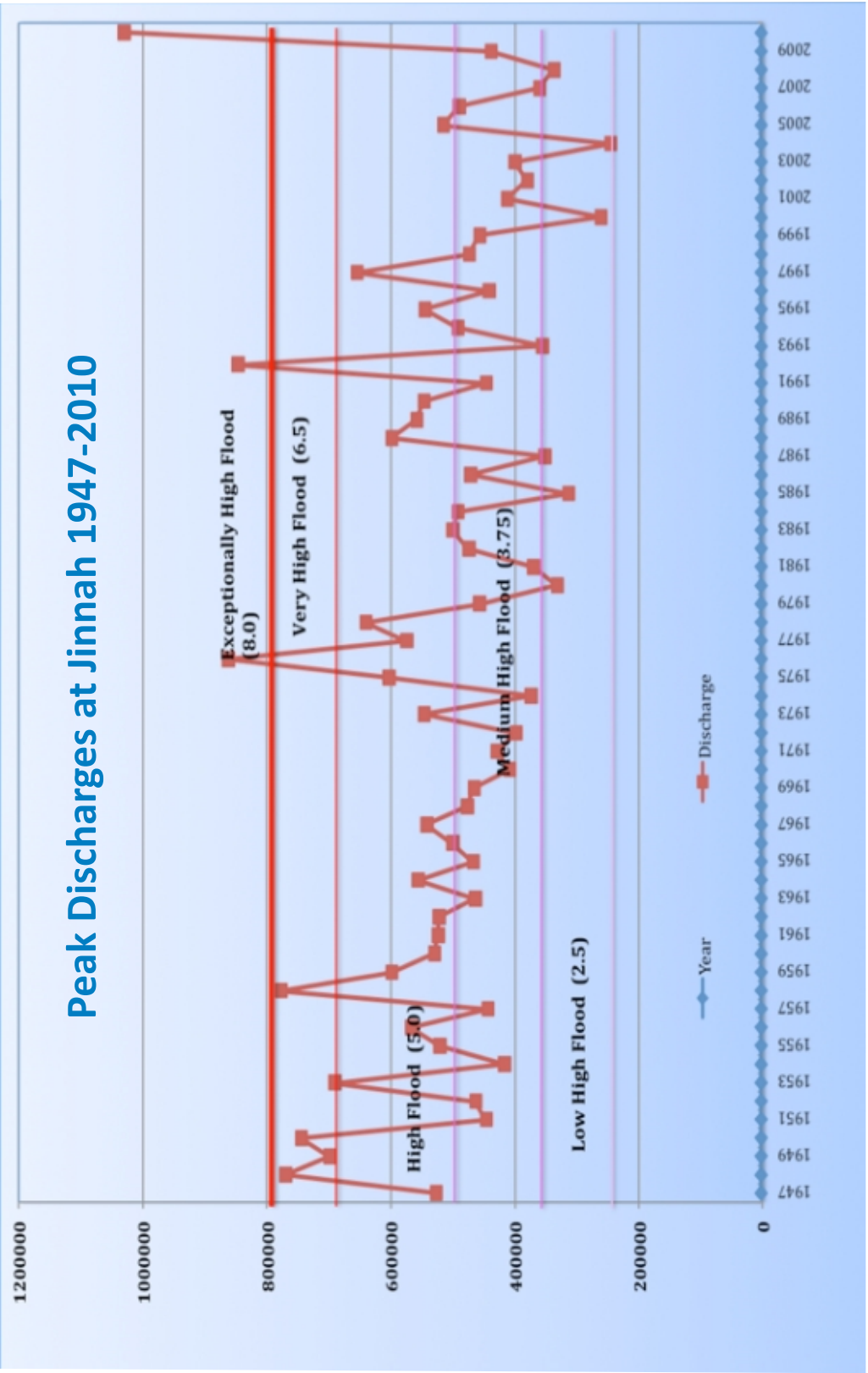
4. GENERAL POSITION OF THE DEPARTMENT REGARDING BREACHES²⁷

4.1. *Recent floods were unprecedented and extraordinary in the known history of the river Indus.* The flood peaks were far in excess of the recorded historical floods. It has been estimated that the flood 2010 was 1 in 1000 years flood event, which highlights that this flood was an extraordinary event. It is relevant to mention that the irrigation structures are designed for 1 in 100 year flood.



NOTE: Current Peak at Jinnah and Taunsa Barrages are incorrectly given by Secretary I & P Department. Above the correct figures according to the Hydrograph are: 9,36,453 Cfs at Jinnah Barrage and 9,59,177 Cfs at Taunsa Barrage. Source: I & P Department.

²⁷ Position Paper of Secretary I & P. Ex I.W.6/1



Peak Discharges at Jinnah Barrage from 1947 to 2010 source: I & P Department²⁸.

²⁸ Ex I.W.6/1

4.2. *Duration:* The duration of flood peaks is generally short, ranging from 12 to 24 hours. In the recent floods the duration of peaks was extraordinarily long, as Exceptionally High and Very High flood persisted for 115 hours at Jinnah Barrage. .

4.3. *Two peaks over a two week period:* Another important feature of the 2010 flood was that two peaks were received in river Indus over two weeks period, which exerted a lot of pressure on the infrastructure, supervisory staff and the watching establishment.

4.4. *Continuous Rainfall and Hill Torrents Flooding:* The flood situation was further exacerbated due to continuous rainfall in the areas, which hampered the flood fighting activities due to over slippery embankments. The hill torrent flooding in Mianwali added to the complexity of the situation.

4.5. *Very Long Dry Spell:* The floods in River Indus were received after a very long dry spell with the result that the embankments and the flood infrastructure had not been tested. Due to this long dry spell, the settlements had also increased within the river Khadir and the river channels also had the siltation trend. As a consequence, very high flood levels had been recorded on the embankments, which were beyond their design parameters and endangered the safety of the embankments and also caused breaches.

5. CAUSES OF BREACH

5.1. The discussion on the causes of breach, hereunder, is in the following format:

- i. PRE FLOOD PREPAREDNESS.
- ii. FLOOD FORECASTING
- iii. FLOOD FIGHTING
- iv. TECHNICAL CAUSES OF BREACH (closure of weir gates)
- v. OPERATION OF BREACHING SECTION.

6. PRE-FLOOD PREPAREDNESS

6.1. Secretary, Irrigation & Power Department submitted²⁹ that the Guidelines for pre-flood preparedness, as well as, guidelines for flood fighting have been laid down in [Guidelines for Flood Preparedness / Works during Flood Season 2000](#) dated 10.03.2000³⁰ (also popularly known as “Suleman Ghani Guidelines” within the Department) and the same has become the guideline for all the subsequent flood fighting plans. According to the said guidelines the following flood preparedness activities have to be strictly followed:-

²⁹ IW-6

³⁰ Ex I.W. 6/3

Activities		Target Date
I)	Preparation of flood fighting plans	
a)	<u>Submission of Draft Divisional Plans by Zonal Chief to Chief Engineer Drainage and Flood (after scrutiny by SE/CE)</u>	15-04-2000
b)	<u>Review by Chief Engineer D&F</u>	30-04-2000
c)	Final Submission of Divisional Plans	15-05-2000
II.	Inspection of flood works	
a)	By XENs	15-04-2000
b)	<u>Checking / inspections by SEs/CEs</u>	30-04-2000
c)	<u>First Inspection by Joint Civil Admn. and Army Teams</u>	15-05-2000
III.	<u>Identification of encroachments to the Civil Administration</u>	30.04.2000
IV.	Painting Gauges, RD Marks, Data Boards and Repairs to Flood Bunds, etc.	30-04-2000
V.	<u>Co-ordination Meetings with District Administration / Army to finalize Flood Fighting Plans / Arrangements.</u>	15.05.2000
VI.	Reserve Stone Replenishment / Flood Fighting Materials	
a)	Identification of needs	28-02-2000
b)	Funding/Procurement Arrangements	15-03-2000
c)	Procurement, Stacking, Prescribed Field Checks	15-06-2000
VII.	Implementation Completion Inescapable of Flood works	15-05-2000
VIII.	Installation of Wireless Sets	01-06-2000
IX.	Opening of Zonal Flood Cells	
a)	Duty Rosters	01-06-2000
b)	Operative	15-06-2000

Source: Flood Preparedness Activities (Annex A to Guidelines for Flood Preparedness / Works During Flood Season, 2000).

The Guidelines provide³¹:

SUBJECT: GUIDELINES FOR FLOOD PREPAREDNESS / WORKS DURING FLOOD SEASON 2000

The Following guidelines for flood preparedness/works during flood season 2000 are reiterated for strict compliance by all concerned departmental officers/officials.

- i. The field officers will strictly follow the schedule of implementation of inescapable flood works and other flood preparedness activities as detailed above.
- ii. **The Chief Engineers / Superintending Engineers should hold exclusive briefing sessions with the concerned Army Coordination / Monitoring Units to brief them about the flood preparedness activities and the flood restoration works.**
- iii. **The field officers would take immediate steps for procurement of the rationalized / agreed quantities of reserve stock of stone. The Chief Engineers would closely monitor the progress in this behalf in order to ensure implementation of the codal rules/latest Government instructions, which are summarized below:**
 - The field officers will prepare a site plan showing the existing stacks of stone, as well as, quantity in each stack of all works. The Stock Registers would also be properly maintained in keeping with the instructions on the subject.
 - The existing stacks would be properly demarcated so as to be clearly identifiable.
 - The Executive Engineers & Superintending Engineers would check the existing stacks 100% and 25% respectively and record their certificate on the site plans as well as in Stock Registers. **These site plans would be furnished to be respective Chief Engineers / Chief Engineer, Drainage & Flood at the earliest. A copy of these plans should also be provided to the Civil Administration / concerned Army Monitoring Teams.**
 - When the supply of additional reserve stock of stone is received, it should be properly stacked in manner to be clearly identifiable as new arrivals.
 - After the stacking of the newly procured reserve stock of stone at site, the concerned Executive Engineers / Superintending Engineers would check the stacks and stone quantities by 100% and 25% respectively, show them on

³¹ Letter no. US (Flood) Misc-96(I)97 dated 10-3-2000 (Ex I.W.6/3)

Site Plans / Registers and **immediately inform the respective Chief Engineers / Chief Engineer D&F / Secretary, I&P.** After this, the Checking Teams should be informed in order that they can plan 10% random check of the reserve stone.

- **The Inspection Teams would check the reserve stone and inform about the out-come of their checking to the respective Chief Engineers / Chief Engineer D&F / Secretary I&P.**

- **The reserve stone to be procured would also be checked by the respective Deputy Commissioners and Army Monitoring Units. For this purpose, the Executive Engineers would also furnish to the respective Deputy Commissioners and Army Units, details regarding quantity of reserve stone being procured, sites where this reserve stock is to be kept and the expected schedule of supply of the stone at site.**

- **Weekly Progress Reports regarding procurement / checking of reserve stone would be submitted by Zonal Chief Engineer Drainage and Flood / Secretary I&P.**

iv. Comprehensive division-wise flood fighting plans should be prepared in accordance with the instructions on the subject (refer Annex-B). **The flood fighting plans should be finalized after discussions / coordination with the Civil / Army authorities and these should also be carefully reviewed by the field SEs / CEs.** The plans should be well documented and forwarded to the concerned quarters according to the notified schedule

v. **The Chief Engineers should ensure strict observance of the financial discipline, particularly on the flood works. They should exercise extra vigilance on emergency flood works to be implemented under para 2.89.** In this context, the instructions / procedure identified in the minutes of meeting dated 18-6-1997 conveyed vide I&P Department letters No.US(Floods)Misc-96(I)97 dated 11-7-1997, No. US(Floods)Misc-96(I)97 dated 26-7-1997 and subsequent instructions should be strictly followed. The main points of the instructions are repeated below:

a. The emergency clause should be implemented judiciously and cautiously and **Chief Engineers should ensure their full satisfaction in all such cases.**

b. All the codal / departmental formalities should be fulfilled before invoking emergency provisions under para 2.89 and cogent reasons should be recorded.

- c. All the damages / emergent works under para 2.89 should be got independently checked from a team of one Superintending Engineer and Executive Engineer, who should be from outside the circle / division where the work is being undertaken.
- d. **Chief Engineer should visit and personally inspect all the works under para 2.89, as soon as possible.**
- e. Intimation regarding all such emergency works should also be communicated to the Deputy Commissioners / Army Monitoring Units.
- f. The Chief Engineers should exercise proper professional skill and adopt most economical and technically sound interventions in each case.
- g. Intimation regarding 2.89 emergency works should also be given to the respective Consultants and the works must be got implemented under resident supervision of the Consultants.
- vi. The Chief Engineers should ensure compliance of all the codal / departmental instructions regarding open and transparent tendering / bid awards.
- vii. The field officers should exercise strict caution in case scheme revision is warranted. The Government instructions in this behalf should be adhered to in letter and spirit. **The Chief Engineers should ensure that revised scope is not implemented without approval of the competent authority.** In exceptionally compelling / emergent cases, at least approval in principle should be obtained from the competent authority.
- 2. **It is advised that the implementation of the above instructions / guidelines may kindly be ensured and the Chief Engineers should closely monitor the progress of implementation.**
(Emphasis supplied)

6.2. Vide notification dated 24.3.2010 issued by the Director Flood/Secretary, Punjab Flood Commission, Irrigation & Power Department, all the Chief Engineers, as well as, the Head PMO Punjab Barrages, were directed to send their comprehensive flood fighting plans to the Punjab Flood Commission/Director Flood by 15.4.2010. The flood fighting plan as per notification was to provide the following:^{31-A}

^{31-A} Mark-93

1. Salient features of the concerned Division (A brief of two pages).
2. Details of flood protection and river training works alongwith the design parameters and location maps.
3. Brief History of past flood events.
4. Designed data. Historic peak flood data and previous five years flood data of H/Works/Barrages and or other control points
5. **Flood Fighting strategy at different flood limits (A brief of one page)³²**
6. **Flood Damages Restoration Works carried out and other repair works.**
7. **Flood Fighting/Watching arrangements Labour required site location and quantities of engineering stores etc.**
8. **Details of encroachments on flood works.**
9. Duty Roster/ battle stations of key personnel during high flood flow.
10. Emergency Telephone Numbers.
11. Any other flood related information

- 6.3. The respective Chief Engineers and Head PMO were further directed through the above notification to complete the flood fighting plans after discussion with Civil/Army Authorities and also to ensure its careful review by the field Superintending Engineers/Chief Engineers.
- 6.4. Secretary I & P Department³³ deposed that Flood Fighting Plan is prepared by the Division e.g., Flood Fighting Plan for Kalabagh headwork's Division is prepared by the XEN and counter signed by SE and C.E. Flood Fighting plan is vetted by the C.E. (D & F) and if there is any disagreement regarding the contents of the same, it is taken up with the Department, but not otherwise.”
- 6.5. According to the Position Paper submitted by the Secretary, I & P Department, the pre-flood preparation was satisfactorily achieved. Summary³⁴ of the “completed” events as given by the Secretary I & P are:

Sr. No.	Activities	Target	Status
1.	Preparation of flood fighting plans	30.04.2010	Completed
2.	Inspection of flood works by Department, Civil Administration and Pakistan Army Teams	30.04.2010	Completed
3.	Reserve Stone replenishment/ flood fighting materials	30.04.2010	Partially completed
4.	Preparation of breaching section	15.06.2010	Completed
5.	Provision of wireless sets on all barrages	15.06.2010	Completed

³² emphasis supplied

³³ I.W.6

³⁴ Exhibit I.W.6/1

6.6. Vide order dated 04.03.2010 Secretary, I&P Department, Government of the Punjab, Lahore constituted inspection team³⁵ to inspect the flood fighting work of Sargodha Zone. In their report submitted in April, 2010 the Committee reported;

“LEFT MARGINAL BUND

Overall condition of the bund satisfactory except minor deficiencies like jungle growth on the slope, rain cuts and gharas on slope and top in some reaches. Some ramps were found built by cutting body of the bund which can jeopardize safety of the bund. **Reserve stock existing on the bund was also told to be short.**

U/S LEFT GUIDE BUND

The bund was found in intact [sic] and in satisfactory condition. However, some jungle growth was existing on the slope in some reaches. **Reserve stock of pitching stone was short.”**
(emphasis supplied).

6.7. The Flood Fighting Plan prepared in the same month (i.e., April, 2010) mentions under the heading **Stores: “sufficient quantity of stone is available on all river training works”.**

6.8. Thereafter, meeting of the Provincial Coordination Committee to review pre-flood season 2010 was held on 21-6-2010 under the Chairmanship of Sardar Zulfiqar Ali Khan Khosa, Senior Advisor to Chief Minister Punjab. In the said meeting Chief Engineer, Sargodha Zone vide his letter dated 11.06.2010 certified that necessary repair to flood protection bunds has been carried out, requisite quantity of the explosive of breaching section is available and has been kept in safe custody which can successfully be used in case of breaching section needs to be operated during high flood. It was also certified that payment for purchase of new explosive material has been made through cheque amounting to **Rs 10 million.**

6.9. XEN Kalabagh Headworks Division vide letter dated 4.6.2010³⁶ reported to Superintending Engineer, Thal Canal Mianwali in the following manner:

4.	Procurement arrangements for replenishment of reserve stock of stone and flood fighting material	<u>Sufficient quantity of reserve stock of stone is available to met [sic] with any emergency. Stock of stone used on emergent work of Jinnah Barrage the procurement of stone stock is in progress.</u>
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³⁵ comprising Khurshid-uz-Zaman S.E. and Hakim Ali XEN (Ex I.W. 6/1)

³⁶ (Ex.I.W.122/2)

6.10. S.E., Thal Canal, Mianwali relying on the above information (Letter dated 4-6-2010 of the XEN) prepared [FOLLOW UP ACTION ON THE FLOOD PREPAREDNESS ACTIVITIES FOR THE YEAR 2010](#)³⁷ dated 13-7-2010. [STATEMENT SHOWING PROGRESS ACHIEVED UPTO 30-6-2010](#). Under the head “Reserve Stone”, S.E. reported to the Chief Engineer, Sargodha in the following manner: **“sufficient quantity of stone is available to meet with any emergency”**.

6.11. The Chief Engineer, as well as, Secretary, Irrigation & Power Department have deposed that on the basis of the above statement they stood assured that reserve stone was in place on the training works at Jinnah Barrage. The Chief Engineer, Irrigation³⁸, Sargodha Zone, submitted that

“Before the start of the flood season i.e., 15-6-2010 onwards I was under constant impression that the said stone had been recouped as per the above mentioned report of the XEN/S.E. I was shocked to notice on 30-7-2010 when I reached Jinnah Barrage to see that there was no reserve stock of stone. When I inquired from the Executive Engineer regarding the status of Reserve Stock Stone, he had no clear answer and this automatically makes the letter dated 13.07.2009 submitted by the S.E to be totally incorrect and a false statement.”

6.12. While Secretary I & P submitted that after the report of the departmental inspection team dated 16-4-2010:

“I & P Department wrote to the C.E. (D & F) to follow up on the subject. As a result of the said follow up, S.E wrote to the C.E. Sargodha Zone, who forwarded the same to the C.E. (D & F) confirming that “Sufficient quantity of stone is available to meet with any emergency” through Report no. 709/105-R dated 13-7-2010.”

6.13. **INQUIRY & FINDINGS**

6.14. [Information given by the Secretary I & P Department](#) (above) regarding highest peaks reached during the Floods 2010 at Jinnah and Taunsa Barrage are incorrect. The highest peaks at Jinnah and Taunsa Barrages were as under and were within the design capacity of the barrages. The total duration of exceptionally high flood (of both the peaks over different dates) is 30 hours³⁹. The twin peaks or the duration or the long dry spell cannot be considered to be technically acceptable reasons for the breach of LGB. Such factors can develop any time and cannot be projected as an excuse for the poor performance of the department. Irrigation department is equipped (or should be equipped) to deal with floods in different climatic conditions. Therefore the generic submissions of the Secretary have no merit.

6.15. According to PMD, every ten years a major flood or exceptionally high level passes

³⁷ (Ex.I.W.6/4)

³⁸ I.W.5

³⁹ According to C.E, Sargodha Zone.

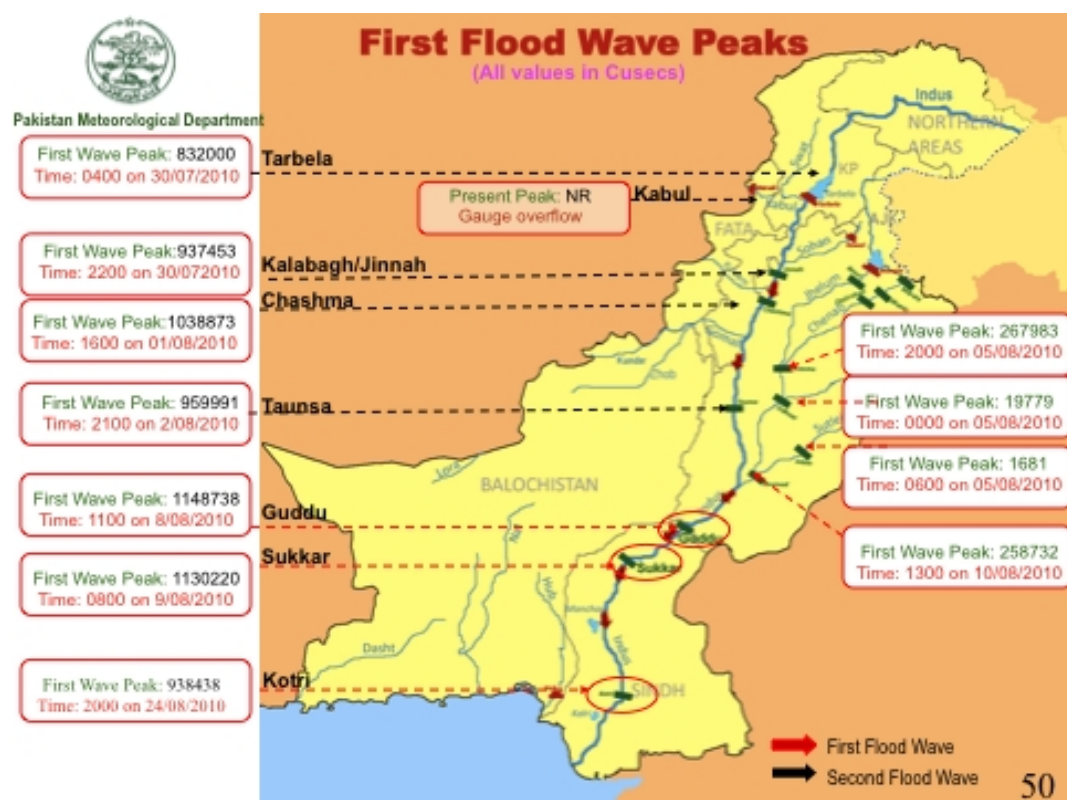
through all the five rivers. Every 15 years a super flood of 1988 or 1992 type occurs⁴⁰. Irrigation department seems to have failed to consult their own histogram or SOP of the PMD while planning and strategizing for the flood season. Long dry spell, therefore, cannot be put out as ground for departmental failure or weakness to face floods. Department should have been in a state of preparedness by having provided for wetting the embankments. This was not done and people were made to live in a false sense of security. Department as the prime flood manager enjoys the role of a trustee for the people of the Province, especially those who live within the flood prone areas. Absence of any flood preparedness or strategy for wetting the embankments amounts to serious breach of this trust. The department should have shared these risks with the local residents so that they could have perceived the threat and not lay cocooned behind the unkempt and unmaintained embankments with a sense of security which in reality never existed.

6.16. Details of the discharges from the Barrages and the breaches are as follows:

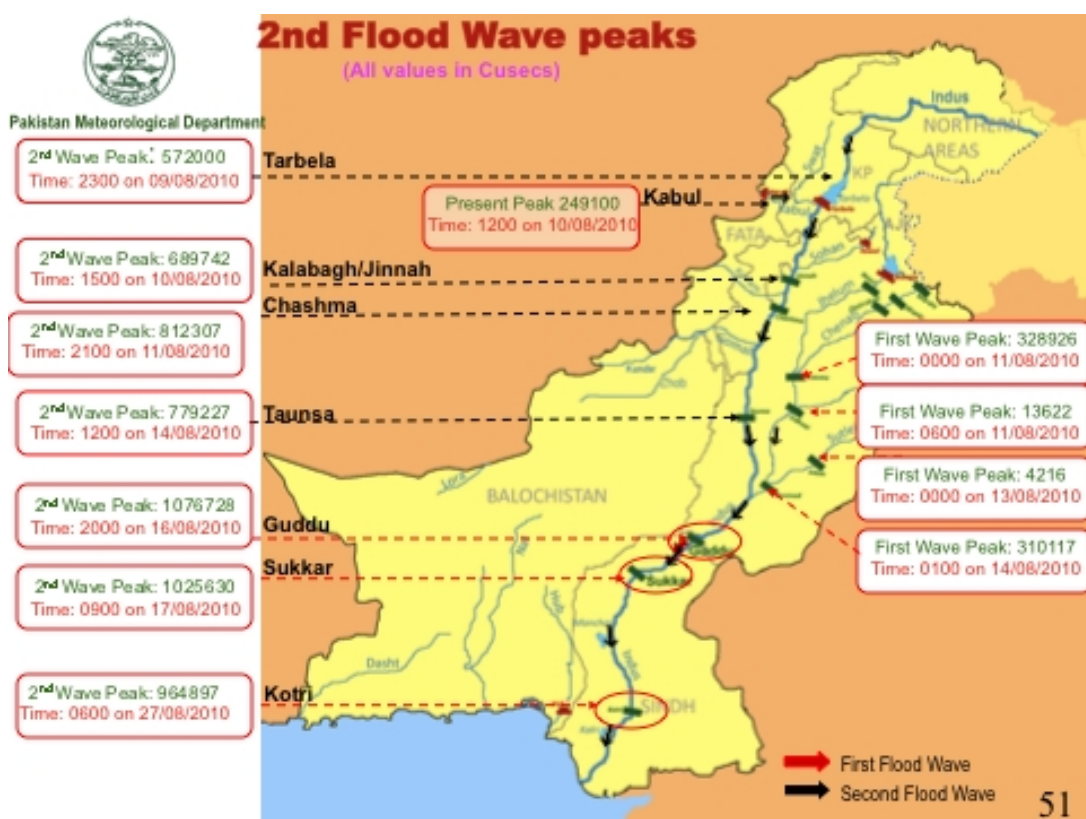
Location	1 st Highest Peak (date)	2 nd Highest Peak (date)	Alleged Discharge through Breach	Design Discharge
Tarbela	837000 (30/7/2010)	572000 (8/8/2010)		
Jinnah Barrage	937453 (30-7-2010)	689742 (10-8-2010)	151392 (total discharge 10,88,845 Cfs)	9,50,000
Chasma Barrage	1038873 (1-8-2010)	812307 (8-8-2010)	NIL	9,50,000
Taunsa Barrage	959991 (2/8/2010)	779227 (14-8-2010)	1,25,000 (total discharge 1,084,991 Cfs)	11,00,000

Info on Highest Peaks during Floods 2010 - source PMD (Design Discharge and Discharge through breaching figures by I & P Department)

⁴⁰ SOP regarding Hydro Meteorological Forecasting - FFD, PMD (Ex I.W. 3/2)



Source PMD



Source PMD

6.17. **Pre flood preparedness and the Flood Fighting Plan:** From the evidence it is abundantly clear that pre flood preparedness is a perfunctory ritual which is done with little pain and interest every year. Infact it is not even done in the manner prescribed. Mechanical and thoughtless Pre Flood Meetings (several of them at different levels) fail to gauge the pre-flood preparedness or the strengths or weaknesses of the various flood managers. The data presented in these meetings is mostly incorrect or intentionally incomplete, there is no flood mitigation or management strategy evolved, it is not inclusive and there is no participation of the local residents. Finally there is hardly any follow up on the suggestions made. In the present case (recent floods at Jinnah Barrage) no mention was made by the C.E. regarding the absence of reserve stones, the continuance of emergent work on the downstream loose apron and the closure of gates since May, 2010 in the Provincial Coordination Committee. The meeting and the Certificate of the C.E were therefore hardly of any use as a pre flood preparation exercise. In another pre flood meeting under the auspices of NDMA in Islamabad, the submissions of DG, PMD failed to highlight that the QPM radar in Attock was not working or that there was not QPM Radar to cover the upper catchment area of River Indus and the Hill Torrents (see discussion under Flood Forecasting later in this chapter)

6.18. Under the **Guidelines for Flood Preparedness** mentioned above, the Flood Fighting Plans after scrutiny by the S.E. and C.E. have to be reviewed by the C.E (D&F) before they are finalized. This year there was no scrutiny by the S.E. or C.E or review by the C.E.(D & F) while preparing the flood fighting plan. It appears that preparation of Flood Fighting Plan every year is a thoughtless perfunctory, cut and paste exercise, paying little heed to the Guidelines mentioned above. Important elements of the Flood Fighting Plan and the Guidelines are pre flood inspection, flood fighting material, the arrangement of workforce, location and installation of camps, observance of the barrage regulations (pertaining to floods), firming up arrangements for machinery required and ensuring the presence of reserve stone for flood fighting as per M.I.P. Record shows that the above requirements were not met. It is no surprise that there was an incorrect assurance recorded in the Flood Fighting Plan, 2010 to the effect that **the reserve stock of stone at Jinnah Barrage was in order**. Failure to follow the regulation by the flood managers came close to a tragic nightmare for the credulous residents of Mianwali and other contiguous districts.

6.19. The flood fighting materials carry items which are no more in use today, like lanterns, etc. There is no proposed mapping of the locations where stones have to be stacked or camps have to be set up. List of machinery required or the proposed list of available contractors, who could supply manpower at the last minute is missing. I & P Department appears to have been frozen in time with nothing but obdurate inertia to show for itself.

6.20. **Importance of Pre Flood Inspection:** Under the Guidelines checking and inspection of the Flood Works has to be done by the S.E. and C.E by the target date of 30-4-2010. No inspection report exists that records that such an inspection took place. More importantly the emergent work carried out on the downstream loose apron had to be closely monitored and inspected by the C.E. Any such work should have been stopped by the C.E. due to the

flood season. The C.E. not only failed to stop the said emergent work he deliberately avoided to mention a word on this in his position paper or his statement before the Tribunal. No mention was made by the C.E. regarding the shortage of reserve stone, closure of the gates during medium to high floods or the emergent work in progress on flexible loose stone apron down stream Jinnah Barrage before the Provincial Coordination Committee or the Certificate issued by the C.E.

6.21. It is important to refer to Letter dated 13-2-2010⁴¹ of the C.E written to the S.E. Thal Canal Circle, Mianwali regarding Emergent Repair / Replenishment of loose stone apron down stream Jinnah Barrage under para 2.89 of PWD Code. The C.E pointed out: “Keeping in view the above situation you are directed to pay your personal attention to this very important matter so that it could be completed well before the onset of the coming flood season, 2010.” The C.E. soon forgot about this “important matter” and the deadline of its completion. On the other hand he was scheduled to inspect the said emergent works on 8-7-2010 in the midst of the flood season.

6.22. **No pre-flood inspection** as per Guidelines was carried out jointly with the Civil Administration and the Army Teams. No pre-flood coordination meetings took place with the Civil Administration by the C.E. It is disturbing to note that after the news of the breach reached the C.E, the entire system was shaken out of slumber and put to immediate work. C.E rushed in from Sargodha and allegedly held tireless meetings with the Civil Administration and the Army teams. This untiring zeal had to be exhibited during the pre flood preparation. In the absence of pre-flood preparedness, post breach exercise does not merit any appreciation. I & P Department forgot that “Prevention is better than cure.”

6.23. We noticed that reference of letter⁴² dated 29.07.2010 Commissioner Sargodha in the letter dated 30-7-2010⁴³ of the Home Department, Government of the Punjab requested for Army force for protection of LMB, Jinnah Barrage. The request was made by the Commissioner for service of 01 Company of Army alongwith three dozers, three hydraulic excavators and other necessary machinery. The Army had not been requisitioned when the breach had taken place on Jinnah Barrage. The Flood Fighting Plan & Guidelines clearly stipulate pre flood coordination with Pakistan Army and the civil administration. Regulations were, therefore, blatantly flouted.

6.24. **Reserve Stone:** According to the Guidelines, funding and procurement arrangement of reserve stones had to be done by 15-3-2010, while procurement, stacking and field checks had to be completed by 15-6-2010⁴⁴. None of the above was done. The entire field formation including the C.E. appears to have slept through the flood season, exhibiting no duty of care, gross violation of the regulations- all this painfully without any remorse or guilt as we observed during the inquiry. It is very disturbing to note that the sufficiency of reserve

⁴¹ Ex I.W. 5/3

⁴² Ex.I.W.11/1

⁴³ Ex I.W.11/1

⁴⁴ Ex I.W.6/1

stone reported to the C.E. in July, 2010 did not raise any alarm with the C.E. (considering that the reserve stones have been missing much before 2009). The sudden procurement in July, 2010 was noted with nonchalance and raised no alarm or concern. This raises serious doubt about the professional capacity and expertise of the C.E. who (in this case) is qualified as a mechanical engineer rather than a civil engineer.

6.25. Under the Guidelines, weekly progress reports regarding procurement / checking of reserve stone have to be submitted by Zonal Chief Engineer (D & F) and Secretary I & P. No such reports were generated and none were seen by the C.E. (D & F) or the Secretary. However, the worrying part is that this did not cause any alarm, then or even now. It is appalling that even today the Secretary or the C.E. (D & F) are not aware of this Regulation, because not a word appears regarding this in the position papers submitted before the Tribunal or in their statements recorded before us.

6.26. Reserve Stock was missing through out the flood season of 2009 as the Stock Register shows a nil balance in June, 2009 when 1,47,012 cft reserve stone was used for the emergent work on the loose stone apron downstream. The Departmental Inspection Committee reported the shortage of Reserve Stone. The amount of stone to be recouped and replenished from the demolished part of RGB is not certain and clear. With all these warnings and uncertainties, the C.E. casually accepted the report of the S.E. dated 13-7-2010 stating that the reserve stone was in place and further communicated the same to the C.E. (D & F). The C.E, as well as, C.E (D&F) should have verified the quantity procured and the site plans showing the stacking done by the field staff of the alleged procured stone.

6.27. The following highlighted Guidelines were totally ignored:

- i. **The Chief Engineers / Superintending Engineers should hold exclusive briefing sessions with the concerned Army Coordination / Monitoring Units to brief them about the flood preparedness activities and the flood restoration works.**
- ii. **The field officers would take immediate steps for procurement of the rationalized / agreed quantities of reserve stock of stone. The Chief Engineers would closely monitor the progress in this behalf in order to ensure implementation of the codal rules/latest Government instructions, which are summarized below:**
 - The Executive Engineers & Superintending Engineers would check the existing stacks 100% and 25% respectively and record their certificate on the site plans as well as in Stock Registers. **These site plans would be furnished to be respective Chief Engineers / Chief Engineer, Drainage & Flood at the earliest. A copy of these plans should also be provided to the Civil Administration / concerned Army Monitoring Teams.**
 - After the stacking of the newly procured reserve stock of stone at site, the concerned Executive Engineers / Superintending Engineers would check the stacks and stone quantities by 100% and 25% respectively, show them on Site Plans / Registers and **immediately inform the respective Chief Engineers / Chief Engineer D&F / Secretary, I&P.** After this, the Checking Teams should be informed in order that they can plan 10% random check of the reserve stone.
 - **The Inspection Teams would check the reserve stone and inform about the out-come of their checking to the respective Chief Engineers / Chief Engineer D&F / Secretary I&P.**
 - **The reserve stone to be procured would also be checked by the respective Deputy Commissioners and Army Monitoring Units. For this purpose, the Executive Engineers would also furnish to the respective Deputy Commissioners and Army Units, details regarding quantity of reserve stone being procured, sites where this reserve stock is to be kept and the expected schedule of supply of the stone at site.**
 - **Weekly Progress Reports regarding procurement / checking of reserve stone would be submitted by Zonal Chief Engineer Drainage and Flood / Secretary I&P.**
- iii. Comprehensive division-wise flood fighting plans should be prepared in accordance with the instructions on the subject (refer Annex-B). **The flood**

fighting plans should be finalized after discussions / coordination with the Civil / Army authorities and these should also be carefully reviewed by the field SEs / CEs. The plans should be well documented and forwarded to the concerned quarters according to the notified schedule

iv. **The Chief Engineers should ensure strict observance of the financial discipline, particularly on the flood works. They should exercise extra vigilance on emergency flood works to be implemented under para 2.89.** In this context, the instructions / procedure identified in the minutes of meeting dated 18-6-1997 conveyed vide I & P Department letters No. US (Floods) Misc-96(I)97 dated 11-7-1997, No. US (Floods) Misc-96(I)97 dated 26-7-1997 and subsequent instructions should be strictly followed. The main points of the instructions are repeated below:

a. The emergency clause should be implemented judiciously and cautiously and **Chief Engineers should ensure their full satisfaction in all such cases.**

b. **Chief Engineer should visit the personally inspect all the works under para 2.89, as soon as possible.**

v. The field officers should exercise strict caution in case scheme revision is warranted. The Government instructions in this behalf should be adhered to in letter and spirit. **The Chief Engineers should ensure that revised scope is not implemented without approval of the competent authority.** In exceptionally compelling / emergent cases, at least approval in principle should be obtained from the competent authority.

2. **It is advised that the implementation of the above instructions / guidelines may kindly be ensured and the Chief Engineers should closely monitor the progress of implementation.**

6.28. The Chief Engineer was under a duty as per the above Guidelines to regularly monitor the emergent works under para 2.89 of PWD Code, especially so when the procurement of the reserve stone had to be recouped from the demolished portion of the RGB.

6.29. As per **paragraph 6.39 of Manual of Irrigation Practice**⁴⁵ (MIP) the stone required for the right and left embankment as well as upstream and downstream, right and left guide bund was **10 lac Cft** as stated by an earlier Chief Engineer, Irrigation Sargodha in his letter

⁴⁵ 1 6.39. Reserve stone is usually sanctioned for guide banks at the rate of 2 ½ lacs cubic feet for each of the upstream and downstream banks and between 1 to 1 ½ lacs for spurs depending upon circumstances. This stone is heaped on the top of spurs and guide banks in stacks not more than 4' high and with gaps at every 100'. (Ex 1.W 121/3)

dated 6.3.1997 (3521/Accounts/97/213/75)⁴⁶. According to the Stock Register the reserve stone in the above quantity has not been stacked at the barrage since 2006 (Stock Registers prior 2006 have not been inspected). During our investigation we noticed that no one including the Secretary, C.E., S.E., XEN and SDO knew the total quantitative requirement of reserve stone to be stacked on the RGB and LGB at Jinnah Barrage for flood fighting. The XEN referred to 7,50,000 cft to be the requirement of reserve stone however no direction or letter specifying this amount was placed before us. C.E. also referred to the said quantity in his statement unsupported by any evidence. Secretary also failed to refer to any document in this regard in his statement. XEN, however, didn't even know of para 6.39 of the M.I.P.

6.30. The quantity of stone to be replenished / recouped from the RGB has not been stated by the Chief Engineer or recorded in any statement, however, according to the present Executive Engineer⁴⁶, Kalabagh headworks (Mr. Masud Anwar Chughtai) at Jinnah Barrage, the stone recouped from RGB in April, 2009 has been recorded in the Stock Register to be 1,47,012 cft, which was utilized on the emergent replenishing work on the down stream loose apron. Was there more stone to be recouped from the RGB? There is no answer forthcoming from any quarter. C.E.'s statement that he was under the constant impression after the start of the flood season in June, 2010 that the stone will be recouped is also unfounded and baseless as the said stone was recouped in April, 2009. This shows weak vigilance, feeble control and poor understanding of the Barrage affairs.

6.31. According to the Canal Wire No.140 dated 23.11.2010^{46-A} issued by Superintending Engineer, Thal Circle to Chief Engineer, Irrigation, Sargodha Zone no payment for the explosives has been made to the Army Authority regarding breaching section at Jinnah Barrage. This contradicts the Certificate of the C.E. dated 11-6-2010 submitted before Provincial Coordination Committee stating that a cheque in the sum of Rs 10 million has been handed over to the Army.

6.32. Reserve stone had to be reflected in the Stock Register of the Barrage and site plans were to be developed by the field officers showing stacking of stones. The Stock Register and the site plans had to be inspected by the XEN and SE. The site plans were to be furnished to the respective C.E. and the C.E (D & F). Such is the importance of reserve stone under the regulations of the irrigation department. Nothing was done and nothing was asked for.

6.33. The performance of C.E. (D & F) and the utility of the said post can be gauged from the quality of the answers^{46-B} given by C.E (D & F) in response to the questions posed by the Tribunal in November, 2010 are reproduced hereunder:

6.33.1. Q.No.(ii): "What is the quantity of stone used for the aforesaid emergent work since its inception in March, 2009"?

⁴⁶ I.W.121

^{46-A} Mark-32

^{46-B} Mark-111

6.33.2. Answer: This information can be provided by the Chief Engineer, Sargodha and his field staff under whose jurisdiction and supervision the work is being carried out.

6.33.3. Q. No.(iii): *“What is the quantity of stone replenished after part removal of RGB at Jinnah Barrage and was the said stone used for the emergent work at the stone loose apron downstream”?*

6.33.4. Answer: The quantity of stone replenished after part removal of Guide Bund is not in the knowledge of this Zone as no information in this regard has been provided by the concerned Chief Engineer Irrigation Sargodha. However, this information must be available with the Chief Engineer, Sargodha.

6.33.5. Q. No.(iv): *“Why emergent work on stone loose apron downstream Jinnah Barrage was allowed to continue during flood season i.e., after 15.06.2010”?*

6.33.6. Answer: Chief Engineer, Drainage & Flood neither allowed continuation of the emergent work on loose stone apron downstream Jinnah Barrage during flood season nor does this fall in the purview / responsibility of Drainage & Flood Zone. Under the direction of Administration Department, the concerned Chief Engineer was required to exercise professional skill in this regard. The circumstances under which permission to continue the work under question was allowed (if allowed) by the concerned Chief Engineer Irrigation Sargodha is best known to him.

6.33.7. Q. No.(v): *“Was the emergent work completed on 21.07.2010?”*

6.33.8. Answer: The completion of the work has not so far been intimated by the concerned Chief Engineer Sargodha to Drainage & Flood Zone, hence the current status of the work is best known to the concerned Zonal Chief Engineer / Incharge field team.

6.33.9. Q. No.(vi): *“Did the said work suffer loss during the recent floods, if so, give estimate amount”?*

6.33.10. Answer: Drainage & Flood Zone has not so far been informed by the concerned Chief Engineer, Irrigation Sargodha Zone about any loss suffered by the said work during the recent floods. The Chief Engineer, Sargodha is in the position to intimate any loss and the estimated amount.

6.33.11. Q. No.(viii): *“Reserve Stock Stone for the training and protection works at Jinnah Barrage is 10 lac cft as per para 6.39 of the M.I.P. The said stone was missing during the flood season 2009 as well as 2010. What steps were taken by the Chief Engineer D&F to ensure the supply of the said Reserve Stock Stone? What is the obligation of Chief Engineer, D&F regarding the said omission”?*

6.33.11. Answer: Procurement of Reserve Stock of stone at barrages or other critical sites is an important item for preparation before floods. Accordingly, all the zonal Chief Engineers were requested to make necessary preparation before commencement of flood season. In response to above, the Chief Engineer, Sargodha vide his letter No.15299/W-II/6-54/2010, dated 27.07.2010 intimated that **“sufficient quantity of stone is available to meet with any eventuality at Kalabagh Headworks”**. Similarly, Chief Engineer, Irrigation Sargodha Zone vide his letter No.8478/Works-II/6-54/2009, dated 15.5.2009 i.e., before flood 2009 intimated that Reserve Stock of Stone is **“available”** at Kalabagh. In view of satisfactory report received from Chief Engineer Sargodha, there was no need to take any further steps.

6.34. Jinnah Barrage, which was declared as sick barrage required extra care this flood season. The poor performance of C.E, C.E (D & F), S.E. and X.E.N reflects otherwise. The Secretary I & P department, who under the Rules of Business of the Provincial Government is the official head of the department and responsible for its efficient administration, discipline and proper conduct of business has not fully discharged his responsibility. His vigilance during the flood season appears to be loose and weak. His systems and control should have been good enough to detect that reserve stone was missing, the alleged procurement was without his approval, the total quantity of reserve stone required at the barrage, the unlawful continuance of emergent work downstream Jinnah Barrage during flood season and the closure of gates much before the start of the flood season. He should have taken extra care considering the Jinnah barrage was one of the sick barrages in his fleet of barrages. The Secretary, as the departmental head, did not fulfill his responsibility. C.E. (D & F) on the other hand was asked questions on 29-11-2010 but he still failed to provide the Tribunal with the information required. The competence and relevance of the post of C.E. (D & F) has become seriously suspect. We were made to understand that the overall head of the flood policy after the Secretary is the C.E. (D & F) but this has been proven wrong by his statements. Is C.E. (D & F) required ?

6.35. The submission of the Secretary that the country was passing through a long dry spell or that the intensity of the floods was unprecedented this year does not at all justify the failure to carry out a responsible pre flood preparation. The omissions have been fatal, resulting in a huge loss. As estimated, restoration cost of LGB is Rs.350 million and of the breach site at RMB and tie bund is Rs. 20 million⁴⁷.

6.36. Para 2.89 PWD Code. Another aspect of the matter is that S.E. or XEN could not have single handedly procured the reserve stone during the Flood Season and therefore had to invoke para 2.89 of the PWD Code, as the procurement would fall under emergent work. Chief Engineer, C.E. (D & F) as well as the Secretary failed to bother how the XEN procured the reserve stone⁴⁸ without their knowledge and without the approval of the Secretary while invoking para 2.89.

⁴⁷ Reference head-wise loss of damages restoration works 2010 Sargodha Irrigation Zone, Sargodha (Ex.I.W.5/3).

⁴⁸ 10 lac cft as per para 6.19 of the M.I.P

6.37. Para 2.89 (1 & 2) of the PWD CODE states :

“(1) It is a fundamental rule that no work shall be commenced unless a properly detailed design and estimate have been sanctioned, allotment of funds made, and orders for its commencement issued by competent authority. Permission granted by Government in orders on a Budget estimate for the retention of an entry of proposed expenditure during the year on a work, conveys no authority for the commencement of outlay. Such permission is granted on the implied understanding that, before any expenditure is incurred, the above conditions will have been fulfilled. Excepting in regard to petty works, as defined in paragraph 2.18, repairs of the nature contemplated in paragraphs 2.20 and 2.59 and in cases of real emergency which must be immediately reported and explained to the authorities competent to accord administrative approval and technical sanction, this injunction may not be infringed. On the other hand, the sanction of a design and estimate by Government or any other authority conveys no permission for the commencement of expenditure on the work, unless such expenditure has been provided for in the budget estimate of the year, or provisions has been made for the outlay within the official year either by re-appropriation or out of some lump sum grant allotted for the head of classification under which the service falls. Similarly no liability may be incurred in connection with any work until an assurance has been received from the authority competent to provide funds that such funds will be allotted before the liability matures.

(2) If in any case, whether on grounds of urgency or otherwise, a Divisional Officer is required to carry out a work for which no estimates have been sanctioned or for which no financial provision exists (whether estimates have been sanctioned or not) the orders of the officer authorizing the work should be conveyed in writing. On receipt of such written orders the officer who is directed to carry out the work should immediately intimate to the audit officer concerned that he is incurring a liability or which there is no provision or inadequate provision of funds and should, at the same time, state approximately the amount of the liability which it is likely he will incur by compliance with the written orders which he has received. The audit officer will then be responsible for bringing the facts instantly to the notice of higher financial authority, with a view to necessary steps being taken either to stop the progress of the work or to regularize its execution. There should be no hesitation in enforcing disciplinary action against any officer administrative or executive, who may fail or delay to comply with these orders.”

6.38. Subsequently, the departmental instructions were further added to the said paragraph. Reference is made to the (a) [Guidelines for Flood Preparedness/works during Flood Season 2000 \(U.S.\(Floods\) Misc-96\(1\)97 dated 10.3.2000](#), (b) [Works to be Implemented Under Para 2.89 of PWD Code In Case of Extreme Emergency \[No.P.A. \(AST\)/8/2001 dated 11.08.2001\]](#), (c) [Execution of Emergent Works Under Para 2.89 of PWD](#)

Code (No.A.S. (Budget) I&P/1-3/2010 dated 30.06.2010)⁴⁹

6.39. Last letter on the subject dated 30.06.2010 is reproduced hereunder for ready reference:-

NO.A.S.(budget) I&P/1-3/2010
GOVERNMENT OF THE PUNJAB
 IRRIGATION AND POWER DEPARTMENT
 Dated Lahore, the 30th June, 2010

To

The Chief Engineers, Irrigation:-

- 1- Lahore Zone, Lahore
- 2- Faisalabad Zone, Faisalabad.
- 3- Sargodha Zone, Sargodha
- 4- Multan Zone, Multan
- 5- D.G. Khan Zone, D.G. Khan
- 6- Bahawalpur Zone, Bahawalpur
- 7- Development Zone, Lahore
- 8- Head, PMO (Taunsa Barage)
- 9- Project Director, LBDCIP Sahiwal.

Subject: **EXECUTION OF EMERGENT WORKS UNDER PARA 2.89 OF PWD CODE.**

In partial modification of the previous departmental instructions regarding execution of emergent works under Para 2.89 of PWD **Code, Secretary, Irrigation & Power Department will allow implementation of emergent works.** Chief Engineers will recommend and monitor all such cases subject to strict observance of all the codal, legal procedural and financial rules / instructions issued by the Government from time to time. The following instructions are reiterated:

- A) Chief Engineer should ensure their full satisfaction before recommending such cases to Secretary, Irrigation & Power Department
- B) All the codal / procedural formalities should be fulfilled before taking up such works.
- C) All the damaged / emergent works under para 2.89 of PWD Code should be independently checked by a team comprising concerned Chief Engineer, one Superintending Engineer, and Executive Engineer who should be from outside the Circle / division where the work is required to be undertaken.
- D) Chief Engineers should visit and personally inspect all the works under Para 2.89 as soon as possible.
- E) Use of stone for emergent works should be restricted to consumption out of stacks of

⁴⁹ Ex I.W. 119/2/1

reserve stock duly checked and documented as per already conveyed instructions. Daily consumption of stone and other materials should always be intimated to all concerned alongwith cost impact of the used materials.

F) The consumed reserve stock should be replenished through XEN/SDO and a contractor other than those involved on implementation of emergent works. The replenished reserve stock should always be checked/ documented as per instructions in this regard before allowing use of replenished reserve stock on implementation of emergent works, if so required.

G) Base line data of all the works should be got checked / verified from the monitoring teams before the start of the works. These teams should always be kept involved during execution and on completion of the works

H) Intimation regarding all such emergency works should also be communicated to the concerned District Coordination Officer.

I) Chief Engineers should exercise proper professional skill and adopt most economical and technically sound proposal in each case.

J) Chief Engineer D&F Lahore would be overall coordinator who should always be kept apprised by concerned XEN /SEs /CEs of all the daily activities and liabilities incurred on emergent works. He may exercise adequate checks as and when deemed fit by him to ensure quantitative as well as qualitative control of emergent works.

K) Chief Engineer D&F as well as concerned Chief Engineer shall keep Secretary I&P posted / updated on the progress of implementation of all such emergent works.

L) The applications for arrangement of funds against the emergent works should contain following information

- i) Name of Works
- ii) Approval of Secretary, Irrigation & Power Department (No. & Date)
- iii) Head of Account
- iv) Estimated Cost
- v) Mode of execution (through contractor, Departmental Machinery or through Stock)
- vi) Amount already paid.
- vii) Expenditure incurred through stock and its adjustment
- viii) Balance amount to be Paid / Adjusted
- ix) Additional Funds required.

ADDITIONAL SECRETARY (Budget)

CC.

1. Additional Secretary to Chief Secretary, Punjab, Lahore
2. Chief , Strategic Planning and Reforms Unit (SPRU), I&P Department, Lahore.
3. Additional Secretary (Technical) Irrigation & Power Department, Lahore.
4. Project Manager, Third Party Monitoring of O&M Works.
5. P.S. to Secretary, Irrigation & Power Department, Lahore.

6.40. On the basis of above, para 2.89 of PWD Code, only Secretary, I & P Department can allow the implementation of emergent work whereas Chief Engineer will recommend and monitor all such cases subject to strict observations of all the codal, legal procedural and financial rules / instructions issued by the Government from time to time. It, therefore, means that in the case of Jinnah Barrage any procurement of the reserve stone allegedly made between 29th to 31st July, 2010 was not in compliance with the above instructions/regulations.

6.41. Vide letter dated 21/23 September, 2000⁵⁰ of the Additional Secretary (Technical)⁵¹ addressed to all Chief Engineers including Sargodha Zone it was directed that in future, field divisions shall obtain supply of stones from Sikhanwala Quarry only. Change in source can only be allowed by the I & P Department on a reference from the concerned Divisions through the Zonal office. However, in the current situation XEN in violation of all the regulations has shown to have allegedly procured reserve stone from private quarries in Sargodha. Why ? there is no answer.

6.42. The C.E. (D & F) once again exhibited total ignorance and incompetency towards important flood related matters. Responding to the questions raised by the Tribunal, the C.E. submitted:⁵²

6.42.13. Q. No.(i): *“What were the daily checks put in place by Chief Engineer, D&F Lahore regarding emergent work carried out under Para 2.89 of PWD Code on the stone loose apron downstream Jinnah Barrage”?*

6.42.14. Answer: The Chief Engineer, Drainage & Flood does not exercise daily checks on any work carried out under Para 2.89 of PWD Code because he acts as “Coordinator” only and as such, exercise the daily check does not fall under purview / responsibility of Drainage & Flood Zone. Therefore, no daily site checks were performed by this Zone on the work of replenishing loose stone apron downstream Jinnah Barrage.

However, under the orders of Administrative Department, the concerned Chief Engineer and the Monitoring Team comprising of Chief Engineer concerned, one Superintending Engineer and one Executive Engineer are required to perform close

⁵⁰ No. S.O. (OP)(I&P) 18-26/98

⁵¹ EX IW-119/2/1

⁵² Mark 111

monitoring for all purposes before, during execution and after completion of the work. (emphasis supplied)

6.42.15. Q. No.(vii): *“Is it also the responsibility of Chief Engineer of the concerned Zone to closely monitor all the emergent works under para 2.89 of PWD Code”?*

6.42.16. Answer: According to the orders / directions of the Administrative Department, the concerned Chief Engineer, Irrigation Sargodha Zone and the Monitoring Teams mentioned earlier are entirely responsible for close monitoring of all the emergent works under Para 2.89 of PWD Code in the Zone before start of work, during execution of after [sic] completion of work. Responsibility of the Chief Engineer, Drainage & Flood is “to coordinate only” between the Zonal Chief Engineers and the Admin Department.

6.42.17. Q. No.(ix): *“According to the SE, XEN and SDO Jinnah Barrage, Reserve Stock Stone was procured on emergent basis on 29th and 30th July 2010. Was Chief Engineer, D&F informed of the said procurement under paragraph 2.89 of the PWD Code? What is the position of the Chief Engineer, D&F regarding the procurement of Reserve Stock Stone from Sikhanwali and Musakhel quarries as per record of the Chief Engineer, D&F and what is the current status of the Reserve Stock Stone at Jinnah Barrage”?*

6.42.18. Answer: According to the record, the Chief Engineer, Drainage & Flood was not informed about the said procurement on emergent basis on 29th and 30th July, 2010 under Para 2.89 of PWD Code. Further, it does not fall in the purview / responsibility of Chief Engineer, Drainage & Flood to allow for carriage of stone from any quarry. It is the authority / responsibility of the concerned Zonal Chief Engineers to allow and sanction such works in accordance with Government rules in this regard. Further, Drainage & Flood Zone was not intimated by the Zonal Chief Engineers about any procurement made for reserve stock stone from Sikhanwali and Musakhel quarries. Current status of the Reserve Stock Stone at Jinnah Barrage has also not been intimated by the Zonal Chief Engineer except previous intimation made vide No.15299/W-II/6-54/2010, dated 27.07.2010 that “sufficient quantity of stone is available to meet with any eventuality at Kalabagh Headworks”. As such, all actions taken in the above regard pertain to the authority / responsibility of the concerned Zonal Chief Engineer Sargodha. However, the current status of the reserve stock of stone at Jinnah Barrage can be provided by the concerned Chief Engineer, Sargodha Zone.

6.43. We find that pre-flood preparation was not done as per Regulation and Guidelines. Reserve Stone stacking is fundamental to pre-flood preparedness. In this case there was no reserve stone at the Barrage since 2006. Infact, no one had any idea as to the exact requirement of reserve stone required for the training works at Jinnah Barrage. Therefore,

the letter of S.E, reassuring the C.E. and the Secretary that the reserve stone is available does not mention the quantity of reserve stone procured. The Secretary or C.E also did not bother to confirm the reserve stone required and therefore could never have know if the reserve stone had been fully procured. We are deeply disturbed at the insouciance and the indifference of the irrigation officers towards one of the most crucial aspect of pre flood preparation i.e., procurement of reserve stone, which undoubtedly forms the bed rock of any successful flood fighting plan.

6.44. Additionally, alleged procurement of reserve stone without invoking Para 2.89 of the PWD Code should have caused a stir and shaken the Secretary, C.E.(D & F) and the C.E out of their slumber as Secretary's permission was not sought for the said procurement but nothing happened and all of them accepted the sudden and rather magical presence of the reserve stones which were missing since long.

6.45. Jinnah Barrage, which was declared as sick barrage which required extra care, especially during the flood season. The poor pre-flood preparation and weak vigilance of C.E, C.E (D & F), S.E. and X.E.N does not reflect this. The Secretary, who under the Rules of Business is the official head of the department and responsible for its efficient administration and discipline and proper conduct of business of the department did not discharge his responsibility well. His vigilance during the flood season appears to be loose and weak. His systems should have been good enough to indicate to him that the reserve stone was missing, the alleged last minute procurement of reserve stone was without his approval, assessment of the total quantity of reserve stone required at Jinnah Barrage, the unlawful continuance of emergent work downstream Jinnah Barrage during flood season, the closure of gates much before the start of the flood season till the day of the breach. He should have taken extra care considering the Jinnah barrage was one of the sick barrages in his fleet of barrages. The Secretary, as the departmental head, did not have the right systems in place and failed to attend to details that were expected of him during the flood season. The argument that the country was passing through a long dry spell or that the intensity of the floods was unprecedented this year does not at absolve the department and its officers from carrying out the pre flood preparation responsibilities.

6.46. CONCLUSION

6.47. The poor pre flood preparation i.e., absence of reserve stone, failure to deploy labour for flood fighting, poor stocks of flood fighting material, failure to set up flood fighting camps, failure to hold pre flood inspection as regulated, abuse of Para 2.89 of the PWD Code, continuance of emergent work downstream on the loose apron, closures of the gates during the flood season, contradictory versions regarding unlawful last minute procurement of reserve stones reflect gross incompetence, little regard for regulation, deep rooted corruption in the face of a national tragedy, misinformed and weak administrative vigilance. All these factors cut a sorry picture of a chaotic dysfunctional governance structure at the I & P Department which is certainly not fit or able to handle floods - unless the department is re-engineered.

7. FLOOD FORECASTING

7.1. According to Dr. Qamar uz Zaman Chaudhary's⁵³, DG PMD during the recent Floods: July 23, 2010 was a normal monsoon day when a monsoon low-pressure system developed over the Bay of Bengal and started moving slowly towards Pakistan. As it reached the skies over Pakistan around July 26, 2010 another westerly trough was approaching the northern parts of Pakistan and the two weather systems started interacting over the country's north-western regions.

7.2. He further submitted that the event was aggravated by the presence of a stagnant jet stream (a tunnel of strong winds at high altitude) at an abnormally low latitude in the north, which helped suck a lot of moisture from the ocean into the monsoon system, aggravating the whole event and causing the heaviest rainfall in recorded history over Khyber Pakhtunkhwa, Gilgit-Baltistan and eastern Afghanistan, [especially in the evening of July 28 and the whole day of July 29.](#)

7.3. Ex DG, PMD was of the view that the rainfall, which was about five times higher than the usual July rainfall in this area, causing flash flooding in the Swat and Kabul rivers. The heavy rainfall in the Hindu Kush and Karakoram mountain ranges also accelerated snow and glacier melt and their combination caused unprecedented floodwater in the Indus river at Tarbela. The combined effect of the flood peak at Tarbela and the Kabul and Swat rivers, and extremely heavy rainfall in the plains of Nowshera, Risalpur, Mardan and Peshawar generated the first flood wave in the Indus.

7.4. He continued to submit that this was not the end of the weather chaos. On August 3rd, 2010 another monsoon low-pressure system formed over the Bay of Bengal and followed the same track: a frozen jet stream and a westerly trough were lying in wait and caused the second heavy rainfall between August 6th and 9th in Khyber Pakhtunkhwa, Gilgit-Baltistan and Ladakh. This second rainfall event generated the second flood wave. These two flood events caused the longest sustained floods in Pakistan's history. For reference purposes, the sustained flood peak of over one million cusecs at Guddu lasted for eight days and 17 hours. Previous similar historic flood peaks of 1992, 1998 and 1986 at Guddu lasted for 28 hours, six days, 22 hours and five days, 11 hours respectively.

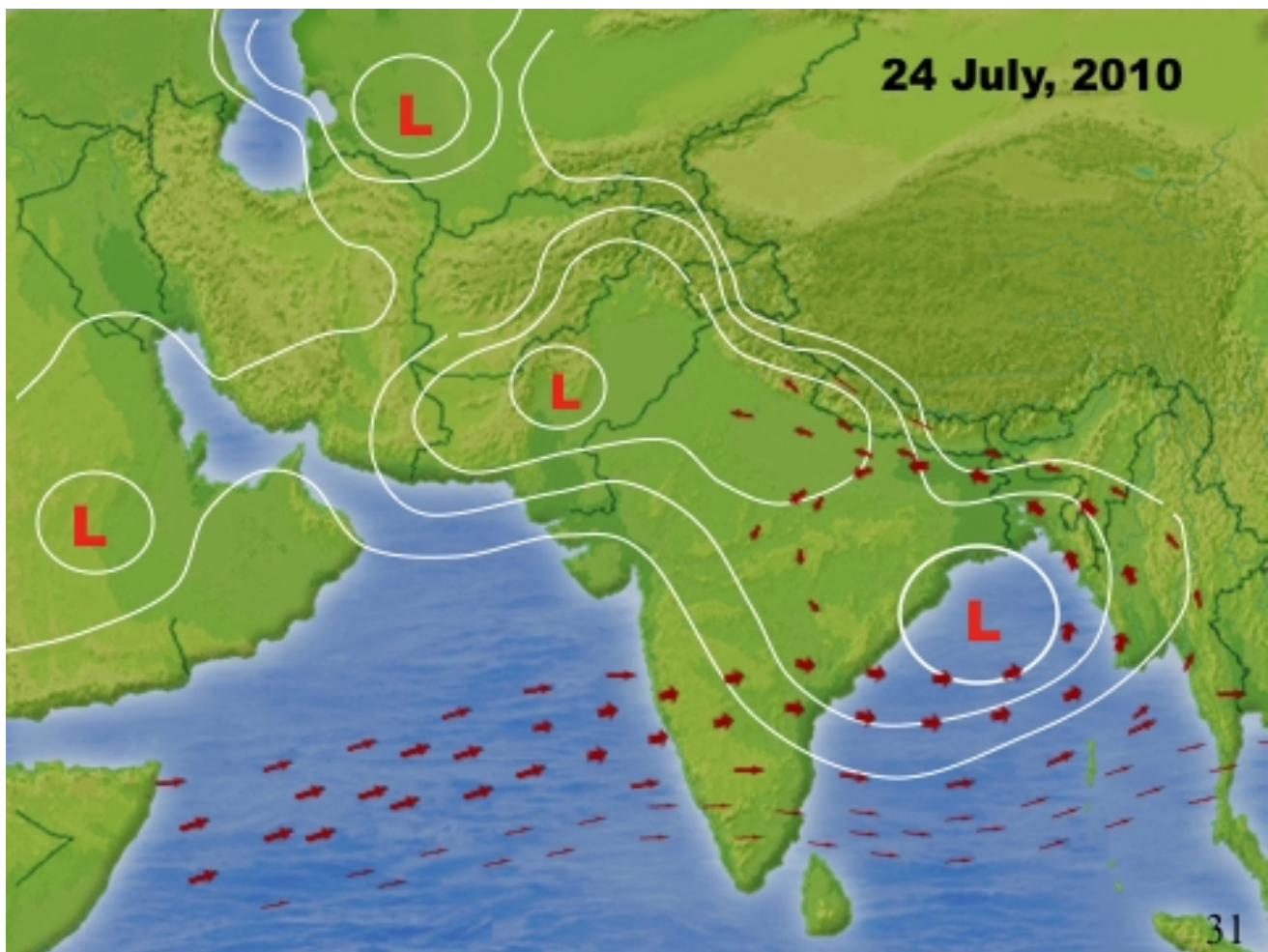
7.5. Dr. Qamar uz Zaman Chaudhary submitted that Pakistan's Task Force on Climate Change in its report very clearly stated that in the country, extreme events would increase in their frequency and intensity while monsoon rains in the country would be more erratic, causing frequent floods and drought. The answer to the question about linking Pakistan's weather chaos to climate change would be easier if we looked at our weather patterns over the last eight months. The year started with drought conditions in the country. March witnessed abnormally high temperatures that affected our wheat production badly because of premature ripening. Then in the first week of June the southern parts of the country were

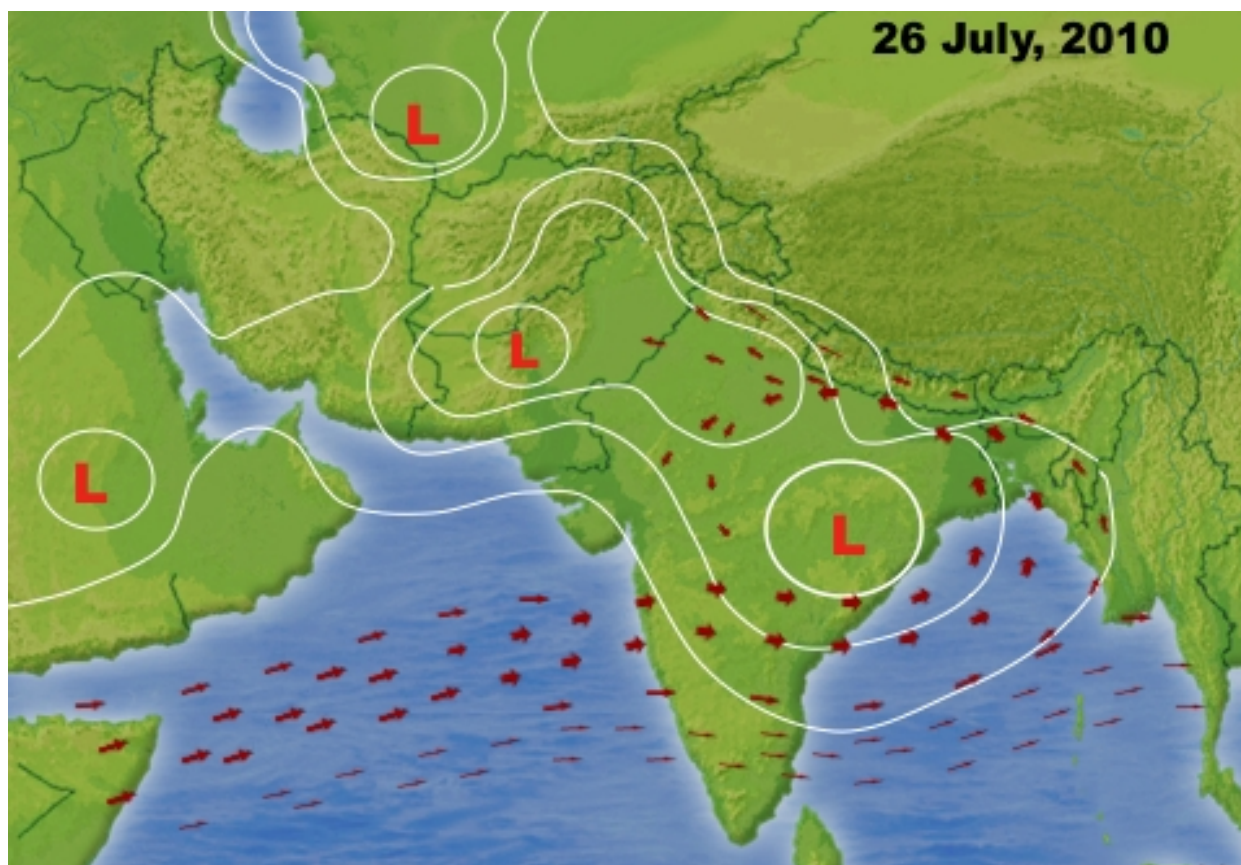
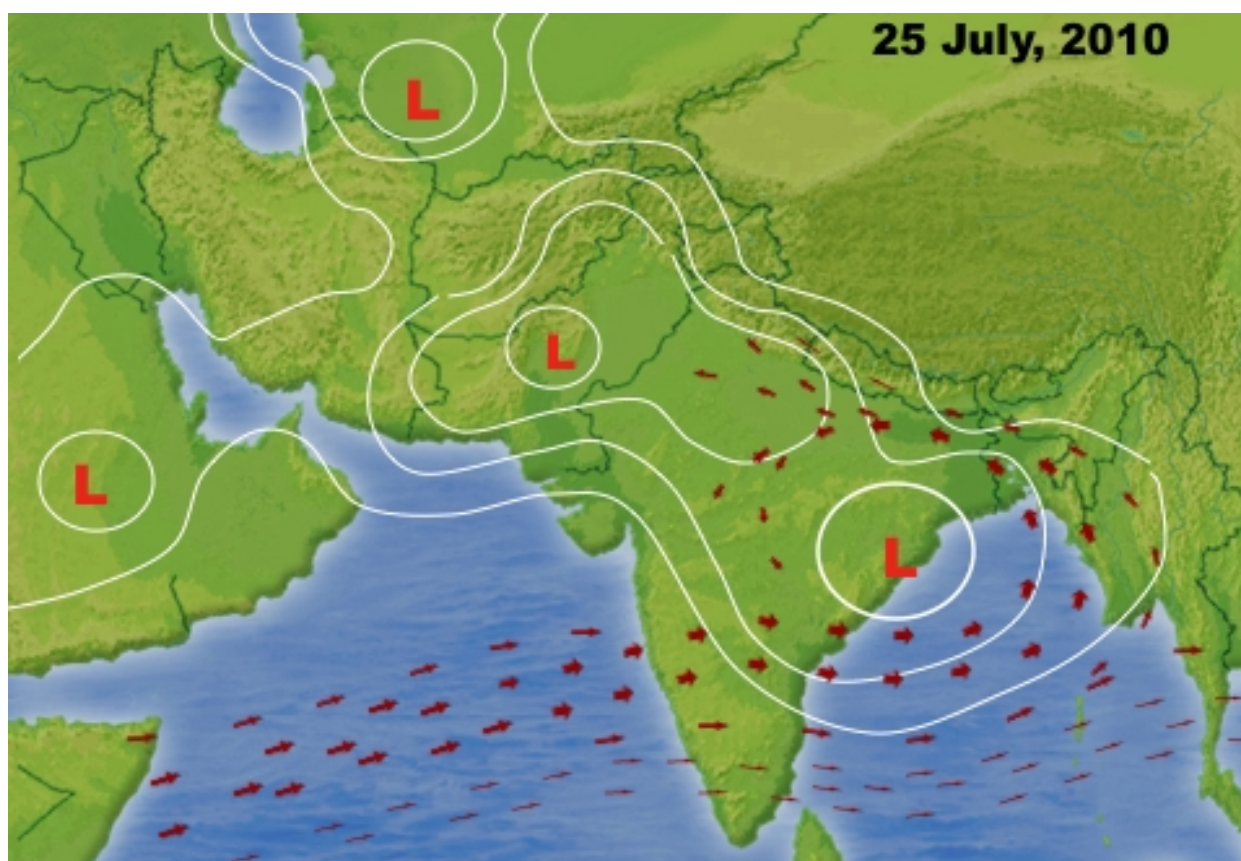
⁵³ Ex.I.W.88/2

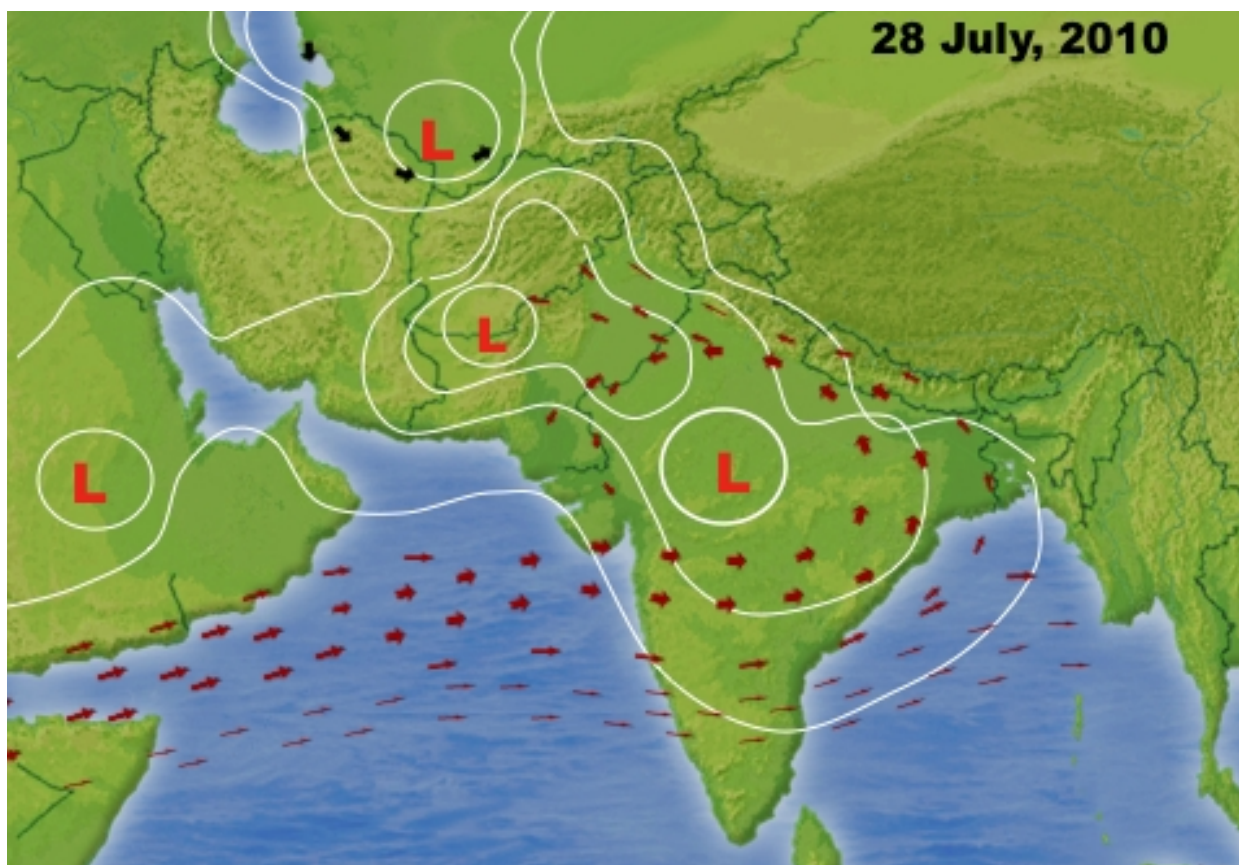
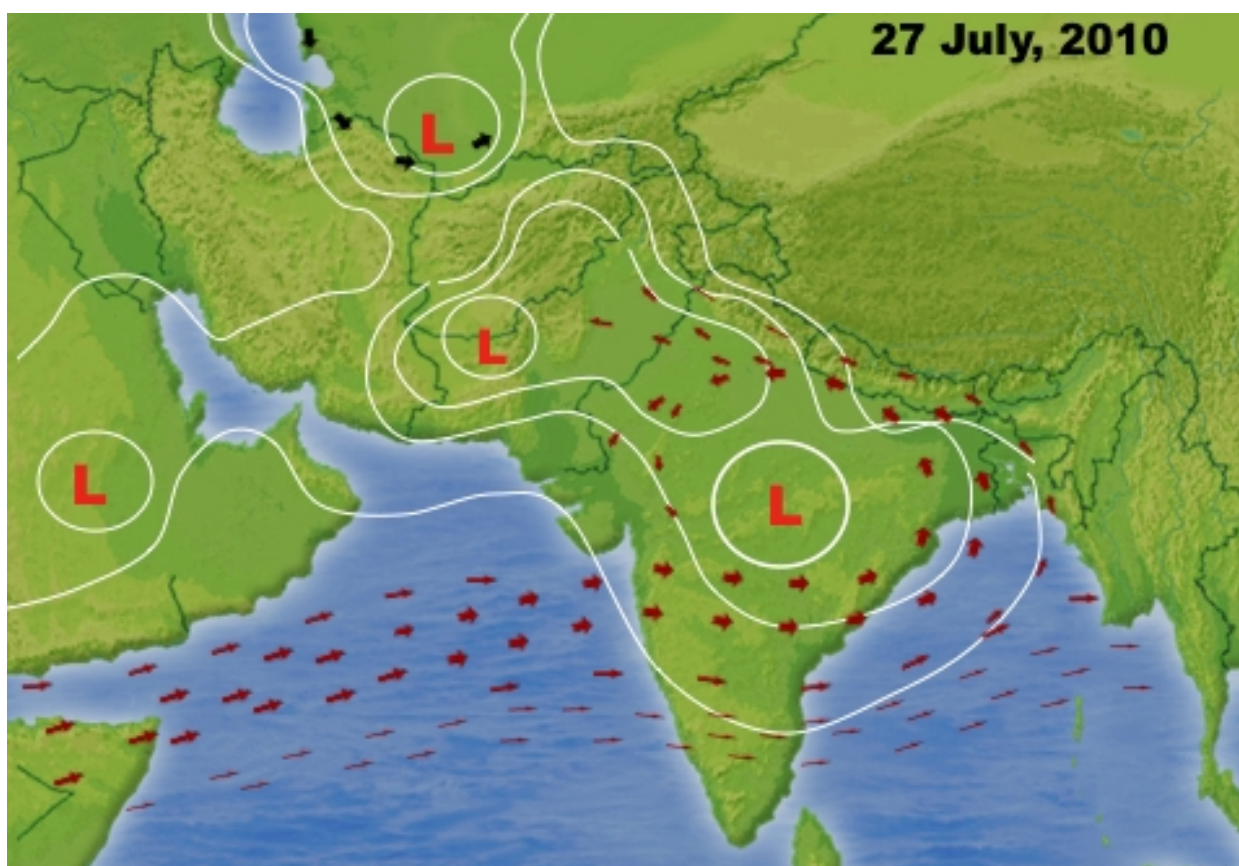
struck by a tropical cyclone, another extreme event. In the remaining part of June the country experienced heat-wave conditions that broke all previous records, while in the last week of July and August the country experienced the worst floods of its history. Can we still afford the luxury to deny that this is not because of climate change? Surely all these extreme events are the visible footprints and signs of climate change in Pakistan.

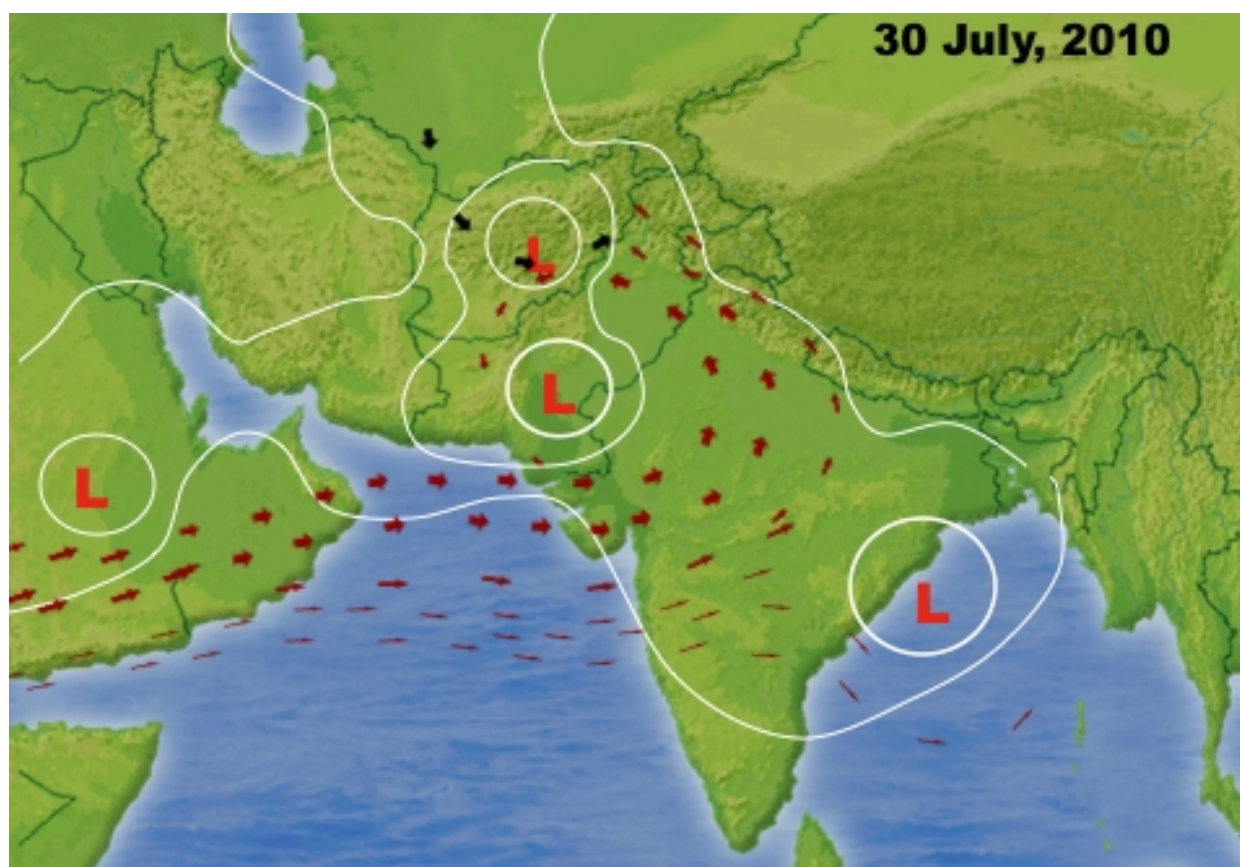
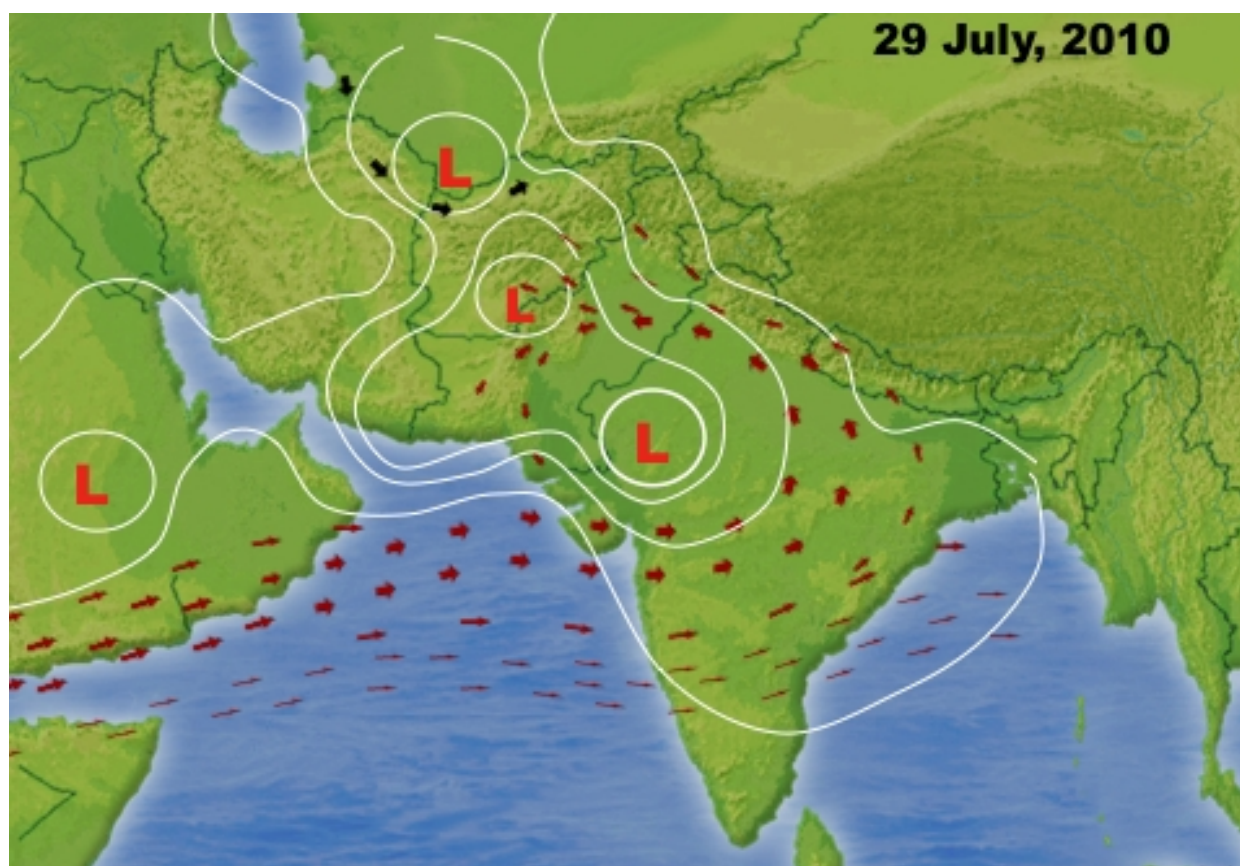
7.6. He recommended development policies should be in line with climate change scenarios, which indicate erratic monsoon rains with frequent and intense floods and droughts in Pakistan. Further, the flood forecast and early warning system in the country should be strengthened. River flood plain laws and regulations should be formulated and strictly implemented, as during the present floods most of the damage was in the flood plain areas. There also needs to be further strengthening of flood- protection bunds wherever possible while the construction of flood-mitigation dams should also be considered.

7.7. The interactions of westerly-easterly waves are shown in the following diagrams:



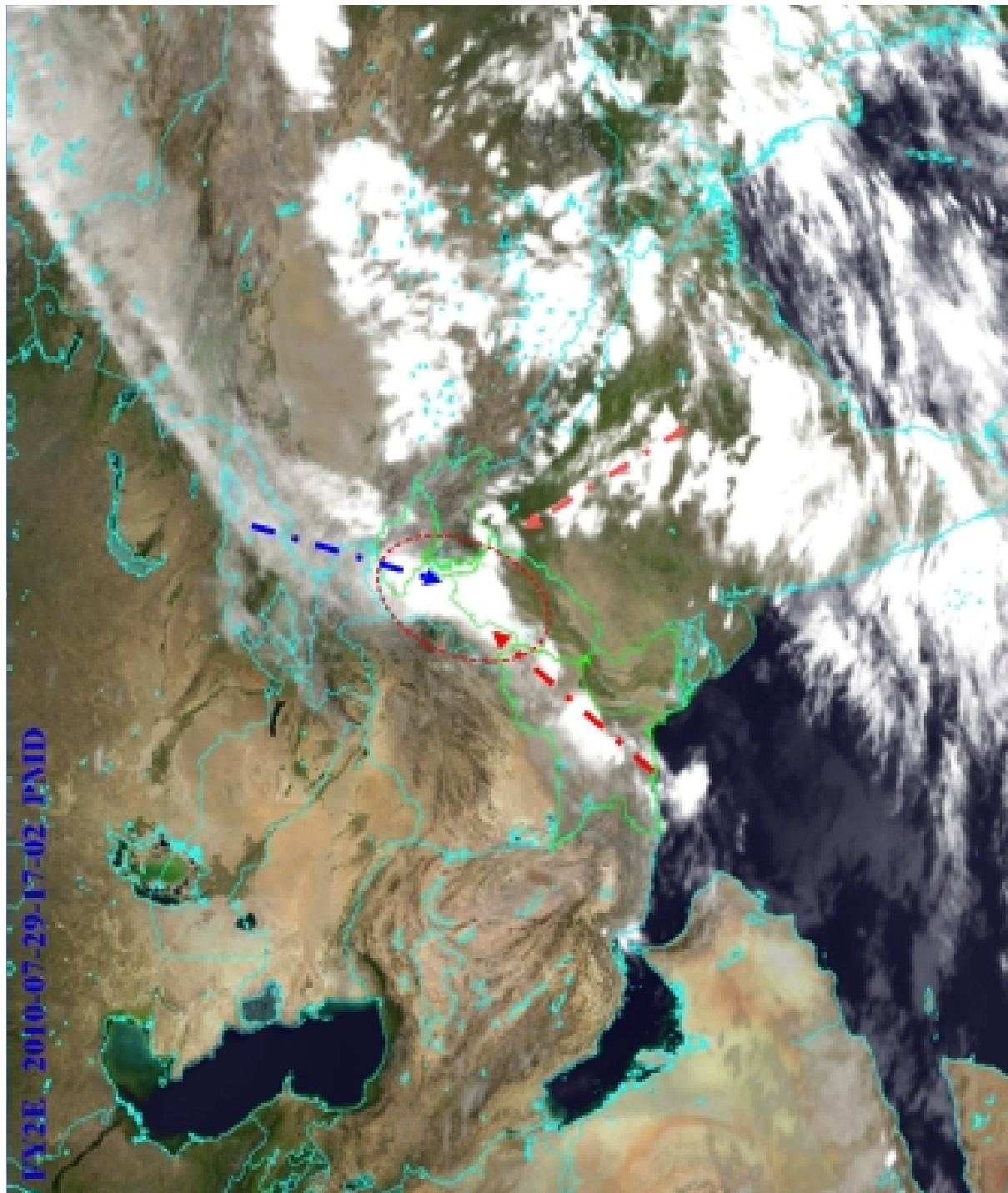








Interaction of 2 Weather Systems: St Image of 29th July



7.8. **Meteorological condition responsible for the flood of July/August 2010⁵⁴:** According to PMD, a well marked low pressure area was located in Bay of Bengal on 25th July 2010 which after traveling over Madhya Pradesh (India) reached the state of Gujarat, India on 27th July 2010. On the same day this low entered Pakistan and merged into the seasonal low at Balochistan and adjoining areas. This condition accentuates the seasonal low and under this situation heavy rainfall was expected over Khyber Pakhtunkhwa (KPK), Punjab and over Kashmir also, due to strong incursion of moist current from Arabian Sea. The presence of westerly waves over KP and adjoining Afghanistan aggravated the situation and record breaking rainfall was recovered over KP, Gilgit Baltistan area.

7.9. After a gap of four days another low pressure, which originated from Bay of Bengal was located over Rajasthan on 5th August 2010, which also merged with seasonal low over Balochistan on 6th August 2010. This was once again accentuated by the presence of westerly wave over Afghanistan & adjoining KP. This interaction of two systems again produced heavy rain in KP, north Punjab, Kashmir and Gilgit Baltistan. The intensity of rains was however less than the first system.

7.10. The record breaking rains in the north of Pakistan, which is a part of catchment of river Indus, generated a historic peak at Tarbela (8,32,000 cusecs at 0400 PST on 30-07-2010). The release of more than 600000 cusecs from Tarbela was joined by a flow of more than 3,50,000 cusecs from river Kabul at Nowshera (the gauge of Kabul river at Nowshera was over topped and it is presumed that the water flow was more than 3,50,000 cusecs). This massive flood wave struck Kalabagh barrage on 31st July 2010. It was a near historic peak (9,37,459 cusecs at 2200 PST on 30-07-2010). After passing Kalabagh barrage, the flood wave reached Chashma on 1st August 2010. The flood wave was more than the capacity of Chashma barrage; however this historic flow (10,38,873 cusecs at 1400 PST on 01-08-2010) managed to pass through the barrage without damaging it. The flood wave reached Taunsa Barrage (9,59,991 cusecs) on 02nd August 2010. At Taunsa, the flood wave was slightly attenuated and the exceptionally high flood level continued for a longer period as expected. From Taunsa this flood wave reached Guddu on 8th August 2010. It was also a historic peak at Guddu measuring 1,148,738 cusecs at 1100 PST on 08-08-2010. The flood wave further traveling down touched Sukkur on 09th August 2010. The volume of water at Sukkur (1,130,220 cusecs) was more than the capacity of the barrage but again the flood wave passed safely without any damage to the barrage. The volume of water can be imagined by the fact that more than 1,130,000 cusecs of water continued for more than 60 hours at Sukkur. Finally, Kotri barrage started to rise slowly and the peak flow of 9,38,438 cusecs was recorded on 24-08-2010 at Kotri.

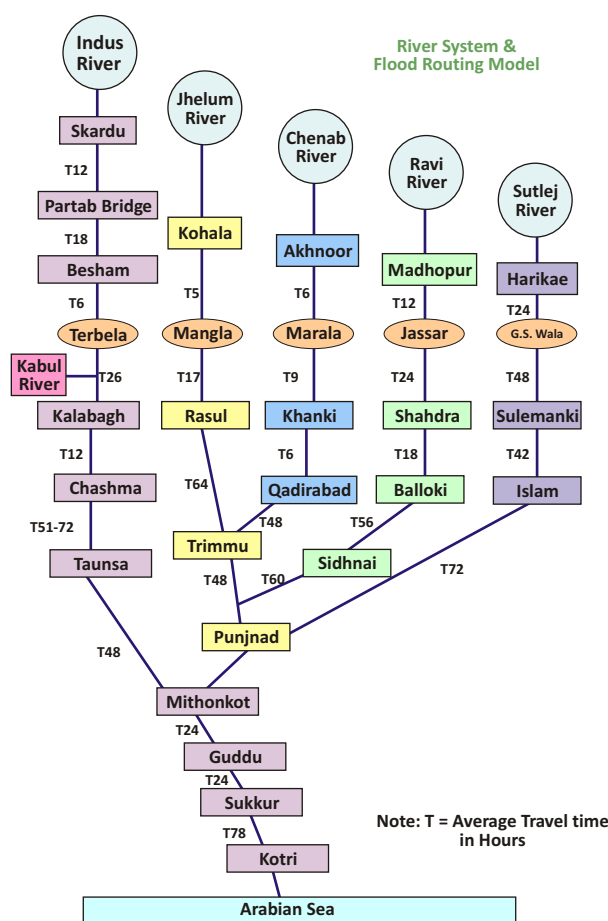
7.11. A second spell of very high flood wave followed the first flood wave due to the second rainy system described above. River Indus at Tarbela again started to rise from 6th August-2010 and a peak discharge of 5,72,000 Cusecs was recorded on 9th August 2010. Consequently the flow at Kalabagh barrage also started to swell from 10th August-2010 and max flow of 6,89,742 Cusecs was recorded there on 10th August-2010. Chashma Barrage

⁵⁴ Ex.I.W.3/2

once again recorded very high flood of 8,12,307 cusecs on 8th August-2010. The second flood wave reached Taunsa barrage on 14th August-2010 when the peak discharge of 7,79,227 cusecs was observed there. After hitting Taunsa the second flood wave reached Guddu where effects of first wave were still present and the water level had not come down. The river at Guddu recorded peak of 1,148,738 cusecs on 8th August-2010 and started to fall but hardly came down below 10,00,000 cusecs when under the influence of second flood wave the water level again started to rise from 14th August-2010 and reached a peak discharge of 1,076,728 cusecs on 16th August-2010. Particularly, the second flood wave merged with the first flood wave after Guddu and the combined effect of the two waves was observed at Sukkur and Kotri.

7.12. *Flood Warning (Significant Flood Forecast)- Position of PMD:* The mandate of FFD (PMD) is to issue flood forecasts and warnings/advisories relating to the flood situation likely to occur during next 24 hours. The warning is definitely issued and the related agencies who are directly affected are informed as well. These warnings are not only faxed to the related agencies but the confirmation regarding its receipt is also confirmed on phone. Simultaneously the Flood Warning Center (established by the Irrigation Department Punjab under the logistic support of Relief & Crisis Management Punjab) is also immediately informed for necessary action at their end (as provided in the SOP).

7.13. The River System and Flood Routing Model prepared by PMD is as follows:



Source: Flood Forecasting Division, Pakistan Meteorological Department

7.14. During this flood event, the first warning for the river Indus at Tarbela, was issued at 1900 PST on 28.07.2010 (warning No.9). At the time the flood at Tarbela was 4,60,000 Cusecs. Due to the extraordinary heavy rainfall in the upper catchment of Indus River, high to very high flood was expected at Tarbela and Kalabagh. Consequently, a warning of expected high flood at Kalabagh was issued at 2200 hrs PST on 28.07.2010 (warning No.10). At that time the flood at Kalabagh was 2,72,424 Cusecs.

7.15. Due to continued worst weather observed over Khyber Pakhtunkhwa, adjoining Kashmir and Afghanistan, second warning for very high to exceptionally high flood likely to be observed at Kalabagh was issued at 1030 hrs. PST on 30.07.2010 (No.14). The actual peak was observed at Kalabagh at 2200 hrs. on 30.7.2010 i.e, about 12 hours after the warning was issued. Eventually this peak was to reach Chashma and a high to very high flood warning for (No.15) Chashma was issued at 1040 hrs PST on 30.7.2010. At that time Chashma was maintaining a level of nearly 7,00,000 Cusecs while the peak (1038873 cusecs) reached Chashma at 16:00 PST on 01.08.2010, 54 hours after the warning was issued. Due to this exceptionally high flood the river Indus started to rise at Taunsa and warning (No.16) for exceptionally high flood at Taunsa was issued at 1340 PST on 31st July 2010. The actual peak of 9,59,991 Cusecs was observed at Taunsa at 2100 PST on 02.08.2010 about 55 hours after the warning was issued by Flood Forecasting Division, Lahore.

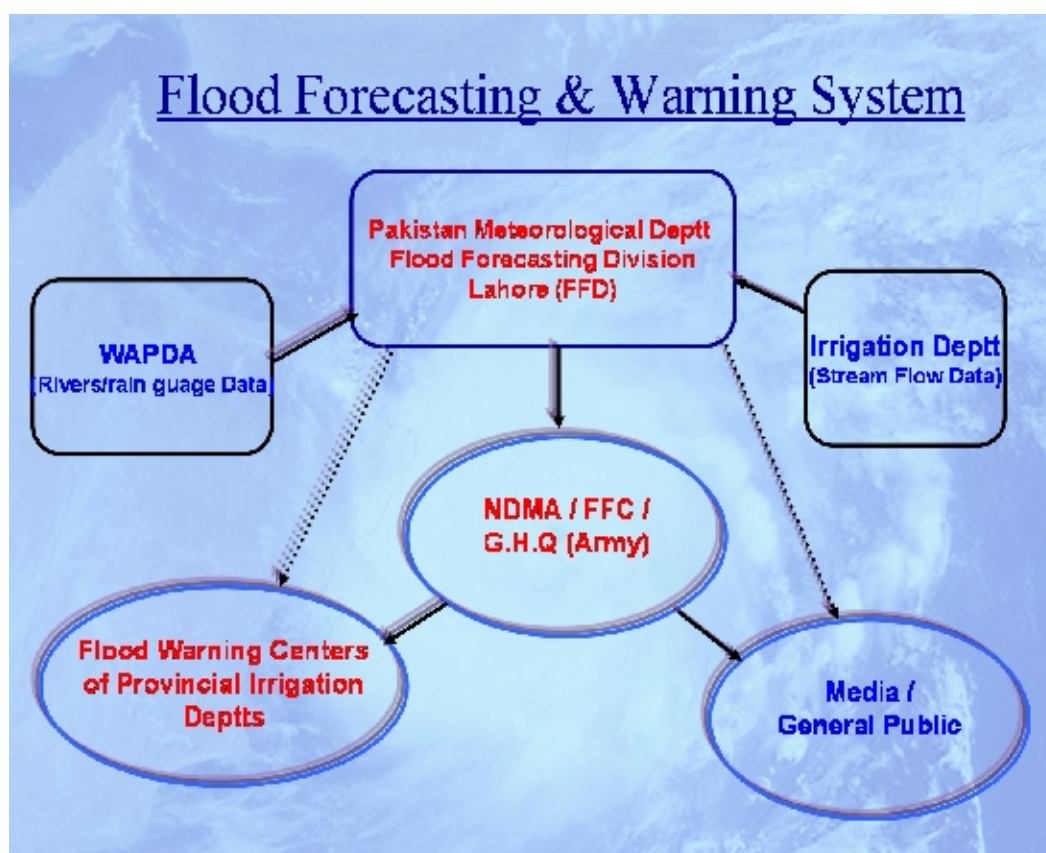
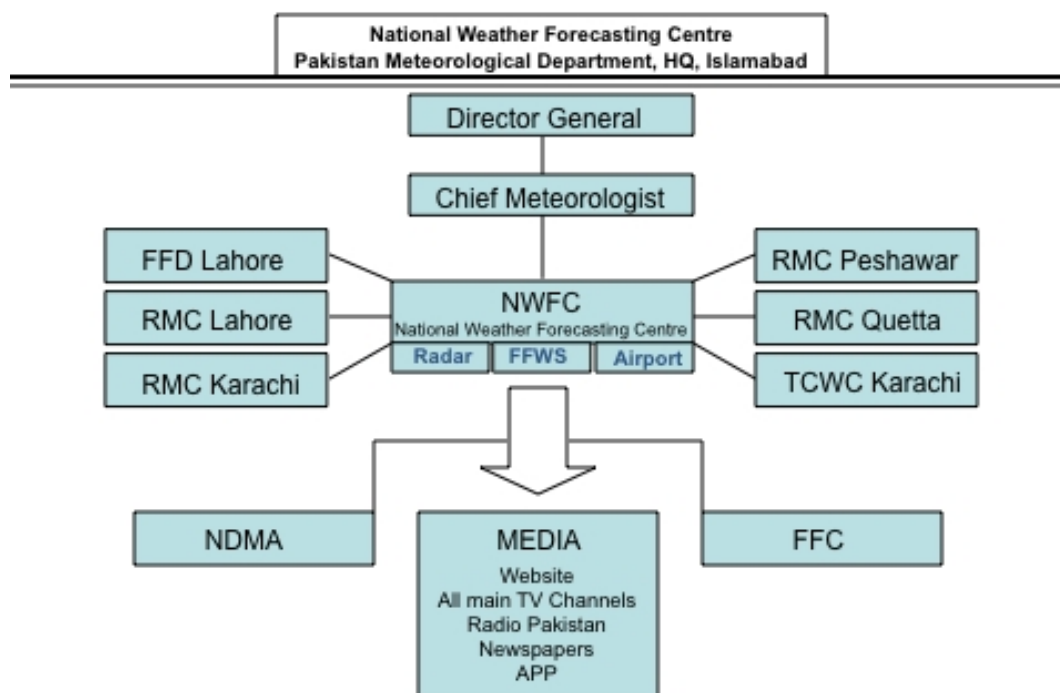
7.16. In the mean time the second wave was also generated due to the continuous high rainfall observed in the upper catchment of river Indus on 3rd, 4th and 5th August-2010. A fresh warning of very high wave likely to be observed at Tarbela, Kalabagh and Chashma ranging between 5 to 7 lac was issued at 1700 hrs PST on 7th August-2010 (No.32). While the actual peaks were observed at Tarbela (5,72,000 Cusecs) at 2300 hrs. PST on 9-08-2010, at Kalabagh (6,89,742 Cusecs) at 1500 PST on 10-08-2010 and at Chashma (8,12,307 Cusecs) at 2100 PST on 11.8.2010, more than 48 hrs after the time of issuance of warning.

7.17. Very high flood was again expected at Taunsa, therefore very high flood warning (No.35) ranging between 680000 to 730000 Cusecs was issued by FFD, Lahore at 1130 hrs. PST on 9.8.2010, while the actual peak of 7,79,227 Cusecs was observed at 1200 hrs PST on 14.8.2010, actually 5 days after the issuance of warning by FFD, Lahore.

7.18. INQUIRY & FINDINGS

7.19. *Structure of PMD:* Two more relevant specialized early warning centres of PMD for this inquiry are the National Weather Forecasting Centre (NWFC), Islamabad and Flood Forecasting Division (FFD), Lahore. NWFC and FFD are structured in the following manner⁵⁵:

⁵⁵ PMD Ex IW3/1



7.20. **SOP⁵⁶ REGARDING HYDRO-METEOROLOGICAL FORECASTING BY FFD, PMD.** According to the SOP (Hydro-Meteorological Forecasting) floods are classified into five levels in the following manner:-

Sr. No.	Classification	Detail
1	Low Flood	It is that flood situation when the River is flowing within deep channel(s) but is about to spread over river islands/belas.
2	Medium Flood	The river is called in Medium Floods when River flows is partly inundating river island/belas but flow half of its highest flood level.
3	High Flood	When the water level of the River is almost fully submerging islands/belas and flowing upto high banks/bunds but without encroaching on the freeboard.
4	Very High Flood	When the water level of the river flows is between high banks/bunds with encroachment on freeboard.
5	Exceptionally High Flood	It is the flood situation where there is imminent danger of overtopping/breaching or a breach has actually occurred or high bank areas become inundated.

7.21. According to the SOP, Floods in Pakistan are mainly caused by the heavy Monsoon rains during summer monsoon period from July to October. There are two situations which cause flood producing rains in the upper catchments of the Rivers. The two meteorological situations in relation to different conditions of intensity and movement of Monsoon low data depression may produce three categories of floods namely; **Category-I, II & III floods.**

7.22. Meteorological situation for Category-I flood is when seasonal low generally built over South Eastern Balochistan, South Western Punjab and adjoining parts of Sindh gets occasional intensity due to the passage of Westerly Wave and thus causes the moisture from the Arabian Sea to be brought up to the upper catchments of Chenab and Jehlum Rivers resulting in heavy downpour along the windward slopes and the mountain ranges due to the orographic lifting of the moist or mass. Floods in these conditions are Category-I floods,

⁵⁶ Ex.IW.3/2

which may cause a short peak ranging from 3 to 5 lac cusecs under extreme conditions. This poses no serious flood management problem for the Mangla Reservoir due to short duration and its less volume.

7.23. The second flood generating meteorological situation is the one linked with Monsoon low data depression such Monsoon systems originating from Bay of Bengal Region and then moving across India in a West/North westerly occasion arise over Rajasthan or any of the adjoining cities of India. After this the Monsoon depression may take any one of the following courses:-

7.23.19. Continue moving toward west causing heavy widespread rains over Sindh, Balochistan in river flooding course in this case.

7.23.20. Re-curve in the North South direction towards the upper catchments Setluj, Ravi and Chenab Rivers causing extremely heavy rainfall and consequently the flood first occurs in India and then at the rim station of Pakistan. This is the Category-II flood situation. In this situation floods first occurs in River Chenab. Ravi and Jhelum are affected in sequence followed by River Setluj. Floods in River Jhelum in this situation may be significantly greater than the Category-I Floods and may thus cause more flood management problems for the Mangla Reservoir. However, the problem can safely be resolved by resorting to safe pre-flood releases;

7.23.21. Continue moving in the Northern direction under the effect of considering Westerly Waves over Lahore/Gujranwala Division anywhere ending up over Rawalpindi / Hazara Divisions. However upper catchments of Chenab, Jhelum and Indus rivers comes under its influence extremely heavy rains may occur over Mangla and Tarbela catchments under this situation. This probable maximum flood (PMF) has an extreme case of Category-III Flood. These are most dangerous floods for Mangla Reservoir typical example of such flood is 1992 flood.

7.24. The Meteorological factors linked with each situation are generally well known and [24 hours advance prediction should be quite possible in each case](#). In fact tracking of the depression from the Bay of Bengal and its reporting on continuous basis in the daily forecast bulletin issued by FFD. Once the depression reaches Rajasthan extremely close watch is kept using meteorological charts and satellite cloud pictures. As the depression advances towards Pakistan and comes within the meteorological range of Lahore Radar and intensify weather starts [color coded met alerts are issued as applicable](#). There are two types of systems one is Westerly Wave and the other is Monsoon system.

7.25. Precipitation in weather (which is mainly in the form of snow) is on account of eastward moving low pressure weather systems called westerly waves, which mostly move about 30 degrees latitude and deposit snow over the mountains. Snow deposited during the winter becomes the major source of water supply in the summer.

7.26. Rainfall in the summer is on account of Monsoon weather systems unlike the westerly waves. The Monsoon weather system is a low level weather system with heaviest rainfall limited to till 5,000 ft elevation. During summer even through Monsoon rain changing weather system yet the system of westerly waves also continues to affect the country along the northern latitudes. Intensification of Monsoon weather system and Northern curving of the Monsoon depression is due to the westerly waves.

7.27. Flood forecasting system has three components namely: (i) Meteorological, (ii) Hydro-Meteorological; and (iii) Hydrological.

a. Prediction and monitoring of the rainfall forms the Meteorological component; forecasting of the flood flows using the actual and predicted rainfall and flow data of the upstream stations constitutes the Hydro-Meteorological component of the flood forecasting system; and the routing of the flood wave below the rim station of the rivers is the Hydrological component of the forecasting system

b. There are three kinds of flood forecasting: (i) Qualitative flood forecast; (ii) Quantitative Flood Forecast; and (iii) Early Warning.

i. QUALITATIVE FLOOD FORECAST is meant to provide advance information about the approaching weather systems, which may cause such loss as may result in generation of significant flood wave in the Indus basin river system. Qualitative Flood Forecasts are issued at the time when the approaching weather system is still outside the river catchments but may move into it in the due course of time. [Such forecast for longer reach time are thus extremely important in providing reasonable advanced information to activate the flood fighting measures at all levels.](#) Category-II & III Floods occur when Monsoon depression upon reaching Rajasthan State of India re-curves to the North or the North East. Chances of the major flood may thus develop in case the Monsoon low depression arise over Rajasthan. [This is the time when all the concerned government agencies need to be alerted to face the possible flood situation.](#) The following color coded alerts are therefore issued. “**Blue Alert**” in case possibility of flood within 24 to 72 hours depends upon the future improvement of the Monsoon. In case Monsoon starts to stagnate over the same position it either fizzles out or becomes stronger, depending upon the availability of the moisture in it. In case it starts to intensify the chances of re-curving shall increase and it starts to move northward, occurrence of flood may become imminent. Consequently this is important stage when another alert is issued. This is more alarming alert than the previous one is called “**Yellow Alert**”, in case the low depression starts to directly affect the catchments areas and the heavy flood producing rains are starts the “**Red Alert**” is immediately issued. Quantitative of the flood picture can only be done after the total storm rain becomes available. This however may be too low for rescue purposes as the time to peak flood if the rain is relatively small in case of most of rivers on account of steep slope of the upper catchments. Thus three qualitative flood forecasts color coded **Blue, Yellow & Red** alerts are issued to alert the

government agencies.

ii. **QUANTITATIVE FLOOD FORECAST:** Routine Daily Flood Forecast (RDFF) is issued once a day and is based upon the discharge measurements of 0600 hours PST, Meteorological Charts latest APT pictures data of Lahore, Sialkot, Mangla and Islamabad Radars and the Indian discharge data as received through PCIW the forecast is issued before the mid day for 24 hours period.

iii. **EARLY WARNING:** If the flood situation undergoes rapid fluctuations significant flood forecast is issued by FFD.

7.2.8. The seasonal forecast issued by the PMD on 23-6-2010 was as follows:

No.St-3(3)/2010/
GOVERNMENT OF PAKISTAN
PAKISTAN METEOROLOGICAL DEPARTMENT
Climate Data Processing Center
University Road Karachi -75270
Phone No.021-99261412,021-99261413

PRESS RELEASE⁵⁷

Date: June 23rd, 2010

Normal Monsoon Rains Predicted during July-Sep (2010)

Meteorological data suggests that on all Pakistan Basis the monsoon rains during July to September (2010) in most parts of the country are likely to be NORMAL (#10%), which means that the over all availability of water in the country from monsoon rains would be sufficient.

Met-Office informed that due to high sea-land temperature contrast, the development of some mid-tropospheric circulations are likely in north Arabian Sea that may cause heavy rainfall events over southern area of Pakistan (Sindh) during July to September. **Due to the interactions of westerly-easterly waves, few very heavy rainfall events would also occur over north-east Pakistan that may cause urban/flash flooding during July to September.** (emphasis supplied)

This is seasonal forecast with confidence level of 80% and meant for the planning purpose only. The normal area-weighted rainfall for July to September of Pakistan is 137.5 mm.

Sd/-
(NAEEM SHAH)
DIRECTOR C.D.P.C,
FOR DIRECTOR GENERAL
METEOROLOGICAL SERVICES,
KARACHI

In June, 2010 PMD issued seasonal forecast predicting interactions between westerly-easterly waves and very heavy rainfall events over north east of Pakistan. This forecast had a

⁵⁷ Ex I.W. 3/10

confidence level of 80%. The seasonal forecast seems to have missed the attention of the flood managers. It is also not clear if the said seasonal forecast was communicated to the I & P Department by PMD or it was simply a (one off) press release ? This information should have been widely circulated and flood managers should have internalized it as a useful information in their flood strategy.

7.2.9. The **Meteorological Analysis**⁵⁸ of PMD of the critical dates are relevant:

7.30. **July 24th, 2010- Upper Air Situation**-According to upper air charts, the **cyclonic circulation** was found at 5000 feet over Bay of Bengal. The incursion from Bay of Bengal was reaching upto U.P. India. However light Westerly winds prevailed over north parts of Pakistan.” **Weather Advisory-I of the said date** forecasted weather for KPK in the following manner:- “Heavy falls expected on Tuesday, Wednesday” (i.e., 27 & 28th July, 2010).

7.3.1. **25th July, 2010** The Meteorological analysis for the above dates states “fairly wide spread rains were expected with heavy falls over the most parts of the country during next 72 hours. It was based upon the movement of cyclonic circulation over Bay of Bengal and the presence of a westerly trough over Afghanistan.”

7.3.2. **26th July, 2010** -Meteorological Analysis: The cyclonic circulation over India has moved rapidly in NW direction and today lies over North Madhya Pradesh. **Under its influence moist air currents from Bay of Bengal and from Arabian Sea have started converging over North of Pakistan. Weather Advisory-2** (26th July, 2010. Time 18:00 PST) “A low pressure system that developed over North Bay of Bengal on Saturday, is now located over central parts of India. **This low pressure system is now likely to move westward and instead of south-southwest ward. Under the influence of this weather system, strong monsoon currents will start penetrating Pakistan territory tonight, particularly in Punjab, and the intensity of monsoon currents is likely to increase from Tuesday.”** i.e., 27th July.

7.33. **27th July, 2010**-Meteorological Analysis-Upper Air Chart- “The 850 mbs and 500 mbs charts indicate that the moist current from Arabian Sea had increased and the trough of westerly wave had also become prominent over **North of Pakistan indicating the situation becoming dangerous.”**

7.3.4 **The Significant Flood Forecasts**⁵⁹ issued by PMD are as follows:

7.3.5. **Significant Flood Forecast (No.9) issued on 28-7-2010 at 1900 hrs** PST predicts that **medium to high flood level** at Tarbela ranging between 3,90,000 to 5,30,000 cusecs during the period 1930 hrs PST 28-7-2010 to 1000 hrs PST of 29-7-2010.

(Note: This forecast is issued just 30 mins before the actual event. While the presentation of PMD states that the quantitative forecast is 12 hours in advance).

⁵⁸ Ex I.W. 3/2

⁵⁹ Ex I.W. 3/2

7.36. **Significant Flood Forecast (no. 10)** issued on 28-7-2010 at 2200hrs predicts medium to high flood at Kalabagh ranging between 4,00,000 to 5,40,000 cusecs during the period 0400 hrs of 29-7-2010 to 2200 hrs PST of 29-7-2010.

(Note: This forecast is also has less than 12 hrs to the actual event).

7.37. **Significant Flood Forecast (no. 12)** issued on 29-7-2010 at 12:45 hrs predicts High to Very High flood level ranging between 600,000 to 700,000 at Taunsa Barrage during 0600 hrs of 31-7-2010 to 0600 hrs of 1-8-2010.

7.38. **Significant Flood Forecast (no. 14)** issued on 30-7-2010 at 1030 hrs predicts very high to exceptionally high flood ranging from 7,60,000 to 900,000 cusecs during 1600 hrs of 30-7-2010 to 1800 hrs of 31-7-2010 at Kalabagh.

(Note: six hours before the predicted flood).

7.39. **Significant Flood Forecast (no. 15)** issued on 30-7-2010 at 1040hrs predicts that river Indus at Chasma is likely to attain a very high to exceptionally high flood level ranging between 7,80,000 to 900,000 cusecs during the period from 0400 hrs of 31-7-2010 to 2000 hrs of 31-7-2010.

7.40. **Significant Flood Forecast (no. 16)** issued on 31-7-2010 at 1340hrs predicts that River Indus at Taunsa is likely to attain an exceptionally high flood level ranging between 8,50,000 to 950,000 cusecs during the period 1800 hrs of 1-8-2010 to 1800 hrs of 3-8-2010.

7.41. Flood Forecast issued by FFD is as under:

FLOOD FORECASTING DIVISION⁶⁰
FLOOD FORECAST (IN 000 OF CUSECS)

Sr no.	date	stations	actual 0600	forecast	TARBELA DAM LEVEL (FT)
1	24-7-2010	TARBELA	120.5	220-250	1503.05
		KALABAGH	251.7	240-270	
		CHASMA	300.4	280-310	
		TAUNSA	293.4	320 R 380	
2	25-7-2010	TARBELA	121	200-220	1505.9
		KALABAGH	204	210-245	
		CHASMA	281.3	250-290	
		TAUNSA	323.7	345-380	
3	26-7-2010	TARBELA	280	210-230	1507.46
		KALABAGH	190.7	200-R-270	
		CHASMA	281.3	250-300	
		TAUNSA	290.6	310-F-250	

⁶⁰ Data collected from Ex I.W. 3/2

Sr no.	date	stations	actual 0600	forecast	TARBELA DAM LEVEL (FT)
4	27-7-2010	TARBELA	219.5	250-290	1508.44
		KALABAGH	245.6	260-300	
		CHASMA	255.7	300-360	
		TAUNSA	265.2	260-280	
5	28-7-2010	TARBELA	115.8	290-340	1511.98
		KALABAGH	276.2	290-330	
		CHASMA	234.8	300-450	
		TAUNSA	246.8	240-265	
6	29-7-2010	TARBELA	439.1	500-620	1515.88
		KALABAGH	410.4	450-R-700	
		CHASMA	507.9	520-R-700	
		TAUNSA	235.4	230-245	
7	30-7-2010	TARBELA	603	600-750	1522.85
		KALABAGH	685.5	750-900	
		CHASMA	743.5	750-900	
		TAUNSA	269.3	280-350	
8	31-7-2010	TARBELA	476	400-500	1524.22
		KALABAGH	855.9	800-F-650	
		CHASMA	974.2	950-F-700	
		TAUNSA	407.9	450-R-700	
9	1/8/10	TARBELA	357	370-440	1525.22
		KALABAGH	776.6	750-F-600	
		CHASMA	1001	1000-F-790	
		TAUNSA	617.6	650-R-850	
10	2/8/10	TARBELA	327	350-370	1526.22
		KALABAGH	736.4	700-F-550	
		CHASMA	837.8	800-F-700	
		TAUNSA	793.7	800-R-950	
11	9/8/10	TARBELA	490	562-650	1536.10
		KALABAGH	595	600-R-750	
		CHASMA	708.9	710-R-760	
		TAUNSA	566.4	570-R-620	

R= Rising F= Falling

7.42. I & P DEPARTMENT'S POSITION ON FLOOD FORECASTING

7.43. According to Secretary I & P Department⁶¹: “The significant flood forecast for River

⁶¹ I.W.6

Indus at Kalabagh was received by the I & P Department from PMD on 28th July, 2010 (warning no. 10) time of the said forecast was 2200 hrs... Canal Wire no. 2911 dated 29-7-2010 was issued around 2pm on 29-7-2010 to all the Chief Engineers as well as Executive Engineers, in the light of the forecast issued by the PMD.”

7.44. According to the record, Secretary, Irrigation & Power Department directed the Flood Emergency Cell (FEC) on 08.06.2010 to start functioning in the Irrigation & Power Department w.e.f. 16.06.2010 under the overall control and supervision of Director, Indus Water Treaty & Regulation, Punjab⁶².

7.45 The above Flood Emergency Cell had the following functions:

- To receive, collect and maintain all the information related to river discharges and flood situation in Punjab
- To receive and review the flood damage reports from the field formations/Zonal Cells and immediately bring to the notice of Secretary, I & P for further necessary action.
- **To keep a close liaison with the Flood Warning Centre and Regional Meteorology Office, Lahore for obtaining information regarding flood forecasting/expected river and flood discharges.**
- **To plan course of action in case of anticipated/approaching flood emergencies.**
- **To brief the Secretary, I&P about the flood situation on daily basis.**

7.46. Zonal Flood Emergency Cells/Centers were also set up on 05.06.2010 and 11.06.2010 in Sargodha Zone Sargodha and D.G. Khan Zone respectively⁶³. Office order whereby Zonal Flood Emergency Centers were set up stated:

“The above named officials will not attend their offices during flood duty period. Sick or C/leave of the above officials will be approved/sanctioned very sparingly by the Head of their offices with the provision of substitute. The officials so deputed will also perform their duty on Saturday, Sunday / Holidays according to their turn.”

7.47. Additionally, a frontline Flood Warning Centre (FWC) of the I & P Department works alongside the Flood Forecasting Division of PMD in Lahore and is the pivotal warning centre of the Department. This internal early flood warning capacity of the I & P Department is set up in parallel to the FFD of PMD.

⁶² Mark 88

⁶³ Mark 89

7.48. Summary of the flood warnings⁶⁴ issued by FWC during the critical dates have been plotted hereunder from the data called from FWC:

At Tarbela

Sr. No.	Location	Flood level	Discharge	Date	Time	Rising/ Falling.
1.	Tarbela Dam	Medium flood	390700 Cfs	28.07.201	1200 hours	Rising
2.	Tabela Dam	Medium flood	392100 Cfs	06.08.2010	1600 hours	Rising

At Kalabagh

Sr. No.	Location	Flood level	Discharge	Date	Time	Rising/ Falling.
1.	Kalabagh	High flood	501060 Cfs	29.07.2010	1200 hours	Rising
2.	Kalabagh Dam	Very high flood	658770 Cfs	29.07.2010	2000 hours	Rising
3.	Kalabagh Dam	Very high flood	731403 Cfs	1.8.2010	2000 hours	Falling
4.	Kalabagh Dam	High flood	624500 Cfs	10.08.2010	0600 hours	Rising
5.	Kalabagh Dam	Very high flood	667921 Cfs	10.08.2010	1700 hours	Rising
6.	Kalabagh Dam	Exceptionally high flood	869512 Cfs	1.10.2010	1000 hours	Rising

At Chasma Barrage

Sr. No.	Location	Flood level	Discharge	Date	Time	Rising/ Falling.
1.	Chashma Barrage	Medium flood	378809 Cfs	21.07.2010	2400 hours	Rising
2.	Chashma Barrage	Medium flood	397940 Cfs	28.07.2010	2400 hours	Rising
3.	Chashma Barrage	High flood	507904 Cfs	29.07.2010	0615 hours	Rising
4.	Chashma Barrage	Very high flood	663072 Cfs	29.07.2010	2000 hours	Rising
5.	Chashma Barrage	Exceptionally high flood	818724 Cfs	30.07.2010	1000 hours	Rising
6.	Chashma Barrage	High flood	549899 Cfs	05.08.2010	0600 hours	Rising
7.	Chashma Barrage	Very high flood	755744 Cfs	10.08.2010	0600 hours	Falling
8.	Chashma Barrage	Exceptionally high flood	803578 Cfs	11.08.2010	1400 hours	Rising
9.	Chashma Barrage	High flood	512584	25.08.2010	0400 hours	Rising

At Taunsa Barrage

Sr. No.	Location	Flood level	Discharge	Date	Time	Rising/ Falling.
1.	Taunsa Barrage	Exceptionally high flood	841399 Cfs	2.8.2010	0900 hours	Rising
2.	Taunsa Barrage	High flood	608205 Cfs	10.8.2010	0600 hours	Falling
3.	Taunsa Barrage	Very high flood	652017 Cfs	10.08.2010	1600 hours	Rising

⁶⁴ Mark 87/1-22

7.49. According to the record of the Irrigation Department, the significant flood forecast for River Indus was received on 29.7.2010 at 12:55pm⁶⁵ from Chief Meteorologist, PMD, Lahore stating that river Indus at Taunsa is likely to attain **High Flood to Very High Flood level** ranging from 600,000 Cfs to 700,000 Cfs during the period of 0600 hours of 31.07.2010 to 0600 hours of 01.08.2010. On the basis of same, Canal Wire No.2911, date 29-7-2010 was issued by Chief Monitoring, PMIU with the following directions from Secretary, I & P Department, namely:

- i. **Chief Engineers and S.Es. should inspect the barrages and embankments and ensure their safety by taking appropriate measures;**
- ii. Ensure that the flood management mechanism is in place;
- iii. The supervisory staff should also camp on the embankments as prescribed in the flood fighting plan.
- iv. Duties to the staff be assigned according to the forecast as prescribed in the flood fighting plan.

7.50. Through Canal Wire No.2910 of the same day Chief Engineer, Development, Irrigation & Power Department was directed to keep machinery ready for flood protection as and when required by the canal officers.

7.51. The next forecast was received from Chief Meteorologist, FFD, PMD on 30.7.2010 which states the following:

“The expected flows in river Indus at Kalabagh is likely to attain a **very high to exceptionally high flood** ranging between 760,000 Cfs to 900,000 Cfs during the period 1600 hrs PST on 30.07.2010 to 1800 hrs PST on 31.07.2010.

7.52. According to Dr. Qamar-uz-Zaman Chaudhry, former Director General, PMD⁶⁶, in Pakistan (but was the Director General, PMD during the Floods under investigation) we have the flood forecasting system based on Hydro Meteorological System, which is an advanced system as compared to the Hydrological System. **Under this system with proposed precipitation, floods can be forecasted which is not so in the hydrological system, which measures the run off water to estimate floods. The PMD has three Precipitation Measurement Radars (PMR)** for the said purpose and there is a special Flood Forecasting Division within the PMD. However, on the contrary, Hazrat Mir, Chief Meteorologist, FFD in his statement submitted that the FFD⁶⁷ did not forecast the flood on the basis of the NWFC forecasts which showed extreme monsoon on 27.07.2010 and, in fact, relied on the real time data received from WAPDA and Irrigation Department.

7.53. The Director General of PMD further submitted that he had pointed out in the pre flood meeting held under the auspices of NDMA at the Prime Minister's Secretariat,

⁶⁵ fax machine time appearing on the document.

⁶⁶ IW-88

⁶⁷ IW-89

Islamabad that there was a possibility of extreme monsoon event this year. This was based on the data received from WMO through emails and website showing convergence of Easterly and Westerly winds in the north of the country. The Director General submitted that by 27th July 2010, PMD had noted that weather in the catchment area of River Indus over KPK was an extreme monsoon, which was unprecedented. According to him, the weather advisory reports issued subsequent to 27th July 2010 were issued keeping this information in mind. He submitted that PMD had found out that KPK was to receive high rainfall on 26th and 27th July, 2010. “However, the said data was not relied upon for the purposes of flood forecasting because of low confidence of PMD in the said data due to the fact that over the last 100 years, such rainfall/data had not been received. Therefore, the actual flood warning of heavy floods was given after the actual rain.” We do not endorse this view. Stagnation of the two weather systems was not an unprecedented event for PMD. “low confidence” by our weather forecasters is disappointing.

7.54. According to Dr. Muhammad Hanif, Director, NWFC, PMD, Islamabad⁶⁸, “on 27.07.2010 it was confirmed to PMD that weather was heading in the direction of KPK which is its catchment area. At this time it was clear to PMD that weather system contained very heavy rainfall. It was also clear to PMD that there would be stagnation due to the interaction of Western and Eastern systems. I admit that the seriousness and the urgency was not fully communicated in the weather advisory report on 26.07.2010 or 27.07.2010 which simply forecasted wide spread rain/thunder showers”. He further submitted “that the forecast issued by PMD and FFD in my understanding had the ability to work out the flood [forecast].” He further commented that: “I also admit that the observatories preparing the forecast do not factor in climate change. I admit that we have to be very careful as such weather system can develop even next year on any catchment area/KPK.”

7.55 Dr. Ghulam Rasool, Chief Meteorologist (R&D), PMD⁶⁹ submitted that NWFC had predicted on 27th July 2010 that there was extreme weather in KPK with very heavy rainfall within next 24 hours. I admit that the seriousness and urgency as predicted by NWFC was not translated in the forecast issued. He further submitted “that on the basis of weather forecast by HRM, FFD could have assessed the water flow and the flood levels.” Both NWFC and FFD failed to deliver timely weather forecasts.

7.56. On institutional level, the erstwhile Director General submitted that PMD does not have a Precipitation Measurement Radar that can cover the catchment area of River Indus. There is also no weather radar in the said area. For this purpose a radar has been proposed at Cherat and is under consideration for the last many years. In the absence of Precipitation Measurement Radar, as well as, weather radar, PMD relied on the satellite information as well as HRM model, which in turn relies on global data, to develop weather forecast for the area in question (i.e., KPK). The former Director General submitted that PMD needs more weather radars to enhance coverage all over Pakistan as well as up-gradation of various

⁶⁸ IW-90

⁶⁹ IW-91

models and forecasting system for the hill torrents. The Director General in his pre flood meetings did not flag this institutional deficiency. No document has been placed before us to show that PMD made desperate efforts for procuring the radar at Cherat. FFD on the other hand developed forecasts on the basis of the real time rain data and placed no reliance on the satellite information mentioned by the Director General.

7.57. Dr. Muhammad Hanif, Director, NWFC, PMD, Islamabad submitted that in Pakistan there are 80 fully equipped Weather Observatories (in addition to five semi equipped observatories). These observatories generate data every three hours. Once the data is collected by the observatories, it is transmitted within five minutes to Central Data Base, Karachi (PMD) which is then shared internationally. He pointed out that radars can only estimate weather condition in real time whereas the Weather Observatories can carry out forecast. PMD/NWFC is now using High Resolution Model (HRM), 11 km x 11 km to convert low resolution data into high resolution data. The data generated by HRM is called Grid Point Data and it is not real time data and HRM largely covers the entire country. However, inspite of the above, the forecast issued by NWFC left much to be desired. There are four Chief Meteorologists looking after Droughts, R&D, Flood and Seismology Departments. Seasonal forecast is the mandate of Climate Data Processing Centre (CDPC), Karachi Centre, also referred to as the Data Bank. CDPC generates seasonal forecast issued in the end of June for the next three months which this year predicted that Monsoon will have 10% increased rainfall. The said seasonal forecast was later on improved by the PMD. It was noticed by PMD that this year Eastern and Western Weather System will converge during Monsoon season, resulting in [very heavy rainfall over northern part of the country](#)⁷⁰.

7.58. According to the Director, NWFC, Seasonal Forecast this year regarding heavy rainfall was publicly advertised through website and newspaper in the last week of June, 2010. The Director narrating the extreme weather that developed over KPK submitted that on 18th/19th July, 2010 the Weather System over Bay of Bengal had developed and on 20th July, 2010 its intensity in the vertical column was upto 20,000 feet and it was a strong weather system. When the weather system reached Central India on 21.07.2010, it is at Rajasthan that the weather system determines its future course, it decides either to move into Sindh or dissipate in the Arabian Sea or to move upward to Kashmir and hit the catchment area of Indus basin resulting in heavy rainfall. This year weather system moved in the direction of DIK and then upward and as a result the weather stagnated over KPK when westerly weather system was also present in the said area. Due to the interaction of two weather systems, namely, Western and Eastern, stagnation took place over catchment areas resulting in heavy rainfall. According to the historical data, such rainfall never occurred in KPK. Said stagnation, however, occurred in Lahore and Kashmir previously. According to the data, stagnation earlier had lasted 8 to 12 hours, however, in the present case the stagnation was between 24 to 36 hours over KPK⁷¹.

⁷⁰ IW-90

⁷¹ IW-90

7.59. *Level of Research at PMD:* According to Mr. Arif Mahmood, Acting Director General, PMD, Research and Development Division of PMD was established in the year 2005-2006 and is headed by Chief Meteorologist. *Since its establishment no report has been submitted by the Division regarding monsoon, which could contribute in upgrading the forecasting capacity of PMD.* He submitted that the main focus of the said Division is to research on climate change. He submitted that PMD has only seven radars installed in the country with the following details:-

“Four Weather Surveillance Radars at Karachi, Rahim Yar Khan, Islamabad and Dera Ismail Khan (DIK), three Doppler Quantitative Precipitation Measurement (QPM) Radars at Lahore, Mangla and Sialkot. The ranges of these Radars vary between 250 km to 400 km.”

7.60. Chief Meteorologist (R&D) also submitted that R&D Division does not submit any annual or bi-annual report to PMD. He also submitted that there is no separate budget for the said Division⁷³.

7.61. PMD (FFD or NWFC) are the harbingers of rain and flood. Forecast means to predict, to foretell or to forewarn. The strength of PMD lies in qualitative and quantitative flood forecast and early warnings. Timing of forecast is fundamental in gauging the performance of PMD. According to the data placed before us PMD could have issued qualitative forecast (coloured alerts) on 24th July, 2010 and onwards and more specifically on 26th July, 2010 when it was certain to PMD that monsoons are heading northwards. Seasonal forecast indicated the interaction of easterly and westerly waves in June, 2010, later on when the monsoons entered Pakistan no colour coded alerts were sent out. No forecasts were issued on the 26th of July, 2010 when exceptional weather and violent rain was in the knowledge of PMD and finally the flood forecast in a haphazard manner started coming in on 28th July, 2010 when real time data was available. PMD must maintain unwinking vigilance like an eagle. As a herald of rain and flood, PMD acts as a trustee for the people of Pakistan. The record shows that PMD has failed to discharge this public trust.

7.62. The Hydro Meteorological System installed at FFD did not perform. The flood forecasting was generated on the basis of the real time data and the ability to forecast flood on the basis of the proposed precipitation was not applied. Hydro Meteorological System was of no use in the recent floods. The sad and disturbing part was that the Chief Meteorologist⁷⁴ failed to admit this fact before us and kept justifying how well FFD had done under him during the recent floods. He miserably failed to show to the Tribunal how he carried out the quantitative flood forecasting and reasons for not carrying out hydro meteorological forecast. His performance before us was disturbingly disappointing.

⁷² IW-3

⁷³ IW-91

⁷⁴ Mr. Hazrat Mir

7.63. That PMD failed in its primary function to make timely and accurate forecasts. PMD had the knowledge about extreme weather developing during these monsoons way back in June, 2010 (seasonal forecast below) and then later on with more detail on 26.07.2010 but inspite of all the information gathered from WMO and through its own sources PMD failed to communicate the seriousness of the situation in its forecasts as has been admitted by the PMD officers above.

7.64. The statements of the officers heading FFD and NWFC on hydro meteorological flood forecasting are contradictory showing a disconnect within the PMD.

7.65. It is also pointed out that the statement of erstwhile Director General that he pointed out during his pre-monsoon coordination meeting at the Prime Minister's Secretariat on 28.6.2010 that there will be extreme monsoon this year is incorrect as the minutes of the meeting supplied by NDMA attribute the following⁷⁵ to the Director General:-

“This year's monsoon will be slightly higher than the previous year and expected to be normal”

7.66. PMD should have issued qualitative forecast from 24th July onwards leading to a more quantitative forecast 26th July onwards- but this was not done. The forecast issued also leaves much to be desired. It does not depict the seriousness of the situation. The lame forecast issued rightly did not raise any alarm. This euphemized use of language in the forecasts has been admitted by the officers of PMD above.

7.67. I & P Department received the first forecast on 29-7-2010, when it could have been issued on 24th July onwards. The forecast or early warning information disseminated did not include the information generated at the PMD from 24th July onwards. Why ? There was no answer from PMD except apologetic silence. This extra lead-time could make all the difference and allow the flood managers to plan and prepare themselves. This is the real test and role of a forecasting agency.

7.68. FWC works closely with FFD, but it too failed to generate any value added information for its own department. The summary of warning issued by FWC have not been relied upon by the department. There is no importance given to FWC in the position paper of the Secretary I & P and reliance has been singly placed on forecasts of PMD. It is therefore not clear why FWC is required and what became of the numerous flood emergency cells ? There is a lot on the paper and there is a lot of talk but the institutions have failed to walk their talk.

7.69. According to the presentation placed on the record of the acting DG PMD⁷⁶. “FFD provides qualitative forecast minimum 24-36 hours in advance of actual precipitation

⁷⁵ Ex I.W.95/1

⁷⁶ I.W. 3/3

indicating the intensity of rainfall bearing system and FFD provides quantitative forecast about 12 hours in advance of actual peak describing range of peak and minimum & maximum volume of flood hydrograph.” The presentation further provides the following three kinds of qualitative forecasts. **But none were issued.**

BLUE ALERT	Depression at Rajasthan
YELLOW ALERT	Turing towards the catchment
RED ALERT	Arrives in the catchment

7.70. *Flood Forecasting within I & P Department:* However, inspite of Emergency Cell at the Irrigation Department, as well as, the Flood Emergency Centres/Cells at the Zonal Offices, Secretary, I&P, as well as, Chief Engineers of the respective Zones have failed to highlight the work done by the aforesaid Cells . There is no mention of the said cells in the position papers or in their depositions.

7.71. The Emergency Cell at the I & P Department, the Zonal Flood Emergency Cells/Centres and the Flood Warning Centre of the I & P Department have nothing to show for themselves. Nothing has been mentioned about them by the Secretary I & P or the C.Es of the respective zones. No correspondence made by them during the critical days has been placed on the record.

7.72. The Flood Warning issued by the Secretary I & P Department through Chief Monitoring, PMIU on 29-7-2010 was based on the forecast received from PMD. There is no mention of the Flood Warning Centre of the Department.

7.73. We called for the record of FWC. The first warning issued by the FWC of the Department is dated 28-7-2010 forecasting medium flood (3,90,700 Cfs) in Tarbela at 1200 hrs (before PMD) . No action seems to have been taken on this warning by the Department. No canal wire is on the record.

7.74. The next warning of the FWC was on 29-7-2010 showing high flood (5,01,060 Cfs) in Kalabagh at 1200hrs. This also went unnoticed. The only warning received by the zones is the canal wire dated 30-7-2010 based on the forecast issued by PMD at 1245 hrs on 29-7-2010 which predicted high to very high flood at Taunsa Barrage. Preference was given to flood forecasts of PMD for Taunsa Barrage over FWC's forecast for Jinnah Barrage. This paints a picture of confusion and poor structure at the Department's end.

7.75. The under-mentioned warning⁷⁷ by the FWC is absolutely incorrect and does not correspond with the data on the record.

⁷⁷ Ex I.W. 87/1-22

7.	Kalabagh Dam	Exceptionally high flood	869512 Cfs	<u>1.10.2010</u>	1000 hours	Rising
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7.76. Even the canal wires were issued by the Chief Monitoring, PMIU on behalf of the Secretary I & P Department, the Emergency Cell set up at the I & P Department finds no presence in the scheme of things.

7.77. It is surprising that FFD issued forecast of **high flood and very high flood at Taunsa** on 29.7.2010 (at 1245 hours), while the forecast regarding Kalabagh was issued a day later. No forecast is available with PMD of any significance before the 29-7-2010.

7.78. FFD issued its first forecast for **exceptionally high flood** at Kalabagh on 30.7.2010 at 1030 hours. By this time, the LGB at Jinnah Barrage already stood breached (7.00 p.m. on 29.7.2010). The said forecast was of little significance.

7.79. **CONCLUSION**

7.80. PMD and FFD had indications in June, 2010 that this year will have extreme monsoons. Later on the on 24th July, 2010 PMD knew that the monsoon is heading towards the upper catchment of KPK but no colour coded alerts were issued. The unusual but not unprecedented stagnation of the westerly and easterly system over KPK was discovered by the PMD on the same day but the same was not forecasted because PMD was not confident to do so. The forecasts issued also did not carry the alarm they were required to generate. It is admitted by the meteorological officers that the language of the forecast did not correctly depict the true nature of the urgency at the time. We are of the view that PMD, being the prime harbinger of rain and flood did not act with the alacrity that was expected of them.

7.81. PMD, NWFC or the FFD are required to be extremely quick on the forecast. Once the real time data starts flowing in, WAPDA and I & P Department are the first ones to get it. Therefore, the role of PMD for those initial few hours when no other department in the country has the capacity or the infrastructure to predict are crucial. PMD did not act swiftly and also failed to employ the right language (as prescribed by WMO) to generate the sense of urgency that was required.

7.82. We also noticed that the qualified human resource employed at the PMD is lacking and the existing staff is not trained as meteorologists.

7.83. The Research Division at PMD also has nothing much to show for themselves. PMD should have been the apex research centre on Monsoons and should have had several quality papers to show for themselves. This was not the case.

8. FLOOD FIGHTING

8.1. As per Regulations Rules of Jinnah Barrage⁷⁸, Executive Engineer (XEN) Kalabagh is the officer incharge of the general control of the Headworks who has to issue instructions for the regulation and guidance of the SDO, Headworks from time to time⁷⁹. The Sub Divisional Officer (SDO) (Headworks) is officer immediate incharge of the Kalabagh Headworks and is responsible to the XEN for the maintenance and control of the Headworks. The objects to be kept in view during the passage of floods from weir are:

- i. **To pass flood without damage to the Headworks and training works.**
- ii. **To employ the flood to remove undesirable obstruction in the river so as to facilitate regulation and silt control.**
- iii. To pass the flood with the minimum interruption to the canal supplies.
- iv. To record various phases of flood for future reference.

8.2. It is duty of the Sub Divisional Officer (SDO) Headworks to supervise personally the passage of floods⁸¹. A survey of that portion of the river which affects the Headworks has got to be made annually⁸².

8.3. According to the flood fighting plan the limits of flood fixed by the "Punjab Flood Commission"⁸³ are as under:-

Normal	Up to 2.50	lac Cfs
Low Flood	2.50 to 3.75	lac Cfs.
Medium Flood	3.75 to 5.0	lac Cfs
High Flood	5.0 to 6.50	lac Cfs.
Very high flood	6.50 to 8.0	lac Cfs
Exceptionally high flood	above to 8.0	lac Cfs

8.4. According to Duty Roster⁸⁴ Battle Station of key personnel required at the Barrage during high flood flow, flood season 2010 the persons required to be deployed at on the LMB and LGB is as follows:

⁷⁸ Ex IW 121/2

⁷⁹ Clause 2.1 (i) of the Regulation Rules

⁸⁰ Clause 5.2

⁸¹ Clause 5.2 (i) [sic].

⁸² Clause 6.6 of the Regulation Rules of Jinnah Barrage.

⁸³ Provincial wing of the Federal Flood Commission (legal structure not clear)

⁸⁴ Ex I.W. 121/1 (page 16537)

DUTY ROSTER BATTLE STATION OF KEY PERSONAL DURING HIGH FLOOD FLOW FLOOD SEASON 2010.

SITE	LENGTH FT	STAGE-I DISCHARGE	LABOUR REQUIRED	LABOUR FOR WATCHING TO BE DEPUTED		STAGE-II DISCHARGE	LABOUR REQUIRED	LABOUR FOR WATCHING TO BE REQUIRED		LABOUR REQUIRED	ESTABLISHMENT TO BE DEPUTED				STAGE-IV DISCHARGE EXCEEDING 8- LAC
				MATE	BELDAR			MATE	BELDAR		SDO	SUB ENGINEER	MATE	BELDAR	
1-Left Guide bund U/S	4099	3.75 lac CS To	One man Per	-	5	5.0 lac Cs To	Three times	1	15	Six times	SDO/HW	SEN/HW	3	30	Establishment will be deputed as per stage-III and volunteer labour brought by Civil Authorities, Army, Jail labour help watching operation.
2-Left Guide Bund D/S	606	5.0 lac CS	-	-	1	6.0 lac Cs			3		SDO/HW	SEN/HW	1	60	
3-Right Guide bund U/S	5487		1000ft	-	5			1	15		SDO/HW	SEN/HW	3	30	
4-Right Guide bund D/S	8080			1	8			3	24		SDO/HW	SEN/HW	6	48	
5-Left Marginal bund	7410			1	7			3	21		SDO/S&I	SEN/CC	6	42	
6-Right Marginal bund	9084			1	9			3	27		SDO/HW	SEN/CC	6	54	
7-T-Head Spur	4820			1	5			2	15		SDO/HW	SEN/MLU	4	30	
8-J-Head Spur at Piplan	3514			-	4			1	12		SDO/KDN	SEN/Piplan	2	24	
9-Guide Spur at Alluwalli	2000			-	2			1	16		SDO/KDN	SEN/Rodi	1	12	
10-J-Head Spur at Bhakra	2500			-	3			1	9		SDO/KDN	SEN/KDN	2	18	
11-Guide Spur at Mussi-Walli	2000			-	2			1	6		SDO/KDN	SEN/ Ghulaman	1	12	

8.5. As mentioned above, in STAGE FOUR, Left Guide Bund upstream should have an SDO, S.ENG., 3 Mates, 30 Baildars and 6 men every **1000 feet** (i.e., around 24 persons) while for LMB, one SDO, one S.ENG., one Mate, 60 Beldars and 6 labourers per **1000 feet**. This is in addition to the support sought from Civil Authorities as well as the Army. At least 100 Army Jawans should be available when the discharge exceeds 8-lac Cfs.

8.6. As per Flood Fighting Plan, Flood material is under the charge of S.ENG stationed at Headworks. During flood, the flood fighting material is taken out and distributed at suitable points along the bund. This quantity is to be brought up to scale before the start of flood season. List of flood fighting materials mentioned in the Flood Fighting Plan, 2010 is as under: -

S.No.	Name of Articles	Unit	Qty. Required	Qty: in	Balance to be Arranged.
1	Lanterns	No.	250	200	50
2	Lanterns, Chimney.	No.	250	200	50
3	Gas lamps	No.	10	10	-
4	Mantles	No.	70	20	50
5	Three cell tarches	No.	50	30	-
6	Gunny bages/ E.C. Bags	No.	1500	1000	500
7	Axes	No.	10	10	-
8	Kassies with handle.	No.	100	100	-
9	Killas	No.	1500	1000	500
10	Ballies 10 Ft. long	No.	3000	1000	200 [sic] (should have been 2000) ⁸⁵
11	Basket	No.	200	200	-
12	Manile rope	Mds.	3	3	-
13	Generator	No.	3	3	-
14	Hammer.	No.	10	10	-
15	Chouldary	No.	3	3	-
16	K. Oil	Litre	120	120	-
17	Patha munj ban/ Tarangers	Mds.	5	4	1
18	Boat.	No.	3	3	-

Source: Flood Fighting Plan, 2010 for Sargodha Zone.

⁸⁵ this shows callousness of the I & P Department in attending to the pre flood preparation.

8.7. According to the current XEN⁸⁶ (appointed after the floods) at Jinnah Barrage: “According to the record no reserve stock was available before the start of flood. According to the flood fighting plan inventory maintained was not upgraded and the flood fighting material as required was not available on critical dates.” No one bothered to complete the inventory of the flood fighting material as mandated under the Flood Fighting Plan, 2010.

8.8. According to the Inquiry Report⁸⁷, the breach at RD 3000 is reported to have occurred at 7:00 p.m. on 29.7.2010 when the discharge in the river was 622,260 Cfs. Breach was first reported by Sub Engineer to SDO and XEN at 7.00 p.m. who reached the site but were “just spectators as there was no stone available at site except a small quantity of 5,426 Cft.” Trees were launched to arrest the erosion but according to the Report, first tree was launched at 9.00 p.m. when the breach was out of control.

8.9. The Report further states that Maple Leaf Cement Factory Limited (“MLCFL”) provided loaders, dumpers and stones to check the erosion of the floodwater. The dumping of the stones/boulders by MLCFL continued till the evening of 02.08.2010. Although LGB was almost washed away in its entire length but due to timely assistance and efforts of MLCFL further erosion was arrested before the start of the LMB. As a result, LMB and Thal Canal Head Regulator remained safe and intact.

8.10. According to the affidavit of the Chief Engineer⁸⁸, Sargodha Zone, Sargodha, the C.E received information on telephone from S.E. Thal Canal Circle on 29.7.2010 at about 7.00 p.m. (the C.E. deposed⁸⁹ in the following manner before the Tribunal: “I came to know of the breach of LGB at 7.30 p.m on 29-07-2010 while I was at my house at Sargodha) that upstream LGB of Jinnah Barrage has been breached at RD 3000. The C.E. directed Muhammad Abid XEN and Azher Merani XEN to reach Kalabagh Headworks on 29.7.2010 to assist the existing staff. The Chief Engineer himself reached Mianwali at 10.30 p.m. on 29.7.2010 alongwith Commissioner and R.P.O. Sargodha. At the time the width of the breach in LGB was approximately 900 ft. The nose of the LGB (approximately 200 ft) was existing at the site. LGB was continuously being eroded and its length in the evening of 30.07.2010 had reduced to 2100 ft.

8.11. C.E. further submitted that in the morning of 31.07.2010 the length of LGB was reduced to only 300 ft. The breach had been contained due to tree launching, however the erosion started again at 02:00 p.m. Thereafter the Chief Minister, Punjab, visited the site at 04:00 p.m. and with the help of Maple Leaf Cement Factory, who supplied Boulders Stone, Loaders, Dumpers, which reached the site at 06:30 p.m. on 31-7-2010. Therefore from 06:30 p.m. (on 31-7-2010) till the evening of 02.08.2010 dumpers and loaders continued to fight the erosion of LGB and it was in the evening of 02.08.2010 when the erosion was checked. By that time LGB had totally washed away.

⁸⁶ I.W.121

⁸⁷ Headed by Mian Asrar ul Haq - Ex I.W 6/1

⁸⁸ I.W. 5/2

⁸⁹ I.W.5

8.12. C.E stated that the Army Authorities were contacted at Kharian/Sargodha Cantt to reach Kalabagh Headworks immediately alongwith explosive material/staff in order to operate the breaching section, if required. Breaching section was also inspected with the Army Engineers at 4.30 p.m. on 30.7.2010. XEN/SE were directed to continue flood fighting on LGB by employing all possible means to check further erosion.

8.13. According to the affidavit of the C.E., Flood fighting on LGB was being done through tree launching “as no stone was available”. Stone being carted from Sikhawali Quarry could not reach site because culvert of Highway Department near Khawajabad had given in and one truck had also fallen into it. Irrigation Department engaged a contractor on 2.8.2010 who carried 2-lac cusec feet stone from Musakhel Stone Quarry.

8.14. Mr. Muhammad Afzal⁹⁰, Executive Engineer, Jinnah Barrage admitted in his statement that the Reserve Stone of 7,50,000 cft was not available on the site during the flood season. He also admitted that he could invoke Clause 2.89 of PWD Code to procure the above stone but he did not do so. According to the XEN other than the stone received from Maple Leaf Cement Factory Limited, 40,000 to 45,000 cft stone was procured from down stream RGB while another order was placed for 1,22,000 cft from a private quarry in Sargodha.

8.15. As per the depositions of the Secretary and the CE no labour was deployed on work charge basis on the LGB. According to the XEN except the muster roll showing six people nominated in June, 2009 there was no additional labour employed from the department. There is no evidence to suggest that even these six people were present on the critical dates. The new X.E.N⁹¹ stated that: “According to the record available no muster roll has been prepared and no person was engaged for the purpose of flood fighting by the erstwhile XEN.” Therefore, work force to be deployed in exceptionally high flood as per flood fighting plan, 2010 was not deployed.

8.16. According to the (new) Chief Engineer, Irrigation, Sargodha vide his letter dated 22.11.2010⁹² there is no inventory for the Machinery available at the Barrage for flood fighting prior to 28.07.2010. There is no information regarding the indent/requisition sent to the Machinery Circle of the Development Zone for Machinery, however, Machinery mobilized from private contractor namely Al-abbas Construction Company are as follows:-

(i)	Excavator	= 2 No.
(ii)	Loader	= 2 No.
(iii)	Dumper	= 4 No.
(iv)	Tractor with Trolley	= 8 No.
(v)	Tractor with Front Blade	= 2 No.

⁹⁰ IW 123

⁹¹ I.W. 121

⁹² Mark-28

8.17. It is further submitted that the above machinery arrived at the Barrage on 2.8.2010 and remained there till 15.08.2010. The Chief Engineer failed to give the cost of the Machinery involved. **From the above it transpires that no machinery for flood fighting was available on the LGB till 1.8.2010 except the one brought in by Maple Leaf Company.**

8.18. A departmental committee of following officers was constituted to probe into the causes of breach at LGB namely: Mr. Asrar-ul-Haq, S.Mansoob Ali Zaidi and Hanif Khalid Bhatti. The committee reported⁹³ as follow:-

“a). No stone was available as reserve stock against approved limit of 750,000⁹⁴ Cft.

b). The other flood fighting material was kept in store and not provided at specified points on the guide banks and marginal bunds (there is to be one material storage point at every 5,000 ft of an embankment). The provisions of flood fighting plan were thus ignored....The Chief Engineer did assign additional officers to help the barrage officials but this step could not prove to be effective due to lack of logistics. The flood fighting plan of the barrage provides for adequate level of short term/work charge staff for flood fighting purposes but **unfortunately no work charge staff was engaged in accordance with the prescribed flood fighting strategy....In overall perspective the technical and administrative measures were apparently inadequate.”**

(emphasis supplied)

8.19. **Reserve Stone:** According to the affidavit of the C.E, on 2.8.2010 Irrigation Department engaged a contractor who carried 2 lac cft from Musa Khel Stone quarry. It is not clear from the Stock Register or the statement of current XEN whether the stone carted from Sikhanwali quarry (40,825 cft) , as well as, **2 lac cft** from Musa Khel Stone quarry ever reached the site. The written statement filed by the Chief Engineer also does not mention whether the said stone finally reached the site.

8.20. Additionally, the depositions of S.E., XEN and S.ENG before the Tribunal reveal that on 30.07.2010 order for **1,22,000 cft** through Faiz & Company from a private quarry from Sargodha was made, which was delivered at the site in the evening of 31.07.2010 in the presence of the Chief Engineer, Commissioner, RPO Sargodha and District Coordination Officer, Mianwala.

8.21. Mr. Abdul Rauf⁹⁵ of Hafiz Rab Nawaz & Company stated that through wire No.548 dated 29.07.2010 issued by Executive Engineer, Kalabagh, Hafiz Rab Nawaz & Company and Shafqat Mansoor were directed under para 2.89 of PWD Code to supply stone. In this regard Hafiz Rab Nawaz & Company supplied **1,16,100 cft** at the cost of Rs.3.2 million. The said stone was procured from Pak Mecca (Raja Atta) and Lahore Gujranwala (Ch. Muhammad

⁹³ Ex IW 6/1 (page 1045)

⁹⁴ The approved limit is 10 lac cft as mentioned above.

⁹⁵ I.W.118

Nawaz). Mr. Abdul Rauf also stated that as far as stone pitching on loose apron of downstream RGB is concerned, the said work was done by Shafqat Mansoor and not by Hafiz Rab Nawaz & Company. Raja Atta Muhammad⁹⁶ of Pak Mecca on the other hand deposed that he supplied only 45 to 50 trucks between 29th to 30th July 2010 at the cost of Rs.13,50,000/-.

8.22. Muhammed Nawaz⁹⁷ deposed as follows: “The name of my business concern in Sargodha is Ch. Construction Service and the main business is supplying stone. Mr. Rauf of Rabnawaz & Co placed order of 200 trucks of stone on 29-7-2010 for Jinnah Barrage, however, I could only supply 69 trucks (2652.397 tons of stone) on 29-7-2010 and 30-7-2010. The total value of the stone supplied by me is in the sum of Rs 1,591,438/-. Out of which I have been paid in cash Rs 5,43,000 by Mr. Rauf and the remaining balance is outstanding.... All supplies made by me were paid by Mr. Rauf of Rabnawaz & Co and I have no direct relation with the Irrigation Department. Normally it takes 15 hours for a truck to reach Jinnah Barrage from Sargodha and in this particular case, trucks sent on 29-7-2010 and 30-8-2010 were duly delivered after 15 hours and delivery was confirmed to me by the drivers of the trucks. Both the assignments on 29-7-2010 and 30-7-2010 left Sargodha around 5pm and therefore reached Jinnah Barrage at around 8am on 30-7-2010 and 31-7-2010.” Shafqat Mansoor⁹⁸ stated as follows: “I work as contractor at Jinnah Barrage as well as Taunsa Barrage. I sent 14 trolleys, 2 dumpers, 4 excavators, 1 loader, 2 mates and 100 labourers with Jamshed Ahmed on the night of 30-7-2010. The said team worked till 2pm on 1-8-2010 and shifted 56,000 cft of stone from downstream RGB of the Barrage.”

8.23. It is also stated by the SDO⁹⁹ that 60,000 cft of stone reached downstream RGB on 26th July 2010 for the emergent work undergoing at the flexible loose apron. Similarly in the statement of Abdul Rauf approximately 30,000 cft stone was available upstream and downstream RGB, respectively.

8.24. The current XEN (Mr. Chughtai) was asked to confirm from XEN Development regarding the reserve stone available at the closure of the work on RGB on 21-7-2010. The said XEN deposed¹⁰⁰ that 1349 cft stone was available at RGB upstream.

8.25. The Chief Engineer¹⁰¹ deposed before the Tribunal that:-

“It is astonishing to note that considering that there was no stone to avoid the breach of LGB, later on the concerned team of Superintending Engineer raised a bill of Rs.82,00,000/- for the alleged procurement of 1,65,191 cft and it was shown that it was used on 30th and 31st July 2010 on the LGB for flood fighting, which was

⁹⁶ His statement was recorded before the Learned Senior Civil Judge, Sargodha and has been placed on the record as Mark 18.

⁹⁷ I.W. 145

⁹⁸ I.W. 146

⁹⁹ I.W. 117

¹⁰⁰ I.W. 121

¹⁰¹ IW-5

absolutely bogus.”
(emphasis supplied)

8.26. The C.E. in his letter dated 30-8-2010¹⁰² written to the Secretary I & P Department reported the following:

“2. As per measurement book the stone i.e., 1,65,191 Cft was dumped on 30-7-2010 and 31-7-2010....only 16 trucks reached site on 31-7-2010 and were utilized on LMB alongwith the stone carted by Maple Leaf Cement Factory.

As per record of the Sikhanwala Quarry the following stone left quarry against the work: “Supplying Pitching Stone above 27 kg from Sikhanwala Quarry for Reserve Stock at Jinnah Barrage Kalabagh Division” on the dates mentioned below:

Sr.	dated		Pitching Stone
1.	31-7-2010		4,600 Cft
2.	01.08.2010		25,300 Cft
3.	02.08.2010		9,200 Cft
4.	03.08.2010		1,725 Cft
		Total	40,825 Cft

It may be pointed out that only 4600 Cft (approximately 16 No, Trucks) left quarry on 31-7-2010. The balance stone is lying on RGB.”

8.27. Mr. Abdul Jabbar, District Police Officer, Mianwali¹⁰³ as well as Mr. Javed Islam¹⁰⁴, Regional Police Officer, Sargodha Region submitted identical replies to the questions posed by the Tribunal.

<p>Q. Did you witness the delivery of stone for the purpose of flood fighting from Maple Leaf Cement Company or any other private quarry? Give details (name of contractor, if any, and number of trucks you witnessed).</p>	<p>Ans. On 31.07.2010 keeping in view the dangerously growing erosion of LGB/LMB of Jinnah Barrage the district police Mianwali made an earnest request to the General Manager (Admin & IR) Rana Muhammad Akram of Maple Leaf Cement Factory Iskander Abad, Daud Khel to provide trained manpower, heavy Machinery and boulder stones to strengthen the LMB/LGB. It was done to save the lives and property of general public of Mianwali. Maple Leaf Cement Factory Iskander Abad, Daud Khel respondent promptly and provided the requisite</p>
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¹⁰² Ex IW 5/3

¹⁰³ Mark-80

¹⁰⁴ Mark 96

	<p>machinery, trained manpower and stone. I witnessed the supply of a large number of trucks of stones from 31.07.2010 to 3.8.2010 from the said Maple Leaf Cement Factory Iskander Abad, Daud Khel on gratis basis.</p> <p>A large number of police jawans were engaged to dislodge the stones from the trucks coming from the Maple Leaf Cement Factory Iskander Abad, Daud Khel and subsequent filling in to strengthen the embankments.</p> <p>Similarly, on request, DPO Khushab and DPO Chakwal also sent 60 numbers of stones trucks on 1st August 2010 to 03 August 2010 on the site. (Emphasis supplied)</p>
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8.28. According to Mr. Jawwad Rafique Malik, Commissioner Sargodha Division, Sargodha¹⁰⁵, **a number of truck loads of stones which were stuck on Mianwali Kalabagh road due to damaged culvert of Highway Department near Khawajabad also arrived** at Jinnah Barrage on 1.8.2010 after the road was repaired. He also confirmed that he was witness of the delivery of the stone from Maple Leaf Cement Factory, which started arriving at 06:30 P.M.

8.29. DCO, Mianwali (Mr. Tariq Mahmood) vide his written submission dated 30.11.2010 submitted that he was present at Jinnah Barrage from 6:00 a.m. till 10:00 p.m. on Friday, the 30th of July 2010¹⁰⁶. He submitted that the Chief Engineer, SE and XEN were present at Jinnah Barrage but he did not witness the delivery of stone for the purposes of flood fighting from Maple Leaf Company or any other private quarry on 30.07.2010

8.30. **INQUIRY & FINDINGS**

8.31. **No Reserve Stone:** On the basis of the evidence before us, we are of the confirmed view that there was **no reserve stone** (requirement as per para 6.39 M.I .P is 10 lac Cft) at the LGB on the critical dates (29th July, 2010 till 31st July, 2010 (when stone arrived from Maple Leaf Cement Company Ltd) to flood fight the breach and subsequent erosion of the LGB. Store Register¹⁰⁷ shows NIL balance in June, 2009 and only procurement shown in the

¹⁰⁵ Mark-94

¹⁰⁶ Mark-114

¹⁰⁷ (Ex.I.W.121/6)

Stock Register is an entry showing 5426 cft on 22.06.2010. Therefore, as per record, no reserve stone was available on the Barrage.

8.32. In spite of this clear position, effort was made before us by the S.E., XEN & SDO to show that reserve stone was shifted from the RGB and also procured from private quarries to meet the requirement of flood fighting. Statements of the Secretary and C.E deny this position, Stock Register maintained at the Barrage does not reflect any such procurement, there is nothing on the record to show that para 2.89 PWD Code was complied with and permission of the Secretary was obtained. C.E. has also brought on record procurement made by him from two different quarries, however the same also did not reach the Barrage on time. Current XEN¹⁰⁸ deposed that the stone available at the time of the closure of work on the downstream loose apron on 21-7-2010 was 13,495 cft. The private contractors on the other hand have deposed that they supplied the stone. Mystery shrouds this unsanctioned and unrecorded procurement of stone. Whatever may be the case this aspect of the matter requires a detailed third party validation /audit by the Auditor General or any other credible institution. To us this reflects of naked corruption and total collapse of flood governance at the Barrage in the midst of a national calamity that gripped Jinnah barrage during 29th July till 2nd August, 2010.

8.33. According to the statement of the XEN and the SDO stone was available on the RGB stocked for the emergent work of the loose apron downstream. If this is taken to be true, why was the same not shifted to the training works immediately on receiving the flood forecast from the PMD and the I & P Department? Why was the same not recorded and reflected in the Stock Register maintained at the Barrage (prior to the flood)?

8.34. C.E. allegedly ordered stone from Musa Khel and Sikahnwali Quarries, this being under para 2.89 PWD Code. No approval was sought from the Secretary I & P Department in this regard. This procurement also does not corroborate the stand taken by the C.E that he was under an impression that the reserve stone had been recouped from the RGB and was in order.

8.35. At the same time the statements of S.E, XEN and SDO reveal that fresh orders were placed for the procurement of reserve stone from private quarries. The Orders were allegedly placed on Rabnawaz and Co and one Shafqat Mansoor. According to the above officers the said stone was received at the site and the contractors confirm that the deliveries were made. The statements of the Secretary, C.E and other officers (RPO, DPO and Commissioner above) belie this.

8.36. We are not convinced with the contradictory statements made before us regarding procurement of Reserve Stock Stone. The position taken by the Chief Engineer is inconsistent with the S.E./XEN and SDO and so is the case regarding the statements of Mr. Rauf of Hafiz Rab Nawaz & Company, Raja Atta of Pak Mecca and Muhammed Nawaz of Lahore

¹⁰⁸ IW 121

Gujranwala. From the evidence, it appears that only stock of stone available for active flood fighting was from Maple Leaf Cement Company. Even the stone, allegedly ordered from Sikhawali quarry as well as Musa Khel Stone quarry did not reach the site on time.

8.37. The emergent work remained incomplete even after passage of 1 ½ years. Technical sanction of the estimate was done three times i.e., dated 8.5.2009, 2.1.2010 and 22.04.2010¹⁰⁹. The cost of the work was increased from Rs.59.32 to Rs.126.52 Million. Upto July, 2010 total payment of the said work is around 55% and most of disbursements were made during June, 2010. The S.E. issued interim approval for the package C & D during March & April 2010, whereas the formal approval was issued by the Chief Engineer on May 20, 2010. This delay creates many doubts. Further, the Chief Engineer in his letter dated 30.08.2010 showed lack of confidence on his field staff. This leaves little room with the C.E. for relying on the revised estimates initiated by the same staff.

8.38. *No workforce/ labour for flood fighting:* There was no labour deployed at the bunds as confirmed by the XEN and the Departmental Inquiry Committee. Flood Fighting Plan was blatantly violated and totally disregarded.

8.39. Inventory of the Flood Fighting Materials was not upgraded¹¹⁰. No flood fighting material was supplied out by the Sub Engineer. No camps were set up on the training works. Flood Fighting Plan was ignored.

8.40. Flood fighting is very similar to war. Appropriate preparedness and strategy is required on war footing especially so when the Barrage was declared to be a sick barrage.

8.41. *Poor Human Resource:* Failure of flood management is also because of poor capacity of officers who lacked the requisite expertise and qualification e.g., the Chief Engineer was a Mechanical Engineer, Superintending Engineer was also a Mechanical Engineer, Executive Engineer although a Civil Engineer had no past experience of Headworks. Sub-Divisional Officer is a Diploma Holder (B-Tech). Why was such poor human resource deployed on a sick Barrage during the flood season ? We heard no answer.

8.42. The Secretary¹¹¹, Irrigation & Power Department deposed before the Tribunal that: "According to details of posting held by Muhammed Afzal XEN, he was appointed at Kalabagh Head Works on 24-7-2009 on current charge basis. He had no past experience of a Barrage and was never appointed as an SDO on any of the Barrages earlier in his entire career which starts in the year 1990. Ideally an XEN appointed at a barrage should have worked on a Barrage as SDO but this was not the case here...service profile [of Khalid Iqbal S.E.] shows that he is B.S. 19 (current charge) with degree in Mechanical Engineering and was promoted in the year 1992 as XEN, however, through out his career he has never held a posting on Barrage except once in the year 2008-2010 at Sidhnai."

¹⁰⁹ IW 121/10

¹¹⁰ confirmed by the current XEN. I.W. 121

¹¹¹ I.W.6

8.43. The Secretary further submitted that “there is a tradition that best of the lot has to be appointed on the Barrage. In my view Muhammed Afzal, XEN did not fit the qualifications.” “..... posting of a Mechanical Engineer on a Barrage was considered to be a sin.” “Traditionally Mechanical Engineers are [sic] not even posted on the canals.” Yet he allowed mechanical engineers to manage the Barrage. This administrative lapse falls squarely in the lap of the Secretary I & P who took over the reigns of the department in February, 2010 much before the start of the Flood Season. He should have meticulously scrutinized the human resource at the Barrages and handpicked the best to manage it. He miserably failed to do so. Nothing has been brought on the record to show that the Secretary deliberated upon the quality of the team managing the barrage or that he made efforts to revise the team when he took over in February, 2010. The general impression that such an exceptional flood was not expected is no excuse. Good governance required that flood or no flood, the Secretary should have taken pain to know the expertise and quality of his field formation especially on a Barrage which is a sick barrage. It is this lack of interest and poor vigilance by the senior bureaucracy that results in tragedies which is conveniently blamed on the vulnerability of the weather and the vicissitudes of nature. The huge loss at Jinnah Barrage could have been avoided had the Secretary taken pain before the flood season to appoint the right people for the job.

8.44. *Corporate Social Responsibility on behalf of Maple Leaf Cement Company.* The report will be remiss if the effort of a business house owned by the Saigols namely Maple Leaf Cement Factory Limited (MLCFL) is not praised and appreciated for their national service. The General Manager¹¹² of the Company deposed:

“I was contacted by the local administration namely DPO Rana Jabbar, Commissioner Mianwali and Muhammad Afzal XEN around 2.30 p.m on 31.07.2010 seeking support to help fight LGB at Jinnah Barrage. I immediately sought instructions from Muhammad Saeed Saigol (CEO of Maple Leaf Cement Factory Ltd.) and mobilized 20 Dumpers and 3 Loaders. My team reached the site (Jinnah Barrage) at about 4.30 p.m. on 31.07.2010. We would have reached earlier but due to Chief Minister's visit at the Jinnah Barrage we got delayed due to the VIP activity. We continuously rendered support round the clock from 31.07.2010 to 05.08.2010 supplying 1.5 to 1.75 lac M/Tons of stone which according to our estimate has a value of Rs.45 lacs. The 20-Dumpers and 3-Loaders mobilized made 345 trips (distance from factory to the site is 10-k.m.). The Chief Minister did not contact Mr. Saeed Saigol or Mr. Tariq Saigol. It was the local administration who reached out to me on 31.07.2010 for help and assistance, subsequent to which our relief efforts were initiated.”
(emphasis supplied)

8.45. The support rendered by MLCFL has been confirmed by the I & P Department and the civil administration. MLCFL has displayed a wonderful example of national spirit and corporate social responsibility and has set itself out as an example to other companies. The

¹¹² I.W.116 Statement of Rana Muhammad Akram, General Manager (Admin & IR) Maple Leaf Cement Factory Ltd., Mianwali

people of Punjab in general and Mianwali, in particular, will remain indebted to the timely and selfless help rendered by the company.

8.46. *Poor Institutional Design:* Once the Secretary has appointed the right officers at the Barrage. Floods are to be handled by the C.E, XEN SDO and S.ENG with the help of civil administration and army.

8.47. We have noticed that the Chief Minister and other Secretaries rushed to Jinnah Barrage in the middle of the emergency. Time and again the senior bureaucracy has tried to convince us of their patriotic zeal and passion for reaching out during national calamities and of their last minute innovative relief measures. While their untiring effort to control post flood damage is noted, what gets hidden under this frenzied VIP activity is the ugly face of a choked and sluggish system that fails to deliver on its own. It is precisely because of this faulty system that the senior leadership runs amok over the entire provincial landscape, when actually it is the C.E, XEN & SDO who ought to be in worried, if at all.

8.48. We need to build strong systems manned by able people who can dexterously withstand the onslaught of a natural calamity. *It is this solid functional infrastructural and institutional construct that requires IMMEDIATE attention.*

9. TECHNICAL CAUSE OF BREACH

9.1. Departmental Committee was constituted to probe into the causes of breach at LGB comprising the following members: Mr. Asrar-ul-Haq, S.Mansoob Ali Zaidi and Hanif Khalid Bhatti. The Committee reported as follow:-

“Normally the guide bank noses and the adjacent portion of the shank can come under river action. The shank can be attacked by swirls due to curved river flow on the country side. The river side is generally affected by both the high velocities and swirls which are generated due to high velocity currents brushing past a stagnant or slow moving water body. According to statements of Sub Engineer, SDO and Executive Engineer, the damage started from the river side slope at RD 3-4 of the LGB. According to them a swirl was the cause. [A reference to the regulation record contained in the log books, revealed that regulation was pathetically mishandled. Bays # 40-56 were kept virtually closed for over 2 weeks \(opening an insignificant 0.3 ft\) upto the high flood discharge of 503,000 cs and opened after 12:00 hrs on 29/7/2010.](#) This resulted in:

- a. excessive stress on left side bays
- b. Intensities of flow increased to about 133% resulting in increase velocities in the left half and along the left guide bank and creation of a deep channel and flow concentration in the left half which apparently started the damage at the breach point
- c. Pier # 39 was also subjected to heavy deferential thrust caused by the difference in openings on both sides of the order of 12.5 ft. We have been lucky in that the pier did not over turn; probably due to support by the bridge deck.

[The committee feels that the regulation staff i.e. Sub Engineer, SDO and the Executive Engineer have all flouted the regulation rules which resulted in this damage. Less care and indifference in maintaining the regulation record and discharge calculations are also apparent.”](#)

9.2. The Departmental Committee recommended as follows:

- i. The SOPs for flood preparedness should be followed in letter and spirit by all the field officers. Any variation should be supported by reason.
- ii. The maintenance of reserve stock of stone should be made one of the top issues to be kept in view by all the functionaries from SDO to Chief Engineer.
- iii. The Civil Engineering graduates who are technically competent and having required experience may be entrusted with the custody, operation and maintenance of barrages.

- iv. The issue of dual working by headworks and development divisions is hazardous and leads to diffused responsibility towards reserve stock of stone by both the Executive Engineers. The arrangement therefore may be reviewed at the Departmental level.
- v. The pre-flood inspection teams should also comment on the availability of reserve stock and other flood fighting arrangements.
- vi. Capacity building and training of officers particularly those incharge of the barrage may be undertaken regularly.
- vii. Case studies approach for learning from the experience and for taking appropriate remedial measures/actions in case of flood events may be adopted by Irrigation and Power Department for improving flood management and avoiding the mistakes of the past.”

9.3. *Work on the Loose Apron Downstream at Jinnah Barrage:* Mr. Muhammad Afzal¹¹³, Executive Engineer, Jinnah Barrage deposed before the Tribunal that he had no past experience of the Barrage and was posted for the first time as an XEN on Jinnah Barrage. It is also admitted that work was going-on on the loose apron downstream as a result gates No. 41 to 49 were opened on **29.07.2010 at noon**. In the written statement submitted by the XEN he states that he observed swirling action, which resulted in the breach of LGB. According to him the reason for carrying out the work on the loose apron was the safety of the main barrage. He submitted that (Rao Irshad Ali Khan) Chief Engineer, I&P, Sargodha Zone was aware of the works being carried out at the downstream loose apron and he did not stop the same. He has referred to the tentative¹¹⁴ program of Rao Irshad Ali Khan, Chief Engineer, I&P, Sargodha Zone, for the month of July 2010, wherein on 8.7.2010, Chief Engineer was scheduled to inspect the replenishment of loose apron downstream Jinnah Barrage.

9.4. *Weir Gates: Daily Log Book Jinnah Barrage,* as well as, the Jamadar Charge Book, Jinnah Barrage, were sealed and collected from Jinnah Barrage vide order dated 16.09.2010 of the Tribunal.

9.5. Perusal of the Daily Log Book, Jinnah Barrage for the period 19.4.2010 to 25.07.2010 reveals that from **31-5-2010** onwards weir gates No.29 to 49 and right undersluice gates No.50 to 56 had a restricted opening of 0.3 feet (which means that they were practically closed).

9.6. On **19.06.2010** only weir gates No.30 to 49 and right under sluice gates No.50 to 56 had a by and large limited opening of 0.3ft (while the others gates were opened) and this

¹¹³ IW 123

¹¹⁴ Ex I.W. 123/1

continued¹¹⁵ till **02.07.2010**.

9.7. On **03.07.2010** main weir gates No.39 to 49 and right under sluices no. 50 to 56 had an opening of 0.3 ft. The said position continued till **28.07.2010** (except gate No.39 which on the said date had an opening of 2-feet).

9.8. On **29.07.2010** only main weir gates No.41 to 49 had an opening of 0.3 feet till 12:00 noon. Recordings at 18:00 hrs and then 24:00 hours the same day show an opening of 13.5 feet and 14 feet, respectively. On **30.07.2010** the weir gates, as well as, the right under sluice gates had an opening recorded as CLEAR from 06:00 hrs and 12:00 hrs respectively.

9.9. **Jamadar Charge Book, Jinnah Barrage shows the opening of main weirs 41 to 49 to 12.5 feet at 1300 hours on 29-7-2010.** Could the weir gates 41 to 49 be opened to 12.5 feet in one hour ?

9.10. According to the Jamadar Charge Book from 1900 hrs to 2400 hrs all the weir gates i.e., gates 38 to 49 were recorded as CLEAR while in the Daily Log Book opening of all the weir gates at 2400 hrs is recorded as 14-feet¹¹⁶. The recording of data in the two registers is not consistent. This undermines the credibility of the record and reflects poorly on the managerial competence of the officers incharge of the Barrage.

9.11. On 16.7.2010 SDO recorded the following canal wire No.362 in the Log Book:

Flood Warning."River Indus at Kalabagh Head works in low flood U/S Left gauge 692-50 D/S left 680.10 U/S Discharge 280908 D/S Discharge 275608 total Thal Canal Discharge 5300. Discharge at 1500 hr on 16.07.2010 and rising."

Inspite of the above, the work on replenishing loose apron downstream continued unabated.

9.12. S.E. recorded the following on 29.07.2010 in the Log Book

During inspection on 29.8.2010 [sic] morning time, gates No.41 to 49 were observed closed, XEN H/W and SDO H/W and S.D.E. H/W are instructed to operate/open the gates as per regulation rules w.e.f.
Khalid Iqbal
S.E. Thal
29-7-2010

¹¹⁵ There is no recording of the opening of the weir gates 29-49 on 23-6-2010.

¹¹⁶ Extracts of above mentioned daily Log Book, Jinnah Barrage and Jamadar Charge Book, Jinnah Barrage have been placed on record as Ex I.W.5/4. As an abundant caution, three registers i.e. Daily Log Book, Jinnah Barrage (two registers) and Jamadar Charge Book, Jinnah Barrage (1 register) have been duly stamped by the Tribunal in order to secure the data recorded in the said registers. It is pointed out that last recording in the Daily Log Book is for 16th September, 2010.

26.8.2010 کو تقریباً 1.00 بجے دوپہر کو جناب ایس ای تھل
نے لاگ بک پر درجہ بالا حکم جاری کیا۔
دستخط
26.08.2010 ٹاراختر ڈیوٹی جمعدار
غلام شبیر خان ڈیوٹی جمعدار

1.13. The dates recorded by S.E. i.e., 29.08.2010 and then by Head Jamadar i.e., 26.08.2010 creates suspicion regarding timely recording of the Log Book at the Barrage and also weakens its authenticity. Maintenance of Log Books with utmost punctiliousness is a sacred trust and an obligation of every public officer and cannot be maintained in an offhand manner.

9.14. Written submissions of the Chief Engineer¹¹⁷, LGB was breached as a result of mis-regulations. He stated that after going through the discharge, gauges and Gate Operation of the Barrage, it revealed that the Regulations, Rules were totally ignored. He stated that flow was concentrated towards left side of the Barrage due to the closure of the gates from 16.07.2010 03:00 p.m. till 28-7-2010 at 12:00 p.m.

9.15. He further deposed that: "This increased concentrated flow launched the apron of LGB and ultimate result was in the shape of Left Guide Bank breach¹¹⁸." He deposed before the Tribunal: "As per the Log Book of the Head Works right side gates were opened at 12:00 (noon), however, *in my personal opinion this is not correct position and I think said gates were opened later in day....I am of the view that substantial damage of the LGB had taken place before 12 (noon) on 29.07.2010.* There was nobody deployed on the LGB, who could have noticed said breach earlier. Mr. Muhammad Younas, Sub-Engineer informed me on 30.07.2010 that he heard stones hitting the under sluice gates around 18:45 p.m. on 29.07.2010. Thereafter, he reached the LGB and within a period of 10 minutes and the breach took place¹¹⁹."

9.16. The position taken by XEN, as well as, the SDO is that the weir gates (40-56) remained closed till 12.00 noon of 29.07.2010. The daily logbook, as well as, register of Jamadar and the discharge register show that the gates were opened around 1.00 p.m. on 29.07.2010.

9.17. Correspondence between the XEN and S.E is also disturbingly revealing. Letter written by XEN to the S.E. dated 23.07.2010¹²⁰ stating that the work of dumping stone from gates No.41 to 48/49 has been completed in all respects and S.E. is requested to check the

¹¹⁷ Ex I.W. 5/2

¹¹⁸ Ex I.W. 5/2

¹¹⁹ Ex I.W.5

¹²⁰ Ex.I.W.121/7/1

executed work on 27.07.2010 through checking committee constituted by the Secretary, Irrigation & Power Department on 17.03.2009. In the said letter it is clearly pointed out by the XEN that “checking be done by 27.07.2010 so that the gates could be opened”. More importantly, vide letter dated 29.07.2010, XEN once again wrote¹²¹ to the S.E. wherein the XEN states: “similarly on 29.07.2010 early morning S.E. Thal Canal Circle, Mianwali requested to check the work and they reached together with Committee members at Jinnah Barrage for checking the completed work. At that time, 4,91,840 Cfs discharge was passing and continuously increasing. The Committee members and S.E. Thal Canal Circle discussed and decided that “it is unsafe and not possible to check the work in this situation”. According to the Discharge Register¹²² the discharge flows 4,91,840 Cfs was around 9.00 a.m. Therefore, it is clear that the XEN and the S.E were fully aware that the gates were closed even during medium flood that was rising.

9.18. Chief Engineer was also aware of this work as is clear from the Tentative Tour Programme¹²³ of Rao Irshad Ali Khan for the month of July, 2010 besides letters referred to by the C.E mentioned above relating to emergent work on loose stone apron are self explanatory.

9.19. PRO Hydraulics was directed by the Tribunal to give his professional input on the breach of LGB and also to run a physical model of Jinnah Barrage at the Hydraulic Research Station Nandipur, IRI for a more precise qualitative assessment.

9.20. The relevant findings of IRI as recorded in his Report (IRR-1253¹²⁴) are as follows:

- i. Mis-regulation of gates in case of Jinnah barrage has been adopted in such a way that river concentration persisted along left half of the barrage and consequently, apron of LGB started launching at river stage of 4 Lac.
- ii. It has been observed in the nature that if any damaging phenomenon of flow starts at any hydraulic structure, then it is not possible to stop the same without timely external efforts.
- iii. As far as the critical gauge at RD 5+000 of LMB of Jinnah barrage is concerned, it is found that with reported gates operation at River stage of 856,949 Cfs. the gauge on model is achieved as 697.2 Cfs. However, in order to attain the critical gauge at R.D 5+000 of LMB at RL 700 as reported by field formation, about 12 gates have to be applied on model at the river stage of 856,949 Cfs. ***(NOTE by the Tribunal: Due to want of clarity in the above para of the Report, we sought clarification from the PRO over the phone and it was explained to us that unless 12 gates were closed at 856,949 Cfs, the critical gauge could not have reached RL 700)***

¹²¹ Ex.I.W.121/7/2

¹²² Ex.I.W.121/8

¹²³ EX I.W. 123/1

¹²⁴ Mark 43

- c. Additionally PRO submitted in para 2.1 of the Report submitted that since the bottom of apron level is higher than the floor level of the left undersluices, therefore apron of the LGB got launched.



Normal Operation of Barrage at $Q = 3,00,000$ Cusec



Site Operation of Barrage at $Q = 3,00,000$ Cusec



Normal Operation of Barrage at $Q = 4,00,000$ Cusec

Site Operation of Barrage at $Q = 4,00,000$ CusecNormal Operation of Barrage at $Q = 5,00,000$ Cusec



Site Operation of Barrage at $Q = 5,00,000$ Cusec



Normal Operation of Barrage at $Q = 6,00,000$ Cusec

Site Operation of Barrage at $Q = 6,00,000$ CusecNormal Operation of Barrage at $Q = 6,60,000$ Cusec



Site Operation of Barrage at $Q = 6,60,000$ Cusec



Site Operation of Barrage at $Q = 8,56,949$ Cusec

9.21. **INQUIRY & FINDINGS**

9.222. According to the Daily Log Book and the Jamadar Charge Book the weir gates (right side) and the under sluice remained practically closed (in varying degrees as noted above) from 31st May, 2010 till the 29th July, 2010 i.e, for almost two months with little regard to flood season and the medium flood on 29th July, 2010.

9.23. According to the Daily Log Book the weir gates (41 to 49) had an opening of 0.3 feet till 12noon on 29-7-2010 while the Jamadar Charge Book states that the said gates had an opening of 12.5 feet at 1300 hrs on the same date. It is not likely that the manually operated weir gates (41 to 49) could be opened from 0.3 feet to 12.5 ft in one hour. The record does not inspire confidence.

9.24. Further, the NOTE of S.E. allegedly recorded on 29-7-2010 in the Daily Log Book gives the date of inspection as 29-8-2010. The Note of the jamadar under the note of the S.E. confirms that the note of S.E was recorded on 26-8-2010 at 1 pm. Other than poor maintenance of registers, it is surprising why all of a sudden S.E. recorded a note in the Daily Log Book in the morning of 29-7-2010 considering that the said gates were closed much before the start of the flood Season 2010. Even the flood forecast issued by the I & P Department through a Canal Wire no. 2911 was at 2pm on 29-7-2010. We are of the view that the NOTE was recorded in haste and after the breach of LGB. We have drawn a negative inference and are of the view that S.E. in order to absolve himself got the said note recorded much after the event as confirmed by the Jamadar.

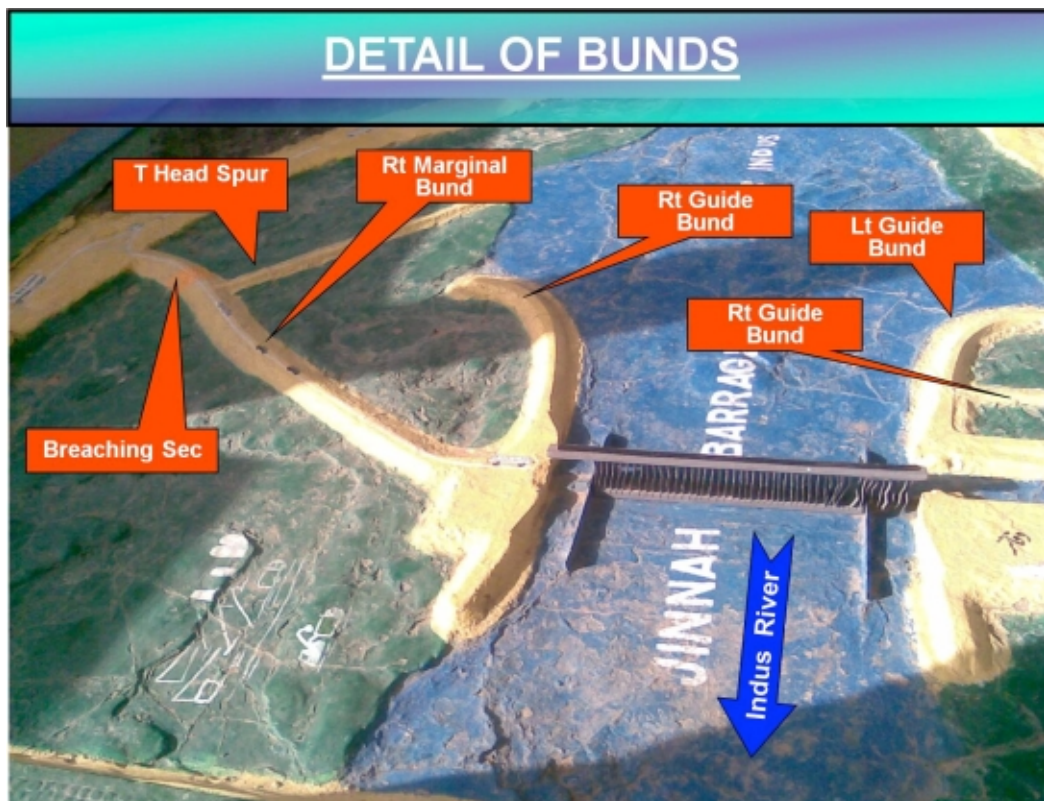
9.25. It is admitted position by the S.E., XEN, SDO that the gates on the right side remain closed till noon of 29-7-2010. Secretary and C.E are of the view that the gates were opened much later. The expert finding of the PRO Hydraulics has also confirmed that the closure of gates resulted in generating the swirl action resulting in the launching of the apron of the LGB. In any case the manual weir gates could not be opened in one hour as the Daily Log Book and Jamadar Charge Book reveals. Continuance of emergent work during medium flood, during the flood season and consequent closure of gates constitutes criminal omission and negligence by the officers incharge attracting criminal liability.

9.26. The C.E., S.E, XEN, SDO were aware of the closure of gates on the right side and also of the work going on downstream. Still the gates were not opened. The professional negligence of the XEN and SDO, besides the professional and supervisory negligence of C.E & S.E. stands established from the record and their admissions.

9.27. It has been established that the LGB was eroded due to mis-regulation and non-availability of the reserve stock of stone. Both of the factors were caused due to ongoing emergent work on the repair of Loose Stone Apron Downstream. No reason was given by the C.E. (who had initiated the said emergent work) for not stopping the said emergent work during the flood season. There is nothing on the record regarding the importance of the said emergent work. What has become of the said work during the recent floods is also not known. C.E. (D & F) todate has not bothered to inquire into the status of the said emergent work, post flood. Mismanagement of the Barrage has been clearly established. Accountability in this matter must start from C.E (D & F) down to the SENG including the C.E., S.E, XEN and the SDO.

10. OPERATION OF THE BREACHING SECTION

10.1. According to the Flood Fighting Plan¹²⁵, there is an approved breaching section between RD 6700 to RD 8700 of Right Marginal Bund. The critical RL for the operation of breaching section is RL 701 on the gauge of Left Marginal Bund at RD 5000 of the Jinnah Barrage. This breaching section has never been operated since the commissioning of the Barrage. The water of breaching section enters into the river after traveling three miles downstream. **No regular Abadi or industrial area exists on the course of water during the operation of breaching section.** Mianwali to Bannu metalled road is built on RMB (breaching section) which will be cut off in case the breaching section is operated.



10.2. The Chief Engineer inspected the breaching section and according to him Army Engineers reached the site at 04:30 p.m. on 30-7-2010. Captain Mujtaba Army Engineer was directed to operate the breaching section at 05:00pm on 30-7-2010 and written orders to this extent were delivered at 05:40 p.m on the same day.

10.3. Chief Engineer invoked the breaching section at 5.40 p.m on 30.07.2010 (in writing). The reasons given for operating the breaching section on RMB were as follows:

¹²⁵ Ex I.W. 6/1

- i. Critical gauge at RD 5000 on LMB was at RL-700.
- ii. There was parallel flow alongwith LMB and upstream LGB.
- iii. There was severe erosion action on downstream LGB (sic) and in matter of 12 hours almost 900 feet had eroded and a balance 2100 feet was left.
- iv. Discharge at Khairabad was 11 lac Cfs and was rising.




10.4. According to Brig. Muhammad Ajmal Iqbal¹²⁶, Director Engineering Corps GHQ, Rawalpindi, Jinnah Barrage down to upstream, Guddu Barrage is covered by 1st, 2nd and 5th Corps of Pakistan Army and its Engineering Corps is incharge of operating the breaching section. Army (Engineering Corps) reached the site i.e. RMB of Jinnah Barrage at 1630 hours on 30.07.2010. The Engineering Corps received instructions to operate the barrage from the relevant Breaching Committee at 1740 hours the same day. The breaching section comprises of four sections. The section was prepared with explosive placement from 1740 hours to 1915 hours. The first breaching section was operated at 1915 hours. The next section was operated at 2115 hours while the third and fourth sections were operated at 0200 and 0500 hours respectively. After receiving the instructions from relevant department, *it takes roughly between 1 to 2 hours for the Engineering Corps to prepare and final operate the breaching section.* After breaching the first section, time is required to clear the debris and also to read the hydraulic water pressure before operating the next section, therefore, *on average there is a time lag of 2 to 3 hours in operating the subsequent sub-breaching sections.*

10.5. The data of the breaching sections is as follows:

DATA OF BREACHES			
Government of the Punjab	Sr. #	Location	Average Length
	1.	RD.6900	330.00 ft
	2.	RD.7400	300.00 ft
	3.	RD.7900	22.50 ft
	4.	RD.8700	462.50 ft
	5.	Tie Bund RD.1000	225.00 ft
	Total		1341.00 ft

¹²⁶ I.W. 99

10.6. Discharge through the breaches have been shown to be as follows:

DISCHARGE PASSED THROUGH BREACHES AT RMB OF JINNAH BARRAGE			
Government of the Punjab	<u>RD.6900</u>		
	Average Length	=	330 ft
	Average Depth	=	23.58 ft
	Area	=	7781.40 Sft
	Velocity	=	6.0 ft / sec
	Discharge	=	$7781.40 \times 6.0 = 46688 \text{ Cs}$
DISCHARGE PASSED THROUGH BREACHES AT RMB OF JINNAH BARRAGE			
Government of the Punjab	<u>RD.7400</u>		
	Average Length	=	300 ft
	Average Depth	=	23.23 ft
	Area	=	6969.00 Sft
	Velocity	=	6.0 ft / sec
	Discharge	=	$6969 \times 6.0 = 41814 \text{ Cs}$
DISCHARGE PASSED THROUGH BREACHES AT RMB OF JINNAH BARRAGE			
Government of the Punjab	<u>RD.7900</u>		
	Average Length	=	22.50 ft
	Average Depth	=	11.58 ft
	Area	=	260.55 Sft
	Velocity	=	6.0 ft / sec
	Discharge	=	$260.55 \times 6.0 = 1563 \text{ Cs}$

DISCHARGE PASSED THROUGH BREACHES AT RMB OF JINNAH BARRAGE		
Government of the Punjab	RD.8700	
	Average Length	= 462.50 ft
	Average Depth	= 22.10 ft
	Area	= 10221.25 Sft
	Velocity	= 6.0 ft / sec
	Discharge	= 10221.25 x 6.0 = 61327 Cs
Total discharge passed through breaching section = 151392 Cs		
(46688 + 41814 + 1563 + 61327)		

10.7. INQUIRY & FINDINGS

10.8. According to the information tendered by the Chief Engineer (D & F), Lahore, breaching section at Jinnah Barrage is at RD 6.7 to 8.6 of the RMB and the critical gauge is RD 701 at RD 5 of LMB.¹²⁷

10.9. Vide notification¹²⁸ dated 26.5.2010 according to the directions of Chief Minister, single committee is responsible for operating the breaching section at Headworks/barrages. Previous Zonal Committee constituted vide notification dated 30.06.2001 were dissolved and the following Breaching Operation Committee was constituted with immediate effect:

i.	Executive Engineer of the Barrage	Convener
ii.	DCO or his representative not below the rank of BS-18	Member
iii.	Representative of respective Army Corps not below the Lt. Colonel	Member
iv.	Representative of Highway Department/ Railway not below the rank of BS-18	Member

10.10. Breaching Operation Committee is to monitor flood situation and emergency at each breaching site. Breaching Operation Committee is responsible for taking decision to operate breaching section as per prescribed criteria as contained in flood fighting plan.

10.11. Vide notification dated 24.3.2010 issued by Director Flood/Secretary, Punjab Flood

¹²⁷Mark-30

¹²⁸Mark 31

- a) History of the breaching section.
- b) Location, Design, quantity and variety of the explosive required for detonation.
- c) Arrangement of explosives and security of explosive stores.
- d) List of the security staff alongwith detail of their training etc.
- e) Detail of mechanical means as a standby arrangements in case of detonation failure.
- f) Duty Roster in case of critical situation.
- g) Breaching Committee with their action plan.
- h) List of the villages likely to be inundated in case of breach.
- i) Announcement and details of evacuation arrangements.
- j) Details of coordination with Civil/Army Authorities.
- k) Parallel communication arrangements.
- l) Index Plan.

Commission, "Standard Operating Procedure" for operating breaching section shall consist the following aspects¹²⁹:-

10.12. Brig. Muhammad Ajmal Iqbal, Director Engineering, GHQ, Rawalpindi¹³⁰ submitted that the breaching section is operated on the direction of the Breach Operation Committee which comprises the following:-

1.	Executive Engineer Barrage/ Headworks/Flood Bund—	Convener
2.	DCO or his rep: not below rank of BS-18—	Member
3.	Representative of Army not below rank of Lt. Colonel.	Member
4.	Representative of Highway Department/Railway Department (BS-18)—	Member

10.13. However, the direction to operate the breaching section was sent to him¹³¹ in writing by the Chief Engineer on 30.07.2010 at 5:40 p.m. and by the SE at 5:30 p.m. He submits that verbal consent of the DCO was obtained and written consent by CCE, 1-Corpos was given on 30.07.2010 as well. From the above, it is clear that the instructions received by the Brigadier were not from the Breaching Committee and were instructions primarily issued by the Chief Engineer himself. The purpose of the Breaching Committee is to collectively decide if the critical gauge has reached 701 RL and then decide to take the action. In this case it is certainly clear that the Committee was never constituted nor the Committee visited the critical gauge at RD5000 on the LMB. No concurrence was given by the representative of the Highway Department or the Railway Department as per the notification. We are of the view that the breaching section was operated by the Pakistan Army in violation of the rules and regulations.

¹³⁰ IW-99 and Ex.IW-99/1 and Ex.IW-99/2.

¹³¹ Brig. Muhammad Ajmal Iqbal, Director Engineering, GHQ, Rawalpindi

¹²⁹ Mark-93

10.14. It is also stated in the written statement given by the Army that the direction was received at 5:40 p.m., however, the breaching section was prepared at 7:00 p.m. on 30.07.2010 and breaches were activated at 0500 hrs on 31.07.2010. Slight delay in operating the breaching section can play havoc with the barrage and the people in the vicinity.

Written orders by C.E. and S.E for operating the Breaching Section.

CHOWDER IRRIGATION SARGODHA

I, Rao Irshad Ali Khan, C.E
 Irrigation here with direct That
 Breaching Section on R.M.B. may
 be operated for the following reasons:-

- 1) Critical Range is Too.
- 2) Parallel flow is flowing along
 LMB + up LGB.
- 3) There is severe erosion
 on up LGB and in a matter
 of 12 hrs. almost 900 ft has
 eroded + balance 2100 ft is
 left.
- 4) Discharge at Khairabad is rising
 + has almost 11 hrs left.

There is no option but to breach
 the breaching section

5.40 p.m. 30/7

□ □ □ □ □ □ □ □

□ □ □ □

9. Khadim Iqbal SE
 That can circle
 Grant permission
 to demolish all four
 breaching sections on
 RMB as a result of
 decision of Breaching
 Committee today on
 30.7.10 at 5-30 PM

Indrajit
 SE Khadim Iqbal
 Maj

I Maj Zahid 89 LT AD hereby
 direct Capt Mujtaba 2 Engrs
 Bn to carryout demolition
 on RMB on all four sections.
 Dated. 30 JUL 10

✓ Indrajit Maj
 30 Jul 10

10.15. As per notification dated 26.05.2004 of the Irrigation & Power Department¹³², breaching operation committee was constituted for each beaching site with immediate effect. The Breaching Operating Committee is to monitor flood situation and the level of emergency at each beaching site and is responsible for taking decision to operate breaching section as per prescribed criteria as contained in the flood fighting plan. In the present case the C.E passed the orders bypassing the Breach Operating Committee in violation of the regulation.

10.16. Additionally, breaching section could only be operated if the critical gauge touched RL 701, however, in the present case, the breaching section was operated at RL 700 in violation of the Flood Fighting Plan.

10.17. Reasons given in the hand written order of Chief Engineer for operation of the breaching section is that there was a discharge of 11-lac Cfs at Khairabad. This is incorrect as according to the Hydrograph of Khairabad¹³³ the discharge on 30.07.2010 was in the range of 9.79¹³⁴ Cfs and was falling.

10.18. According to the physical model run by PRO Hydraulics at Hydraulic Research Station Nandipur, IRI, at a discharge of 856949 Cfs at 6pm on 30.07.2010 the critical gauge at the model achieved RL 697.2 and it was not likely that the critical gauge would have touched RL 701. It appears that the C.E panicked in advance and ordered the operation of the breaching section without assessing the situation and by disregarding the regulation. There is also no evidence on the record that the breaching committee visited RD 5000 and witnessed the critical gauge. We are of the view that the CE in order to cover his mistakes like absence of reserve stone, closure of weir gates (right side) and emergent work unlawfully carried out during the flood season took reckless and rash decision of operating the breaching section prematurely. It is clear that the breaching section was operated in violation of the regulation and the reasons given for it are not corroborated by the evidence on the record. We are of the view that the breaching section was wrongly operated resulting in an additional damage to the exchequer in the sum of Rs.18.50 million.

10.19. The Breaching Section having been inspected on 30-7-2010 at 430pm by the C.E. and the Army officers, the time spent (two hours) in operating the first breaching section shows serious omission on the part of the Army. If the breaching section will actually get operated in several hours after it is directed to be operated the very purpose of the breaching section is frustrated and can cause huge damage to the headworks.

10.20. The Flood fighting plan also provides that the water course of the breaching section must be clear at all times. However, the hydel power plant had a temporary housing colony set up in the said watercourse. C.E should have ensured that water course remained clear.

¹³² (Mark-31)

¹³³ Mark 33 (Canal Wire 140 dated 23-11-2010 by XEN, Kalabagh Division.

¹³⁴ Mark 41- WAPDA has stated that peak discharge of 997,300 Cusecs was at 1500 Hrs on 30-7-2010.

11. RECOMMENDATIONS (JINNAH BARRAGE)

1.1. The breach of LGB at Jinnah Barrage can be attributed to poor flood preparedness, failure to observe the regulation, absence of reserve stone, continuance of emergent work on the loose apron downstream, closure of weir gates and abuse of para 2.89. It also brings to fore the premature operation of the breaching section, conflicting statements of the officers regarding procurement of reserve stone during the critical dates and poor capacity of human resource employed at the barrage especially the XEN. This resulted in a loss of **Rs 417 million**¹³⁵ to the public exchequer, which could have been avoided.

We therefore **recommend** as follows:

Penalties

11.2. The competent authority to initiate departmental disciplinary proceedings against Secretary I & P¹³⁶, under relevant service rules for **inefficiency**.

11.3. To initiate departmental proceedings against C.E.¹³⁷, C.E (D&F)¹³⁸, S.E.¹³⁹, XEN¹⁴⁰ and SDO¹⁴¹ under PEEDA, 2006 for **misconduct and inefficiency**.

11.4. Till the conclusion of the departmental inquiry Mr. Rab Nawaz, Secretary I & P be immediately replaced, so that the Department does not face the next flood season (2011) under his stewardship.

11.5. In order to conduct an impartial and transparent departmental proceedings and in order to avoid further loss and damage, the above named C.E, C.E (D&F), S.E., XEN & SDO be placed **under suspension** and a fresh team of able and competent officers be appointed at Jinnah Barrage for the upcoming Flood Season, 2011.

11.6. To initiate criminal proceedings against the above named C.E., S.E., XEN & SDO under sections **166, 167, 283, 322, 427 and 431 of the PPC**. The competent Authority on the basis of the inquiry and findings above as well as the damages recorded in chapter 7 below initiate criminal proceedings against the above named C.E., S.E., XEN & SDO under section **166, 167, 283, 322, 427, and 431 of the PPC**.

11.7. NAB (National Accountability Bureau) to hold an inquiry to verify the alleged procurement of reserve stone from private quarries, stone allegedly procured for the emergent work on the downstream loose apron, the quantity of stone recouped from the RGB, reserve stone of stock maintained at the Barrage, if any and the source of reserve stone made available for flood fighting between 30th July, 2010 to 2nd August, 2010.

¹³⁵ Ex IW-5/3 Headwise list of flood damages, Sargodha Division, Restoration works 2010. (Page 793 Appendix 9)

¹³⁶ Mr. Rab Nawaz

¹³⁷ Rao Irshad Ali Khan

¹³⁸ Rafiq Ahmed

¹³⁹ Khalid Iqbal

¹⁴⁰ Muhammed Afzal

¹⁴¹ Nawazish Ali

Reforms

11.8. *Pre Flood Preparedness* must provide for the following:

- i. Proper Pre-flood Inspection of the headworks including training works. Other departmental representatives must also be included and the reports put up on the website.
- ii. An inspection check list needs to be developed, showing in detail the areas to be covered in the inspection. The said check list to be filled out by the inspection team and duly submitted with the C.E. and C.E. (D &F). The entire pre flood inspection to be videographed.
- iii. The pre inspection to be counter checked by the C.E. and C.E. (D & F) separately and independently of each other.
- iv. Total stoppage of works (U/S or D/s) on the barrage during the flood season.
- v. Severe penalties attached if there are lapses on pre flood preparedness.
- vi. I & P to develop a proper procedure of using Para 2.89 of the PWD code. A new emergency clause of the I & P Department can be developed and incorporated in the Flood Management Plan.
- vii. The officers posted out on a barrage must carry out the pre-inspection and should remain posted till the close of the flood season so that they can take ownership of the barrage during the flood season and effectively flood fight and coordinate with other departments.
- viii. There is also no effort on analyzing climate change and its effects. The I & P Department will have to develop its capacity to read the new trends in weather and climate change and be able to predict and forecast more intelligently. It is now common knowledge that due to global warming there will be extreme weather which could result in heavy and super floods and also severe droughts. This common knowledge wasn't available at the I & P Department and was never discussed during any pre flood meeting.

11.9. The *Flood Fighting* Plan must include:

- i. Quantity of Reserve Stone required under para 6.39 M.I.P. at every barrage. The Flood Fighting Plan must specify the Reserve Stone required.
- ii. Location must marked for stacking the said stones- and a map showing such locations shall form part of the Flood Fighting Plan.

- iii. Duty roster per camp- clearly giving out names of officers.
- iv. List of Flood Fighting Material carries outdated items which are not required in this time and age. This list needs a proper revision after need assessment.
- v. List of Machinery (dumpers, trucks, etc) for flood fighting required to be specified according to the flood levels. The said machinery to be available through out the flood season. There is no mention of the machinery in the flood fighting plan or its procurement mechanism from the Machinery Division.
- vi. Personnel of Army and Civil Administration to conduct rehearsals with the officers of the I & P Department and should remain standby through out the flood season. Civil Administration and the Army must depute a point person on the Barrage who shall assist and facilitate the C.E or the XEN to arrange manpower and any other assistance as per flood fighting plan.
- vii. Flood Fighting camps and stations must be clearly demarcated on a site map.
- viii. Chief Engineer to closely monitor, supervise and manage the entire flood season, especially at the Barrages.
- ix. Emergent works should not generally be allowed to continue during the flood season. This requires to be clearly provided in the Flood Fighting Plan.
- x. Flood Fighting Plan has to be put in motion at the start of the Flood Season with weekly reporting to Flood Emergency Cell at Lahore.
- xi. The data pertaining to the management of the Barrage must be on line during the flood season so that the efforts made by the I & P Department are available to the public on the Flood Website of the I & P Department.
- xii. Complete Flood Fighting drill to be carried out before the Flood Season.
- xiii. Sensitive and high risk areas to be marked during the pre flood preparedness – so that flood fighting is based on a well thought out strategy.

11.10. Breaching Section.

- i. The Breaching sections must be ready to be operated.
- ii. Explosive should be housed near the barrage rather than 4 hours away in Sargodha Cantt. The explosives for the breaching section should be housed on the barrage at the start of the flood season so that there are no transportation delays. Army and Civil Administration needs to deploy a point person who shall be deputed

at the barrage for immediate coordination.

- iii. Critical Gauge of RL 701 at RD 5000 needs to be revisited and its accuracy verified by IRI in close consultation with the I & P Department.
- iv. The Flood Fighting Plan must clearly spell out the number of breaching sections and the time lag involved in utilizing all the sections.
- v. The regulation setting down procedure for invoking the breaching section must be provided in the Flood Fighting Plan. Regulations spread into loose leaf circulars and notifications has also weakened the structure of governance. Without the majority of the members of the Breaching Committee being witness to the Critical Gauge, the breaching section should not be operated.
- vi. Water Course of the breaching section must be a no go area and must be kept clear at all times.
- vii. The delay in activating the breaching sections is also disturbing and in this aspect of the matter the I & P Department is directed to take up the matter in detail with the Pakistan Army

11.11. Pakistan Meteorological Department (PMD)

The Tribunal recommends the following to the Federal Government:

Penalties

11.12. Departmental action for **inefficiency** and **misconduct** be initiated against the Chief Meteorologist¹⁴² FFD of PMD for **inefficiency** under the relevant service rules.

11.13. Departmental action against ex-D.G.¹⁴³, PMD for **inefficiency and misconduct** under the relevant service rules for failing to procure radars for upper catchment area of River Indus, failure to raise this as an urgent issue with the Federal Government and also in the Pre Flood Meetings held with other stakeholder organizations, failure of PMD to issue weather forecast with confidence on 26th July, 2010 when an unusual stagnation of the two weatherly systems had become clear to PMD, to issue timely forecast and issue coloured coded alerts when the monsoon moved into Pakistan on 24th July, 2010 and also in failing to issue correctly worded forecasts (strictly in terms of WMO) that could have rightly communicated the severity of the weather and the urgency and importance of the forecast.

11.14. Chief Meteorologist, FFD (PMD) be placed under suspension till the final conclusion of the departmental disciplinary proceedings.

¹⁴² Mr. Hazrat Meer

¹⁴³ Dr. Qamar uz Zaman Ch.

11.15. The Federal Government should carry out an audit /assessment of PMD, particularly looking at the human resource as well as the infrastructural capacity of PMD and put the house in order before the next flood season. Four areas of concern are:

- i. Technological capacity- more QPM radars to cover the upper catchment of KPK and the Hill Torrents within Punjab.
- ii. International bench marking of the quality of Human Resource and weather models employed at PMD.
- iii. Upgrading the Research Division. PMD must lead cutting edge research in monsoons and climate change.
- iv. Ensure meaningful utilization of existing resources/ model/ equipment available with PMD and fixing responsibility / penalties in case of non-functioning of existing models acquired at heavy cost.

Reforms

11.16. Monsoon Research Centre to be set up under the auspices of PMD to develop more depth and understanding of Monsoons in Pakistan.

11.17. The human resource at PMD has to be upgraded and at the same time QPM Radar at Cherat has to be fixed and made functional. New and latest radars and other equipment to be installed for the catchment areas of Indus as well as the hill torrents.

11.18. We feel that PMD has to seriously buckle up if the extreme weather is to be predicted in future. On the whole, we feel that the PMD has failed in its responsibilities as the only forecaster in the country. As all the institutions have to react on the information disseminated by PMD, it takes a central role. It was also disturbing to note that inspite of the Research and Development Division within PMD, no material research has come out on monsoons or the climate change. PMD requires more internal coordination and more robust and dynamic approach towards weather and flood forecasting.

11.19. We recommend that Ministry of Defence must seriously revisit the structure as well as capacities of PMD specially FFD and stream line the same.

11.20. Better-qualified, trained, experienced and paid human resource is employed so that proper forecasts are generated at the right time. The infrastructure regarding purchase of new Radars and other equipments must be immediately attended to so that MET Office is always in the best state of preparedness at all times

11.21. According to the data supplied the human resource employed at the PMD has just one person at the FFD holding M.S. Meteorology while rest of the staff has degrees in

Physics and Mathematics.

11.22. PMD has to revisit its forecast terminology. The terms used by WMO must be incorporated. “Widespread rain or showers” must be replaced by “violent or exceptional rain” (where necessary) so that the sense of emergency can be properly conveyed.

FWC & I & P Department

11.23. I & P Department needs to revamp its flood warning centre (FWC). There is no coordination between the FWC and the Department.

11.24. The lag/travel time from Tarbela to Jinnah Barrage is 16 hours and from Tarbela to Chasma is 20 hours and from Tarbela to Taunsa is 36/37 hours. If the pre flood preparation is up to the mark, flood fighting plan can be set in motion in 16 hours at Jinnah and certainly in 36 hours at Taunsa. All the emergency cells ought to do is to keep a track of gauges at Tarbela and Khairabad as a second line of defence even if the PMD fails to deliver, as it partly did this year.



CHAPTER 4

In a land where it seldom rains, a river is as precious as gold¹.

TAUNSA BARRAGE



¹ Empires of the Indus-The Story of a River, Alice Albinia



1. INTRODUCTION

1.1. Taunsa Barrage is located across the River Indus at a distance of 18 K.M. from Kot Addu Town, District Muzaffargarh. Taunsa Barrage derives its name from a Town of Taunsa Sharif situated on the right bank of the River, 30 km upstream of the Barrage. The structure of the Barrage is one of the most important diversion structure for the arid zone of Southern Punjab².

1.2. The story of Taunsa Barrage dates back to 1936 when Mr. J.D. Bedford initiated the scheme to improve the lot of the backward Districts D.G. Khan and Muzaffargarh. At that time these two districts were served by a large number of inundation canals from River Indus. Since, supplies from these inundation canal were uncertain especially during the critical sowing and maturing period it was planned to complete these canals into weir control channels. In 1943 when a new circle known as “[Project Circle](#)” was opened in Punjab Irrigation Department to investigate new schemes for development of the Province, the idea was revived and work for preparation of Taunsa Barrage Project was initiated. In 1951,

¹ Empires of the Indus-The Story of a River, Alice Albinia

development of a hydel power project on the left flank was proposed i.e., by off taking a channel from Taunsa Barrage and dropping it into river Chenab near Muzaffargarh. It was decided by the government that scheme of Taunsa will be multipurpose scheme to include hydel power, Tube-well, roads and railway bridges, however, the project was revived and hydel power and tube-well were dropped. The construction of project started on 15.09.1953. On the completion of barrage the river was diverted through it on 11.4.1958 and the barrage was formally inaugurated by the President of Pakistan on 3.3.1959³.

1.3. According to the [Rules & Regulations for the Maintenance & Working of Taunsa Barrage \(1979\)](#)⁴, maximum discharge for which the Barrage is designed is [10,00,000 cusecs](#), but it can take and pass super-flood of [12,60,000 cusecs](#) for short periods in an emergency. The Regulation points out that Sangar Hill Torrent on the banks of which Taunsa town is situated, meets the river about 12 miles upstream of the Barrage and may bring in discharge upto 50,000 cusecs, or even more, all of a sudden, and needs a careful regulation during rains.

1.4. Three canals off take from left and right side of the Barrage namely Muzaffargarh Canal (discharge 8,900 Cfs) and T.P. Link Canal (discharge 12,000 Cfs) from the left side and D.G. Khan Canal (14,000 Cfs) from the right side of the Barrage. Muzaffargarh Canal and D.G. Khan Canal provides irrigation to [838,000 acres](#) and [950,000 acres](#) of land, respectively.

1.5. Taunsa Barrage delivers the following benefits⁵ to the area:-

- i. It diverts 20,450 Cfs of irrigation water to [2.23 million acres](#) of fertile agriculture lands of Muzaffargarh, D.G. Khan & Rajanpur Districts;
- ii. It serves as an important / vital rail – cum – road link between Sindh and NWFP;
- iii. The barrage structure also houses a 16” dia high pressure pipe line of PARCO Linking Karachi with their up-country storage at Mehmood Kot Terminal, besides 16” dia gas pipe line from Dhodak oil & gas field;
- iv. A head regulator is under construction to feed the kachhi Canal which will irrigate [7,13,000 acres](#) of barren lands of kachhi plains in Balochistan besides meeting with the drinking water requirement in the brackish Zone.
- v. The barrage also provide 12,000 Cfs of water to the River Chenab through 38 miles long Taunsa – Panjnad Link Canal constructed in 1965-71 for supplementing the supplies required at Panjnad to feed Panjnad and Abasia Canals in Districts Rahim Yar Khan and Bahawalpur.

³ Appendix-2 of Operation and Maintenance of Taunsa Barrage, November, 2007 (Ex I.W. 7/6/1)

⁴ Ex I.W. 7/3

⁵ Ex I.W. 7/3

1.6. According to the Operation and Maintenance Manual for Taunsa Barrage⁶ the operation of barrage is very important and a sensitive process. A small mistake or irregularity can trigger many serious problems. The operation of the barrage should effectively achieve the following objectives:

- i. To maintain the approach of the dominant river channel in three distinct streams approaching the under sluices and the central part of the weir.
- ii. Control sedimentation in guide bank zone to eliminate or contain the deposits close to or in the pockets.
- iii. To ensure indented supplies in the off-taking canals.
- iv. To control silt entry in the canals within their carrying capacity.
- v. To ensure safe passage of flood discharges.
- vi. Manage the flood flows at flow intensities close to uniform over the whole Barrage [sic], or if there is need to vary the discharges through adjacent Bays, ensure to limit the variation to 10%.
- vii. See that the Barrage is not over strained in any section / component.
- viii. Maintain the pond level to designated limits
- ix. Limit head across the Barrage to the permissible value.

1.7. The said Barrage was rehabilitated and modernized during the years 2004-2008 not only to avert the risk of river but also to provide water supply to District D.G.Khan, Muzaffargarh and Rajanpur.

1.8. At Taunsa Barrage, the River Indus has three main channels i.e., the Puran Creek (western arm), the main river in the centre and the Hassan Wah Creek (eastern arm).

1.9. The important flood protection and training works for the purposes of this report are the Left Marginal Bund (R.D. 1500 – 134700), Tibba Tie Bund (8,900 ft) and Sanawan Bund (42,000 ft).

1.10. Histogram⁷ of the highest floods that passed the Barrage since its commissioning is as follows:-

⁶ Ex.I.W.7/5

⁷ Ex I.W.7/3

Year	Date	Month	U/Stream Gauges	D/Stream Gauges	Up-Stream Discharge	D/Stream Discharge	Remarks
1958	21	July	441.80	441.60	760784	760784	V.H. Flood
1976	07	August	445.50	433.60	677105	675233	V.H. Flood
1992	14	September	446.00	434.70	655879	654579	H. Flood
1993	28	July	446.50	432.50	385302	381302	M. Flood
1994	19	July	444.00	436.70	574602	574602	H. Flood
1995	30	July	446.00	434.70	611937	611937	H. Flood
1996	20	August	448.00	432.30	521708	518208	H. Flood
1997	31	August	447.00	432.40	536199	534199	H. Flood
1998	18	July	447.00	431.50	528543	519881	H. Flood
1999	13	August	447.00	430.70	409720	387720	M. Flood
2000	05	August	447.40	429.40	227605	209405	L. Flood
2001	27	July	445.60	430.30	281873	281873	L. Flood
2002	17	August	447.00	430.80	335150	306150	L. Flood
2003	7	August	447.00	430.90	431277	421177	M. Flood
2004	21	August	447.60	428.65	206412	179157	Normal
2005	20	August	446.00	432.85	531177	531177	H. Flood
2006	11	August	446.80	432.70	612269	612269	H. Flood
2007	19	August	447.50	435.00	351820	333220	L. Flood
2008	08	August	447.00	430.70	279500	263177	L. Flood
2009	21	August	447.50	429.70	343369	312769	L. Flood
2010 ⁸	02	August	446.60	438.10	959177	959177 ⁹	Exceptionally High Flood
2010	12 ¹⁰	August	443	438	782698 ¹¹	782698	Very High Flood
2010	14 ¹²	August	443	437	779227	779227	Very High Flood

⁸ Daily Log Book and Flood Register of Taunsa Barrage. The said registers have been duly stamped by the Tribunal and returned to the I & P Department.

⁹ At 2100 hrs on 2-8-2010 according to the Flood Register. Plus the alleged discharge of 1,25,000 Cfs through the LMB.

¹⁰ Time 1100 hrs.

¹¹ From 1100hrs till 1500 hrs on 12-8-2010 as per Flood Register.

¹² 1000hrs on 14-8-2010 as per Flood Register.

2. NATURE OF BREACHES¹³

Sr.No.	Location	Date	Time	Nature	Duty Officer	Officers of other Deptt. Present at Site	Cause of Breach
LMB-B1	RD 32-33 LMB Taunsa Barrage RD 34-40 LMB Taunsa Barrage	2/8/10	4:00 PM	Spontaneous Breach	Inayat Ullah Cheema SE, Rana Muhammad Afzal SDO, Muhammad Afzal SDO, Muhammad Saleem Bhatti SBE	1. Army Officers with Jawans 2. DDO(R) Kot Addu	At super flood, deep sheet flow took place and it was extraordinarily headed up due to pocketing effect of the four long spurs (RD 9,11,15,26) and convex nature of LMB. Heading up continued rapidly till the LMB breach due to foundation / HGL failure
SN-B2	Sanawan Flood Bund	2/8/10	8:00 PM	Spontaneous Breach	Munir Anjum SDO, Muhammad Saleem Bhatti SBE	N.A	Hitting of more than 1.25 Lac Cs discharge from breach at RD 32-33 of LMB. Bund was overtopped / breached at many sites.
TPL-B1	RD 9-10 L/S TP Link Canal	3/8/10	3:30 AM	Spontaneous Breach	Rana Muhammad Afzal SDO, Zafar Javed SBE	XEN & SDO Highway Kot Addu	Hitting of more than 1.25 Lac Cs discharge from breach at RD 32-33 of LMB caused overtopping
TPL-B2	RD 15-16 R/S TP Link Canal	3/8/10	7:30 AM	Spontaneous Breach	Rana Muhammad Afzal SDO, Zafar Javed SBE	N.A	Hitting of more than 1.25 Lac Cs discharge from breach at RD 32-33 of LMB caused overtopping
TPL-B3	RD 19 L/S TP Link Canal	3/8/10	7:00 AM	Spontaneous Breach	Zafar Javed SBE	N.A	Hitting of more than 1.25 Lac Cs discharge from breach at RD 32-33 of LMB caused overtopping
TPL-B4	RD 23 L/S TP Link Canal	3/8/10	6:30 AM	Spontaneous Breach	Zafar Javed SBE	N.A	Hitting of more than 1.25 Lac Cs discharge from breach at RD 32-33 of LMB caused overtopping
TPL-B5	RD 28-29 L/S TP Link Canal	3/8/10	7:00 AM	Spontaneous Breach	Zafar Javed SBE	N.A	Hitting of more than 1.25 Lac Cs discharge from breach at RD 32-33 of LMB caused overtopping
TPL-B6	RD 35-36 L/S TP Link Canal	3/8/10	10:00 AM	Spontaneous Breach	Muhammad Hafeez Leghari SBE	N.A	Hitting of more than 1.25 Lac Cs discharge from breach at RD 32-33 of LMB caused overtopping
TPL-B7	RD 51 R/S TP Link Canal	3/8/10	10:30 AM	Spontaneous Breach	Muhammad Hafeez Leghari SBE	N.A	Hitting of more than 1.25 Lac Cs discharge from breach at RD 32-33 of LMB caused overtopping
TPL-B8	RD 176-177 R/S TP Link Canal	3/8/10	11:30 AM	Spontaneous Breach	Zafar Javed SBE	N.A	Hitting of more than 1.25 Lac Cs discharge from breach at RD 32-33 of LMB caused overtopping

3. SUBMISSIONS OF THE FLOOD AFFECTEES AND PRIVATE COMPLAINANTS¹⁴

1.1. 49 (forty nine) complainants came before the Tribunal and recorded their grievances at Muzzafargarh, Kot Addu, Taunsa Barrage and Lahore. The submissions made by the flood affectees and private complainants (in their own words¹⁵) were as follow:

- i. There was head up due to the closure of side gates of Taunsa Barrage which resulted into the breach of LMB.¹ Out of the 64 gates 11 middle gates of the Barrage were closed prior to 2.08.2010 and in addition four gates on the right side and four

¹³ According to the Head PMO. Mark 151 (email received by the Tribunal)

¹⁴ see Schedule 5

¹⁵ Flood affectees deposed and submitted their complaints in Urdu. This is the closest translation.

¹⁶ I.W.24 and I.W.27.

¹⁷ I.W.71

gates on the left side were also closed, resulting in the raising of the pond level.¹⁸

ii. The area between the Spurs and the LMB was under unlawful cultivation resulting in development of private bunds. It is these bunds that did not allow water to flow into the pond area thereby developing a load on the LMB.¹⁹ The encroachment in Pond Area is in connivance with the officials of I & P Department and also reflects the corruption of the department.

iii. Right gates of the barrage were also closed and therefore the river flowed towards the left.

iv. There was seepage in the LMB which was pointed out by the local residents but no action was taken by the Department.

v. Seepage took place on the LMB starting from 26.07.2010. No flood protection work was carried out by the Irrigation & Power Department to protect the bund or plug the seepage taking place.

vi. The embankments have not been properly maintained over the years.

vii. The breaching section on the right side was not operated.

viii. Khosas have a chunk of land at Kala which falls within the water channel of regular breaching section of Link Bund. The right side of the barrage was not operated only to save the land and crops of Khosas.

ix. In order to save Spur No.5, six gates on the left side of the barrage were closed on 28.7.2010 and remained closed till the time of breach.²⁰ In spite of reporting to the XEN about the seepage from LMB on 26.7.2010, the entire emphasis was upon Spur No.5 (on the right side of the Barrage) and efforts were made to protect the same.⁶ It is further pointed out that relief activities were carried out only at Spur No.5 on 1.08.2010.²¹

x. XEN Munir Anjum had the support of Khosa family. Pond level on 30.07.2010 was 447.80 RL which should have been reduced prior to the flood but this level was not reduced.²²

xi. In order to save forest in the Active Flood Plain, the gates of the barrage were closed in order to build a head up so that the velocity of water passing through the

¹⁸ I.W.25 and I.W.26.

¹⁹ I.W.28

²⁰ I.W.28.

²¹ I.W.65

²² I.W.28

said forests does not damage the said forests.²³

xii. There was nobody from the I&P Department addressing the situation, however, I saw four dumpers attending to some seepage upstream on the un-pitched portion of the embankment.^{23-A}

xiii. The breaching section was not operated and as a result of which breach took place on the left side at Abbaswala, LMB. The breaching section for such like eventuality is at RD-22 on the D.G. Khan Canal.^{23-B}

xiv. On 11.08.2010 Army demolished four spurs on the left side along LMB which reduced the pressure on the embankment. Had the department done this on 2.8.2010 heavy losses could have been avoided.^{23-C}

xv. Prior to the flood about 10 days before, the concerned staff at the barrage was transferred.^{23-D}

xvi. Influential families of Sultan Hanjra, Ahmed Yar Hanjra and Afzal Yar Hanjra on the left side and Khosa family on right side have cultivated the pond area which has resulted in the breach of LMB.^{23-E}

xvii. It is pointed out that seepage was going on in the LMB prior to its breach but the same was not noticed and no steps were taken for its protection.^{23-F}

xviii. The gates of the barrage were not opened in order to save the subsidiary weir downstream, which cost around Rs.11 billion to construct.^{23-G}

xix. In the right pond area Mian Muhammad Khan (contractor) had standing crops (sugarcane) in 16 squares of land and this was the reason the RMB was not breached.^{23-H}

xx. Had a relief cut made in the Muzaffargarh canal and T.P. Link Canal before Railway Line, Muzaffargarh could have been saved as the water would have traveled into the river. This was not allowed to be done by Khar family as the land under the said T.P. link Canal belongs to them.^{24-A}

²³ I.W.28

^{23-A} I.W.53 and I.W.58

^{23-B} I.W.70 and I.W.71

^{23-C} I.W.71

^{23-D} I.W.71

^{23-E} I.W.72

^{23-F} I.W.83

^{23-G} I.W.102

^{23-H} I.W.102

^{24-A} I.W.102

- xxi. The reason for the breach of LMB is the flow of Tibba minor alongwith the toe of LMB²⁴.
- xxii. Departmental negligence. If the Irrigation Department timely repaired the bunds the irreparable loss would have been avoided²⁵.
- xxiii. Before the flood the silt was not ejected²⁶.
- xxiv. Ashraf Rind, ex-Nazim did not allow to run water through Channel²⁷.
- xxv. The breach of LMB at Abbas Wala was natural²⁸.
- xxvi. There was departmental negligence. They did not open the gates of Barrage²⁹.
- xxvii. Ashraf Rind, resisted to make a cut at 4148 Burji³⁰
- xxviii. Ashraf Rind is responsible for the losses³¹.
- xxix. Breach is a result of Heavy Floods³².
- xxx. The Department tried its best to stop the erosion but in vain³³.
- xxxi. Embankments were weakened due to pitching³⁴.
- xxxii. The breach took place due to seepage³⁵;
- xxxiii. In the Indus River there is a Shikargarh which is under the use of Malik Muhammad Afzal Hinjra and Malik Ahmad Yar Hinjra, MPA, where the said peoples go for hunting. To save the Shikargarh, these peoples did not allow the Irrigation Department's officers/officials to perform properly³⁶.
- xxxiv. Had Shikargah known as Lashari Wala did not exist, the water pressure could not have been built on the embankments and the bund Abbas Wala would not have been breached³⁷.

²⁴ I.W.32

²⁵ I.W.32

²⁶ I.W.32

²⁷ I.W.32

²⁸ I.W.33

²⁹ I.W.33

³⁰ I.W.33

³¹ I.W.33

³² I.W.34

³³ I.W.34

³⁴ I.W.34

³⁵ I.W.36

³⁶ I.W.40

³⁷ I.W.40

xxxv. If the water flowed in its previous course of river on Western Side at Mauza Beet Wala, then there would have been no damage. Dost Muhammad Khosa is involved for not using this option. Damage of recent flood was due to connivance of local politicians and Irrigation Department³⁸.

xxxvi. Since the construction of Barrage the Department has not been properly maintained/repared the Bunds/Embankments³⁹.

xxxvii. Trees on Bunds/embankments have been cut down⁴⁰.

xxxviii. During the rehabilitation/remodeling of Taunsa Barrage in 2007 –2008, the construction and repair by pitching the bunds/embankments of upstream, was defective and the soil was not properly dumped on the Bund to raise the length⁴¹.

xxxix. The influential of the area have leased out the land of pond area and they are receiving Rs. 10 to 40 thousand per acre⁴².

xl. In the Pond area on the Eastern Side of Barrage there is a bund known as “Noor” which was raised by Malik Muhammad Afzal Hinjra, ex-Chairman Zila Council Muzaffargarh. In this regard a Writ Petition was also filed against the Department⁴³.

xli. On the western side of Barrage at spur No.5 illegal bunds have been raised⁴⁴.

xlii. Illegal bund for cultivation on Spurs No.1,2 & 3 have been raised for safety of their crops. The Irrigation Department did not breach these bunds⁴⁵.

xliii. Lashari Wala Shikargarh have been occupied by influential politician i.e., Malik Muhammad Afzal Hinjra, where he does hunting. There is also a jeep in the bela and there exist houses⁴⁶.

xliv. The breach took place due to seepage⁴⁷.

xlvi. The bund was very weak and water was percolating from various places. There were no safety arrangements⁴⁸.

³⁸ I.W.40

³⁹ I.W.41

⁴⁰ I.W.40

⁴¹ I.W.40

⁴² I.W.40

⁴³ I.W.40

⁴⁴ I.W.40

⁴⁵ I.W.40

⁴⁶ I.W.40

⁴⁷ I.W.40

⁴⁸ I.W.42

xlvi. The Department illegally attempted not allow water to flow to the pond area⁴⁹.

xlvii. There are two canals alongwith the Bank from where seepage started and the said seepage was not stopped and due to these canals the embankments became weak⁵⁰.

xlviii. LMB was in miserable condition⁵¹.

xlix. The flow of water was very high and the embankments were in weak condition and there was no proper arrangement for the protection of embankments⁵².

I. We have not seen any Baildar and Chowkidar, who should have been deployed for the protection of bunds⁵³.

li. No machinery was available for the stoppage of seepage⁵⁴.

lii. On 2.8.2010 I alongwith many other persons was present at LMB and the public was trying to plug the seepage by using sand bags but all of sudden the breach took place⁵⁵.

liii. This breach was due to Departmental Negligence⁵⁶.

liv. On the eastern side of LMB there was seepage at many places⁵⁷.

lv. No proper arrangements for the repair of bunds were seen at the spot⁵⁸;

lvi. On 2.8.2010 at about 4:00 p.m. I was present on Abbas Wala Bund. All of sudden seepage became into a spring and bund collapsed⁵⁹.

lvii. If the Officers of Irrigation Department timely opened the gates of Barrage and ejected the silt, there was no chance for the breach of LMB at Abbas Wala⁶⁰.

⁴⁹ I.W.43

⁵⁰ I.W.45

⁵¹ I.W.46

⁵² I.W.47

⁵³ I.W. 47

⁵⁴ I.W.47

⁵⁵ I.W.48

⁵⁶ I.W.48

⁵⁷ I.W.49

⁵⁸ I.W.50

⁵⁹ I.W. 51

⁶⁰ I.W.51

lviii. If the cut was made at 4148 Burji the whole Muzaffargarh District would not have been inundated, but Mr. Muhammad Ashraf Rind is responsible because he did not allow the Department to make cut at the said place⁶¹;

lix. The Department has not breached the private bunds raised in the spurs⁶²;

lx. It appears that it was a conspiracy to target Thermal Power Kot Addu, Lal Peer Thermal Power Muzaffargarh, Oil Depot Mahmood Kot and Pak Arab Refinery⁶³.

lxi. Due to heavy rainfall and intensity of water flow, the erosion started in the bund⁶⁴;

lxii. The Department had not made proper protection arrangements⁶⁵;

lxiii. I alongwith many people including Irrigation Departments' officials was present at LMB when all of sudden the bund collapsed⁶⁶.

lxiv. Due to resistance of Ashraf Rind the cut was not made at silt ejector which caused irreparable loss⁶⁷.

lxv. On 2.8.2010 at 03:45 p.m. I was present on the LMB at Abbas Wala and all of sudden bund collapsed⁶⁸;

lxvi. I am an eye witness that the bund was breached naturally. No one has breached the same⁶⁹.

lxvii. Due to resistance of Ashraf Rind the cut was not made at silt ejector which caused irreparable loss⁷⁰.

lxviii. On 2.8.2010 at 03:45 p.m. I was present on the LMB at Abbas Wala, all of sudden bund collapsed⁷¹;

lxix. I am eye witness that the bund was breached naturally. No one has breached the same⁷².

⁶¹ I.W.51

⁶² I.W.52

⁶³ I.W.52

⁶⁴ I.W.53

⁶⁵ I.W.53

⁶⁶ I.W.55

⁶⁷ I.W.55

⁶⁸ I.W.56

⁶⁹ I.W.56

⁷⁰ I.W.56

⁷¹ I.W.57

⁷² I.W.57

lxx. Due to resistance of Ashraf Rind the cut was not made at silt ejector which caused irreparable loss⁷³.

lxxi. I request that the responsible officer and Ashraf Rind may be punished⁷⁴.

lxxii. Heavy rainfall and high flood⁷⁵;

lxxiii. Defective strategy of Irrigation Department⁷⁶;

lxxiv. The Irrigation Department concentrated only at Spur No.5⁷⁷;

lxxv. Ex-Nazim alongwith his companions resisted and did not allow the Department to make cut at TP Link canal to flow water through silt ejector⁷⁸.

lxxvi. Old riverbed known as the breaching section was not operated in time⁷⁹.

lxxvii. The main causes of recent disaster are the Wadaira, Nawab, Hinjra, Khosa and politician of the area⁸⁰.

4. DEPARTMENTAL POSITION PRESENTED BY SECRETARY I & P⁸¹:

4.1. Other than the general submissions recorded in the chapter dealing with Jinnah Barrage (above), the Secretary I & P made the following submissions in the context of Taunsa Barrage:

4.2. Flood Peak reached Taunsa Barrage on 02-08-2010. Spur 5 came under direct attack and was saved by hectic efforts spread over five continuous days. Exceptionally high and very high flood persisted for 124 hours at Taunsa. LMB, however, could not sustain the pressure of flood waters and breached at RD 32-33 on 2-8-2010.

4.3. The Peak flood at Taunsa (1,085,000 Cusec) corresponds to 1 in 500 year flood event.

⁷³ I.W.57

⁷⁴ I.W.57

⁷⁵ I.W.61

⁷⁶ I.W.61

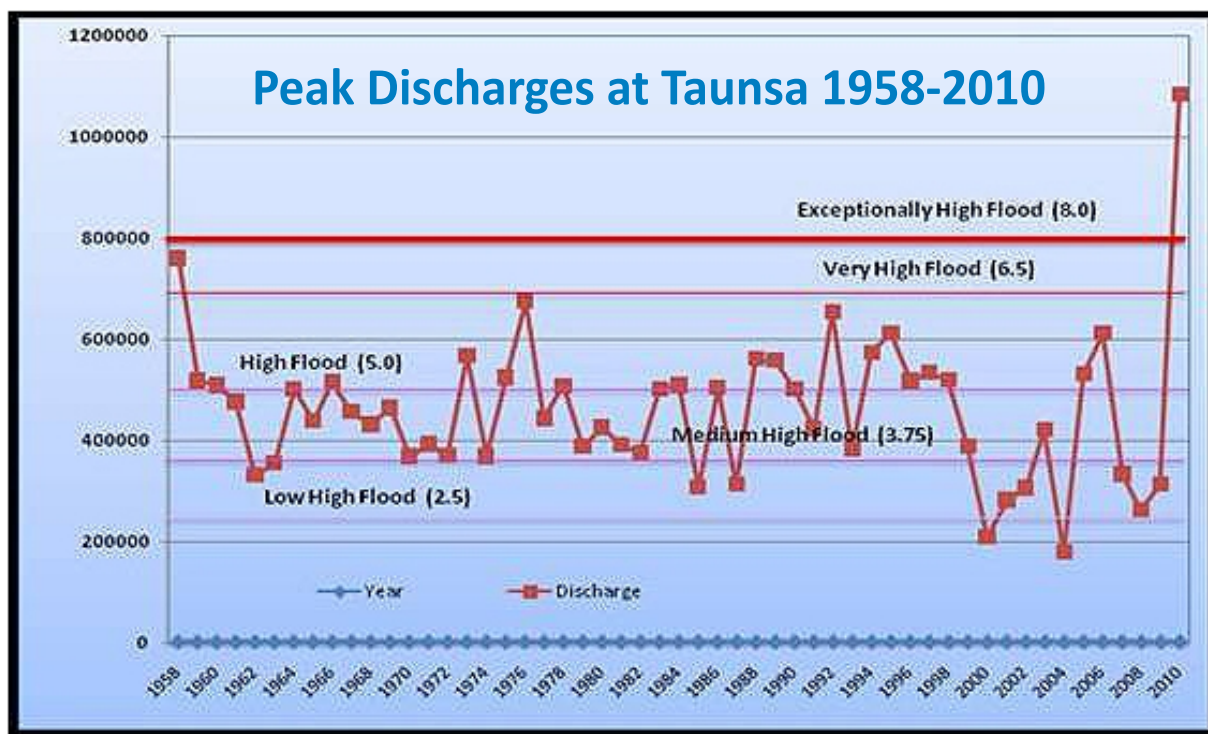
⁷⁷ I.W.51

⁷⁸ I.W.61

⁷⁹ I.W.65

⁸⁰ I.W.68

⁸¹ Ex I.W.6/1



4.4. The breach in LMB was the main cause of the extensive damages and inundations in Muzaffargarh District via TP link / Muzaffargarh canal.

4.5. A second wave of very high flood generated in river Indus in the second week of August 2010, which also aggravated the flood situation.

4.6. *Actions taken by the I & P Department:* Secretary I & P in his presentation / position paper⁸² stated that he took the following actions:

- a. On 29-07-2010 he directed Head PMO Barrages to reach Taunsa Barrage for taking appropriate action regarding safe passage of flood for the barrage. He was also directed to have a liaison with the district administration as well as with the military authority as prescribed in the SOP of Flood Fighting Plan.
- b. On 30-07-2010 Head PMO Barrages was issued instruction to call all the officers working in PMO Barrages at Taunsa Barrage for performing flood duties.
- c. The senior officers who had previously served at Taunsa Barrage were called at Taunsa Barrage to avail their services. They reached at Taunsa Barrage and worked there till the flood was over.

⁸² Ex I.W.6/1

STEPS TAKEN BY THE DEPARTMENT AFTER RECEIVING THE INFORMATION ABOUT SUPER FLOOD 2010



Government of the Punjab

Sr. No.	Name of Officers / Officials	Designation
1	Inayat Ullah Cheema	Superintending Engineer, LCC West Circle, Faisalabad
2	Khalid Hussain Quershi	Superintending Engineer, Drainage Circle, Lahore
3	Sajid Razvi	Executive Engineer, Small Dam, Chakwal
4	Ijaz ul Hassan Kashif	Executive Engineer, Small Dam, Islamabad
5	Rana Muhammad Afzal Naseem	Sub Divisional Officer, Machinery Division, Multan
6	Muhammad Afzal	Sub Divisional Officer, Chakwal Sub Division

Table : Source I & P department

d. The contractor along with the heavy machinery of the Department was deputed at site to face any eventually. The Detail of Departmental & contractual machinery is as follows:

Name of Machinery	Quantity
Front End Loader	4
Dumper	21
Tractor with Jack Trolley	18
Front blade Tractor	4
Water Bouzer	1
Excavator	3
Buldozer	3

Table : Source: I & P Department⁸³

e. **Ring Bund:** According to the Secretary I & P⁸⁴ cost of closing breach of RD 32-40 of LMB Taunsa Barrage through a Ring Bund is **Rs 206.36 million** including contingency @ 1% (2.04 million). This activity was carried out by Head PMO Barrages, Punjab. Expected payment to the Third Party Monitoring (TPM) Consultant

⁸³ Ex IW-6/1 (Appendix-11 page 1044)

⁸⁴ Mark 125

as reported by them comes out to be **Rs 1.0 million**. The Secretary submitted that this arrangement will be made out of normal M & R grant separately by the C.E., Lahore for the consultancy services of the aforementioned work.

5. POSITION OF HEAD PMO FOR PUNJAB BARRAGES⁸⁵:

5.1. During recent super flood 2010, River Indus at Taunsa Barrage raised from normal state of flow to low, medium, high, very high and exceptionally high floods as follows:

Date	Discharge	Flood Category
July 28, 2010	270,441	Low Flood
July 29, 2010	384,889	Medium Flood
July 30, 2010	377,889	Medium Flood
July 31, 2010	595,796	High Flood
August 01, 2010	768,804	Very High
August 02, 2010	1,085,000⁸⁶	Exceptionally High
August 03, 2010	934,116	Exceptionally High
August 04, 2010	790,021	Very High
August 05, 2010	743,466	Very High
August 06, 2010	692,981	Very High
August 07, 2010	614,418	High
August 08, 2010	580,013	High
August 09, 2010	572,154	High

5.1.1. On receipt of information of torrential rainfall in the catchment area, the field staff was directed to be alert to handle the expected flood as per Flood Fighting Plan. The higher officers of I & P Department, District Administration and Public Representatives were informed accordingly.

5.1.2. **Flood fighting camps established at vulnerable reaches were equipped with materials during July 29, 2010 to August 02, 2010⁸⁷**. Protective works were taken in hand on July 29, 2010, on all left and right side training works.

⁸⁵ Ex I.W.7/3

⁸⁶ Incorrect- only a discharge of 9,59,991 Cfs passed through the Barrage and alleged discharge of 1,25,000 Cfs through the breach at LMB. Design capacity of Taunsa Barrage is 1.1 million Cfs.

⁸⁷ Emphasis supplied.

5.1.3. Head PMO and Director Technical reached Taunsa Barrage on July 29, 2010. Head PMO asked the following officers of I & P Department to reach Taunsa Barrage for flood emergency duty.

Regular Staff

Sr. #	Name of Officer / Officials	Designation	Place of Duty
1	Ghulam Hussain Qadri ⁸⁸	Head/PD, PMO Barrages	Taunsa Barrage
2	Rao Muhammad Riaz	Director Technical Taunsa	Taunsa Barrage
3	Ijaz-ul-Hassan Kashif	Executive Engineer	Shahwala Groyne and LMB RD 80-134+500
4	Muhammad Munir Anjum	Sub Divisional Officer	Upstream Right side of Taunsa Barrage
5	Rana Muhammad Afzal Naseem	Sub Divisional Officer	Left Marginal Bund of Taunsa Barrage
6	Muhammad Afzal	Sub Divisional Officer	Left Marginal Bund of Taunsa Barrage
7	Tariq Aziz	Sub Divisional Officer	Shahwala Groyne LMB RD 80-134+500
8	Muhammad Saleem Bhatti	Sub Engineer LMB-I Section	LMB (RD 8-80) + allied spurs
9	Ghulam Akbar	Sub Engineer H/Works	Barrage Site
10	Inayat Ullah Shah	Sub Engineer Hydraulics	Spur on D/S left side
11	Saeed Ahmad	Sub Engineer Mechanical	Barrage Site
12	Ghulam Shabeer Bhatti	Sub Engineer Lind Defence Section	Link Bund and Spur on U/S & D/S right of barrage
13	Muhammad Ajmal	Sub Engineer LMB-II Section	Shahwala Groyne + LMB- II (RD 80-134)
14	Muhammad Hafeez Leghari	Sub Engineer Tarkhana Section	During Flood on LMB + TP Link Canal
15	Zafar Javed	Sub Engineer Muhammad Wala Section	During Flood on LMB + TP Link Canal
16.	Muhammad Farood	Sub Engineer Lashari Section	Right side river training works

⁸⁸ Head PMO has mentioned his name also.

Staff especially Deputed

Sr. #	Name of Officer / Officials	Designation	Place of Duty
1	Inayat Ullah Cheema	Superintending Engineer	Left Marginal Bund of Taunsa Barrage
2	Khalid Hussain Qureshi	Superintending Engineer	Headworks, Regulation and Supervision of Restoration works
3	Sajid Hussain Rizvi	Executive Engineer	Headworks & Regulation
4	Amjad Saeed	Ex-Director Technical	Upstream Right side of Taunsa Barrage
5	Shahid Saleem Ch.	Deputy Director Procurement, PMO Barrages	Upstream right side of Taunsa Barrage
6	Shafiq Ali	Deputy Director Electrical, PMO-Barrages	Upstream right side of Taunsa Barrage
7	Muhammad Aslam Randhawa	Deputy Director Mechanical, PMO Barrages	Upstream right side of Taunsa Barrage
8	Sajid Iftikhar	Design Engineer, PMO-Barrages	Upstream right side of Taunsa Barrage

5.1.4. On August 01, 2010 Spur No.5 located on right bank came under direct hit of River Indus. Head PMO visited the site and allowed to engage resourceful contractor for protection of Spur No.5.

5.1.5. Secretary, Irrigation & Power Department reached Taunsa Barrage on August 01, 2010. Head PMO supervised the flood fighting operation on the training works.

5.1.6. LMB breached at [RD 32-33 at about 04:00 PM on August 02, 2010](#) due to 10.85 lac cfs discharge approaching the site which was one in 1000 years flood.

5.1.7. Sanawan Flood Bund overtopped / breached at many sites. [The people also made many cuts on Sanawan Bund⁸⁹](#).

5.1.8. TP Link Canal at RD 9-10/L, RD 15-16/R, 19/L, RD 23/L, RD 28-29/L, RD 35-36/L, RD 51/R and RD 176-177/R breached on August 03, 2010 due to hitting of more than 1.25 lac Cfs discharge from breach at RD 32-33 of LMB.

5.1.9. Spur No.1 on U/S right side of Taunsa Barrage came under severe river attack on August 04, 2010. Spur no.1-A on U/S right side of Taunsa Barrage came under river attack on August 06, 2010 which were saved by the Department through tremendous flood fighting efforts.

⁸⁹ Emphasis supplied.

5.1.10. Spur No.2-A on U/S right side of Taunsa Barrage came under severe river attack on August 09, 2010, its head portion was damaged but at every inch flood fighting had to be done to slow down the rate of erosion to minimum possible extent. The spur was saved along with loop bund.

5.1.11. Two relief cuts at RD 4-5 (common bank of TP Link and Muzaffargarh Canals) and RD 4-5/R Muzaffagrah canal were made by I & P Department ordered by Head PMO-Barrages on August 12, 2010 with the help of Army authorities headed by Col. Kamran of Army unit to give relief to District Muzaffargarh as far as possible. Up to 25,000 cfs water was diverted to the river by this cut.

5.1.12. Spurt No.T-2 on U/S right side and Spur No.1 D/S left side of Taunsa Barrage came under river attack on August 17, 2010 and were saved by the Department through hectic flood fighting efforts.

5.1.13. Spur Bait Qaim Wala D/S left side Taunsa Barrage came under action on August 19, 2010.

5.1.14. The river then subsided. Operation for closing of LMB was immediately started on August 05, 2010 when discharge in the river was 7,43,000 cfs i.e., exceptionally high flood. The breach was closed on August 24, 2010. Immediate start of closing of the breach provided tremendous relief to District Muzaffargarh because as the new embankment was advanced into the river the discharge through the breach went on reducing and within 10 days the discharge through the breach came down to 1/5th of the original discharge which was 1,25,000 cfs.

6. CAUSES OF BREACH

6.1. The Tribunal after considering the complaints, the evidence on the record, reports of the local commissions, local politicians and field survey proposes to discuss the breaches in the following manner:

1. PRE FLOOD PREPAREDNESS
2. FLOOD FORECASTING
3. FLOOD FIGHTING
4. TECHNICAL CAUSE OF BREACH
5. POLITICAL INTERVENTION
6. ENCROACHMENT OF POND AREA
7. ROLE OF PMO

7. PRE FLOOD PREPAREDNESS

7.1. According to the Flood Fighting Plan, 2010⁹⁰ of Tausna Barrage emergencies and disasters can be experienced by any infrastructure anywhere, anytime and it is therefore essential to have an emergency preparedness plan available to start corrective/supportive works immediately on occurrence, forestalling uncertainties and indecision to minimize the damaging effects of an emergency and to avoid irreparable losses through catastrophes generated by uncontrolled emergencies.

7.2. According to para 7.1 of the Flood Fighting Plan, 2010, flood watching material should be arranged in ample quantities. Particular care should be taken to ensure that adequate quantity of the required material is distributed and placed at all the watching huts especially at all critical sites. It further provides that Sub Engineers should inspect all the bunds under his charge. They should walk along the river side, the toes of the bund on both side and locate the rat or porcupine holes on the slope and get these opened, refilled and compacted in his presence⁹¹. *(emphasis supplied)*

7.3. For flood bunds in the 2nd defence line the same pre-flood arrangements shall continue throughout the flood season⁹². *(emphasis supplied)*

7.4. Similarly Sub Divisional Officer should inspect all the vulnerable reaches of the bunds and act in similar way. Executive Engineer is also expected to see certain reaches of the bunds to ensure that no rat/porcupine hole is left un-attended. The Sub Divisional Officers should personally check that:-

7.4.15 All lamps, patromax, actuator and torches, kassies and baskets etc. are in good working condition and lightening arrangements at important points of the Head works and at vulnerable reaches of the bunds are satisfactory.

7.4.16. Adequate arrangements are made for communication of urgent messages from any part of the bund or spur to the Executive Engineer in case of any emergency. If there is no telephonic, telegraphic or wireless link, special messenger should be kept ready at all time for this purpose. All members of the staff must keep their mobile phone open 24 hours.

7.4.17. All the watching establishment should be properly trained. Dry rehearsals for flood fighting by the end of June should be carried out⁹³ and any shortcoming noticed should immediately be got rectified. It will be seen by the Senior Officer also. *(emphasis supplied)*

7.5. During pre-flood period, the watching staff should be engaged on the following works:-

⁹⁰ Ex.I.W.7/3

⁹¹ Emphasis supplied.

⁹² ibid

⁹³ ibid.

7.5.18. All jungle growth from the outer and inner toe of all bunds up to five feet width should be cleared.

7.5.19. Rats / porcupines, and other burrowing animals should be killed. Their holes after opening and pudding them thoroughly, should be closed.

7.5.20. Gul-Abassi should be grown in a width of 10 ft along the slope of the bunds for protection against wave wash action etc.

7.5.21. Repairing of temporary watching huts be done.

7.5.22. Any other work which is deemed necessary. In case of bunds of 1st Defence line, rolls of pilchi or “dib” will also be necessary in certain reaches. These rolls should be arranged and placed on the slopes of earthen embankments as per past year's experience to guard against wave wash. This work will however, be got done through extra labour i.e., other than pre-flood staff.

7.5.23. Temporary watching huts are to be constructed for storing flood fighting material⁹⁴ and are normally to be located at the following important sites, if required:- (*emphasis supplied*)

On Up-Stream left side works ⁹⁵		
i)	Left Marginal Bunds	At R.D. 5000, 11350, 15000, 19200, 26000, 32000, 40000, 47000, 55000, 65000, 75000, 79000, 85000, 92000, 100000, 110000, 120000, 130000 = 18 Nos.
ii)	Sanawan Bund	At R.D. 6000 and 15800
iii)	Tibba Tie Bund	At R.D. 4500

Figure : Location of temporary watching huts-source I & P Department

7.6. Pre flood arrangements for exceptionally high flood limits require 10 men per mile per shift for three shifts to be employed. In addition, 500 additional “Razakaars” shall also be requisitioned from the Civil Authorities to cater to any emergency⁹⁶. (*emphasis supplied*)

7.7. In case where it is difficult to get labour at the time of high discharge, it will be arranged through the civil authorities⁹⁷. The provision for this already exists in the District flood protection schemes of District Muzaffargarh. It is advisable to keep tractor with blades /trolleys and dozers as stand by for use in emergency during very high flood. (*emphasis supplied*)

⁹⁴ ibid.

⁹⁵ Ex.I.W.7/3

⁹⁶ ibid.

⁹⁷ ibid.

7.8. According to para 7.13 in case of extreme emergency, on request by Executive Engineer, the District Coordination Officer Muzaffargarh will be required to call the Army for immediate help and rescue. *It is also appropriate to ask for 100 Army men to station at the Barrage as and when discharge exceeds 7.5 lac cfs*⁹⁸. (*emphasis supplied*)

7.9. According to paragraph 8, inhabitants of the riverine area leave their houses and take shelter at the flood bunds along with their animals. This practice needs to be curbed as it creates law and order situation.

7.10. INQUIRY & FINDINGS

7.11. *Flood Fighting Plan, 2010 & the Guidelines*⁹⁹: In addition to the instructions given in the Guidelines discussed above (Jinnah Barrage) the following pre flood preparation never took place as prescribed under the Flood Fighting Plan, 2010:

- flood watching material should be arranged in ample quantities.
- Particular care should be taken to ensure that adequate quantity of the required material is distributed and placed at all the watching huts.
- Sub Engineers should walk along the river side, the toes of the bund on both side and locate the rat or porcupine holes on the slope and get these opened, refilled and compacted in his presence.
- For flood bunds in the 2nd defence line the same pre-flood arrangements shall continue throughout the flood season.
- Dry rehearsals for flood fighting by the end of June should be carried out.
- Temporary watching huts were to be constructed for storing flood fighting material.
- In addition, 500 additional “Razakaars” shall also be requisitioned from the Civil Authorities to cater to any emergency
- In case where it is difficult to get labour at the time of high discharge, it will be arranged through the civil authorities
- It is also appropriate to ask for 100 Army men to station at the Barrage as and when discharge exceeds 7.5 lac cfs

7.12. The submissions made by the Secretary I & P as well as Head PMO lay emphasis on the steps taken on 29th July, 2010 onwards. The main concern and focus of this investigation is to check whether the Barrage Regulations and Flood Fighting Plans were duly followed and a proper pre flood preparation made. It matters less to this Tribunal how hurriedly, over zealously and extra efficiently the senior management reacted once the flood was on their head. Our concern is with the functionality of the systems set up by the institution and not with one off last minute individuals efforts, no matter how heroic and fruitful they were.

7.13. *No pre-flood inspection report*: The joint inspection report of flood embankments and river training works of Taunsa Barrage Division placed on the record vide letter dated

⁹⁸ *ibid.*

⁹⁹ Guidelines for Flood Preparedness/ Works during Flood Season, 2000 dated 10-3-2000 (Ex.I.W. 6/3)

18.03.2010¹⁰⁰ pertains to Shahwal Groyne (upstream Taunsa Barrage). There is no pre-inspection report relating to LMB. The only joint team comprising of the Army Officer and Executive Engineer inspected only Shahwal Groyne on 18-3-2010 and not the Taunsa Headworks. Letter dated 07.06.2010 is simply a compliance letter of the earlier inspection note pertaining to Shahwal Groyne. Head PMO¹⁰¹ deposed: “...pre inspection has to take place in the month of March every year, which is to be done by one S.E. and 1 or 2 XENs of another zone, however, no such pre flood inspection took place at Taunsa this year [2010].” (emphasis supplied)

7.14. Director Technical, PMO inspected the barrage five times before flood i.e, on May 27, June 11, June 22, July 6 – 7 and July 21-23, 2010. However, according to his note dated July 23, 2010,⁹⁸ he alongwith Executive Engineer, Taunsa Barrage Division, Kot Addu carried out the inspection of the Training Works as well as seepage drains on 22.07.2010. The general observations recorded during the inspection are as under:

TAUNSA BARRAGE SEEPAGE DRAIN.

The drain which has recently been re-aligned and rehabilitated to meet with the optimum performance but it was found that the drain has been blocked at some locations. The undersigned has directed to clear the blocked sites by employing work charge establishments at the earliest so that the drain may run at its maximum capacity to ensure relief to inhabitants of the area.

BARRAGE GATES

The undersigned inspected the barrage gates and found that the weir gates No.22,31-35, 37, 39, 41, 60, 63 are behaving malfunction. Sub Engineer (Mechanical) is directed to assess the missing parts of the gates and replace them immediately to ensure smooth operation of said gates.

INSPECTION OF LMB

The undersigned inspected the Left Marginal Bund, the condition of the embankment has been found satisfactory. The spill water touches the LMB from RD 28-70 and no serious threat reveals in this particular reach. The battery of spurs T-I, T-II, T-III and hockey spur off-takes from LMB at RD's 11350, 15000, 19200 and 26000. The slopes of hockey spur at RD 26000 found badly damaged due to wave wash action and require immediate attention. The undersigned directed to launch killa bushing and tree branches as temporary remedial measures, so that further advancement of erosion may be stopped.

7.15. The Inspection by Director Technical, PMO, does not pass for the pre-flood inspection provided under the Flood Fighting Plan. No departmental committee was constituted to carry out a joint pre-flood inspection with the civil administration and the army as provided above in the Guidelines for Flood Preparedness/ Works during Flood Season, 2000 dated 10-3-2000¹⁰². The so-called pre flood inspection carried out by the Director Technical, PMO Barrages is not provided under the Regulation. I & P Department and the PMO never conducted a pre-flood inspection and the above write up given by the Head PMO is to

¹⁰⁰ Ex I.W. 7/3

¹⁰¹ I.W.7

¹⁰² Ex I.W. 6/3

mislead the Tribunal. The PMO has tried to cover up the absence of pre flood inspection by presenting the inspection note of the Director Technical, who is part of the secretariat of the PMO, and has no role under the regulation in the management of the Barrage in the presence of the XEN. PMO is to work with the existing field formation of the Barrage (headed by the XEN) when it comes to management of the Barrage and not with the officers of the PMO who are there to assist the PMO in the Rehabilitation Project and form part of his secretariat. The date of the alleged pre-inspection of the LMB has also been intentionally withheld. Was it before the Flood Season as it should be? There is nothing on the record to show the follow up of the above note. The malfunctioning of the weir gates and the “badly damaged” spurs have been mentioned but it is not clear if the same were rectified. No information regarding this has been provided to the Tribunal.

7.16. It is stated by the Head PMO that he himself inspected the Barrage on July 06, 2010, the Inspection Note¹⁰³ dated July 08, 2010 reads as follows:-

“Inspection Note dated July 06, 2010 by Head PMO-Barrages

Taunsa barrage was inspected in company of the Director Technical and Executive Engineer, Taunsa Barrage Division. It was found that the weir, sub-weir and the hoisting system is in excellent condition. Executive Engineer was directed to keep a watch personally on pitching of the guide bunds. In case of displacements, it should be repaired immediately. Left and right side training works were inspected and found in satisfactory condition. The Executive Engineer informed that 25.05 lac cft reserve stone is available against 35.37 Lac cft limit. He was directed to procure the balance quantity as early as possible. He was also directed to make flood fighting arrangement as per flood fighting plan. Director Technical is requested to ensure compliance.”

7.17. It is surprising to note that without any field inspection the Head PMO has reported that left and right side training works were found satisfactory. He also directed to make a flood fighting arrangement as per flood fighting plan and pointed out the shortage of reserve stone. There is nothing on the record to show that compliance of the said direction was carried out. The said inspection note is contradictory to the statement of Head PMO, who stated that he visited the Barrage for the first time on 30th July 2010. It is also surprising that the issues raised in the notes of the Director Technical prior to 6-7-2010 (above) did not find mention in the inspection note of Head PMO.

7.18. Mr Muneer Anjum, XEN, deposed that “ I carried out physical pre-flood inspection of LMB by walking through the entire length of LMB alongside toe of the riverside which took almost one-week. I did this physical pre-flood inspection in the month May, 2010. No hole was reported by me in the entire length of LMB while I inspected river side of LMB¹⁰⁴.” It is strange that after carrying out such a laborious exercise of walking on foot alongside the entire LMB, he failed to submit a written report. Even otherwise, under the Flood Fighting

¹⁰³ Ex I.W. 7/4

¹⁰⁴ I.W.105

Plan, it was the Sub Engineer who was supposed to perform this task. The statement of the XEN does not inspire confidence and has persuaded us to draw a negative inference against the XEN, who is supposedly the best of the lot¹⁰⁵ and therefore was handed over the prize post of XEN at the Barrage.

7.19. There is no report by the SDO or the XEN on the pre inspection of the embankments, in particular the LMB. The embankments as well as the retired bunds (2nd defense line) were not checked during the pre flood preparation.

7.20. No watching huts were set up on the LMB and as a consequence no flood fight material was supplied out in the field. In exceptionally high flood, 10 men per mile are supposed to observe the Barrage to spot possible seepage, leakages or boils. There is nothing on the record that establishes that such labour was actually on the LMB at the time of the breach.

7.21. Nothing has been placed on record that meetings were held with the civil administration or the army during the pre flood season or if any strategic flood management plan was developed.

7.22. *Flood Fighting Material*: Head PMO submitted in his reply to the questions posed by this Tribunal that ex-Executive Engineer (Mr. Ijaz-ul-Hassan Kashif) informed him that sufficient flood fighting material was purchased last year (2009) which was still lying with the respective Sub-Engineer and therefore there was no need to buy new material. No such letter has been placed on the record, however, the list of material available with the Sub-Engineer has been placed on the record¹⁰⁶, which shows 15 items, however comparison with the flood fighting plan shows that 39 items were required. Therefore reliance of the Head PMO on the alleged statement of Ijaz-ul-Hassan Kashif is incorrect.

7.23. *Pre flood work force arrangement*: According to the record placed before the Tribunal, List of Work Charge Labourers¹⁰⁷ on the LMB (one section i.e., RD-0 to RD-80) was 16, engaged for the morning shift and 16 for the night shift. In addition three Chowkidars were also appointed. Other than the said workers, no list or muster roll has been placed on the record to show that as a part of pre-flood preparation, labourers were duly engaged for flood fighting. No firming up was done with the civil administration or the Army.

7.24. Inayat Ullah Cheema¹⁰⁸, Superintending Engineer¹⁰⁹ in his written statement has stated that arrangements of pre-flood preparedness were very nominal / meager against the requirement of super floods being received at the Barrage

7.25. *Operation & Maintenance*: Statement showing structure wise O&M expenditures

¹⁰⁵ I.W. 6

¹⁰⁶ Ex I.W. 7/4 (Annex-12A)

¹⁰⁷ Ex I.W.7/17

¹⁰⁸ Ex I.W.107/1

¹⁰⁹ Who was member of the team sent in by the Secretary I & P Department at the last hour.

incurred during 2005-2010 on Taunsa Barrage dated 12.08.2010¹¹⁰ reveals that there has been no expenditure on the operation and maintenance of the Tibba Tie Bund, Retired LMB and Sanawan Bund. However, surprisingly, in the year 2009-2010, the statement shows that **Rs.299168/-** were spent as an O&M expenditures on Sanawan Bund. Head PMO¹¹¹ submitted: "I admit that Sanawan Bund and Tiba Bund were not maintained. There is no expenditure regarding the maintenance of the same. Only in 2009-2010 **Rs 2,99,168/-** were spent on Sanawan Bund just to fix the drain cuts made in the bund, otherwise it is admitted position that there are road crossings in the Bund, as well as water course passing through. In fact it is not an embankment in the present form."

7.26. The Tribunal is curious that an amount of **Rs.299168/-** has been shown to have been spent on an abandoned bund that miserably failed to hold the onslaught of the flood that gushed through the breach of the LMB as a second defense line. The PMO also confirms that the said bund was unkempt and practically abandoned.

7.27. The statement of O & M expenditure also shows that regularly since 2005, expenditure is being incurred on the LMB and a total of **Rs.7,371,054/-** has been spent over the years. This once again is surprising because in the statement of PMO, as well as, the Secretary, Irrigation & Power Department, LMB was not properly maintained and no wetting channel has been provided. The above statement shows that there has been no allocation for Spur No.5 which according to the PMO fell prey to the recent floods.

7.28. It is most disturbing to note that letter dated 26.07.2010¹¹² bearing No.369-71/30-G(TSA) issued by the Executive Engineer, Taunsa Barrage Division, Kot Addu, in favour of Director Technical (Taunsa). The said letter seeks permission to take up works under para 2.89 during flood 2010. The said letter read as follows:

"The super flood in the River Indus is approaching Taunsa Barrage. Kindly allow me to undertake the following works under Para 2.89 of P.W.D. Code in anticipation of provision of funds and sanction estimates:- (*emphasis supplied*)

Sr. #	Name of Work	Tentative Cost Rs. Million
1	Protection of Shahwala Groyne and its allied River Training works during flood 2010	4.00
2	Protection of LMB from RD 80 to 134+500 in Workshop Sub Division during flood 2010	2.50
3	Protection of LMB from RD 0 to 80 and its allied River Training works in Head Works Sub Division during flood 2010	1.50
4	Supply of flood fighting materials and providing watching establishment in Workshop Sub Division during flood 2010	1.00

¹¹⁰ Ex I.W. 7/18

¹¹¹ I.W.7

¹¹² I.W.7/4

Sr. #	Name of Work	Tentative Cost Rs. Million
5	Supply of flood fighting materials and providing watching establishment in Head Works Sub Division during flood 2010	1.00
6	Supply of flood fighting materials and providing watching establishment in Bund Sub Division during flood 2010	1.00

7.29. It is surprising and important to note that on 26.07.2010 when the said letter was issued there was no warning of flood what to say of “super flood” as recorded in the said letter. Secondly, the funds are being sought for the supply of flood fighting materials in the end of July, 2010 when the same should have been done before the flood season. More surprisingly the permission is granted to carry out the above mentioned works under para 2.89 of the PWD Code on the same day i.e., 26.07.2010 vide letter No.188/HPMO/PMO dated 26.07.2010¹¹³.

7.30. Vide another letter No.372-74/30 G¹¹⁴ dated 26.07.2010 approval was sought by the same XEN to call gallup tenders for the above mentioned works as “super floods” were anticipated in the next few days. As pointed out above no such forecast is on the record of the PMD for 26th of July 2010. Approval of the gallup tender was granted by Director Technical (Taunsa) PMO for Punjab Barrages on the same day. The tenders were accepted vide letter dated 30.07.2010 bearing No.30/DT/PMO, tenders of M/s A.M. Associates¹¹⁵ were accepted for protection of LMB from RD 0 to 80 as well as of Malik Brothers¹¹⁶ for supply of flood fighting materials and providing watching establishment in the aforementioned Sub Divisions. No record has been placed before us to show that the said tenders were advertised and the lowest rates offered by S.A. Associates were rightly accepted. The statement as well as record placed before us does not show the quantity of the material supplied for flood fighting. The authenticity of the said letters is doubtful as they refer to the super floods when there was no such indication of “super floods” on 26.07.2010. Further, no embankment protection requirement has been pointed out earlier during the pre flood preparation period.

7.31. The Executive Engineer has also placed on record a Pre-Flood Inspection Report¹¹⁷ of Flood Bunds and River Training Works of Taunsa Barrage dated 23.04.2010 bearing No.234/30G. Perusal of the same reveals that it is about the same joint inspection carried out of Shahwala Groyne in District Layyah and there is no a word regarding LMB at the Taunsa Barrage.

7.32. According to the Report issued by Mr. Muhammad Muneer Anjum, ex-Executive Engineer, Taunsa Barrage Division, Kot Addu dated 28.10.2010¹¹⁸ titled Pre-Flood

¹¹³ Ex I.W. 7/4 (Annex 12B and 12-C)

¹¹⁴ Ex I.W.105/1

¹¹⁵ Ex I.W. 1051/1

¹¹⁶ Ex I.W. 105/1

¹¹⁷ Ex I.W. 105/1

¹¹⁸ Annex-12D - Ex.IW.7/4

arrangements on LMB:-

“As per flood fighting plan, following pre-flood arrangements were made on LMB:

1. A total of fifteen watching huts were established with flood fighting material at RD 11350, 15000, 19200, 26000, 32000, 40000, 47000, 55000, 79000, 85000, 92000, 100000 & 120000.
2. It was ensured that one Sub Divisional Officer alongwith three Sub Engineers (Saleem Bhatti, Hafeez Leghari, Zafar Javed) to check the Bund thoroughly.
3. I myself inspected the Bund many times.
4. On 29-07-2010, due to expectation of exceptionally high flood, additional flood fighting material was arranged under para 2.89 of PWD Code, as no funds were available Additional 150 work charge beldars were employed through contractor. Two excavators, two front end loaders, seven dumpers, twelve tractors with jack trolleys and one water sprinkler were arranged.
5. The establishment and machinery worked day and night to protect the Bund. On 31-07-2010, a boiling opposite RD 34-35 of LMB was observed in Tibba Minor bed, which was controlled by filling earth in the bed of the minor. I inspected the Bund many times also along with Director Technical and Head PMO Barrages and kept the situation completely under control.

7.33. As per statement¹¹⁹ of Mr. Muhammad Muneer Anjum no pre-inspection report has been filed. During our physical inspection of the LMB (till the RD 32) we did not see watching huts or were not shown any watching huts, on the LMB, as claimed by the XEN. In his deposition before the Tribunal the XEN did not mention the setting up of watching huts especially at RD 32000.

7.34. LMB had to be pitched till RD 40, however, pitching was done till 34+500 and the rest (RD 5.5) was left unpitched with a slope of 2:1. Head PMO admitted that this aspect went unnoticed during pre flood preparation. (*emphasis supplied*)

7.35. The Tribunal is of the view that no pre-flood preparedness took place at Taunsa Barrage under the PMO. No pre-flood inspection took place according to the Flood Fighting Plan or the Guidelines. Tribunal has also noticed that the Head PMO and the XEN have tried to mislead the Tribunal by placing on record documents that appear to be fabricated and paint an incorrect picture of compliance of pre flood preparedness. This has seriously undermined the position of the PMO and the XEN and has tarnished the confidence and trust of the Tribunal in the said officers.

7.36. The following documents are prepared at the end of every flood season according to the Flood Fighting Plan, 2010 and are a starting point for any pre flood preparedness. No such material was available with the PMO except the Survey Map.

¹¹⁹ Ex.IW.105/1 (Statement of Muhammad Muneer Anjum, Executive Engineer, Taunsa Barrage Division)

7.36.24. *Survey of Riverine area* (River Survey)¹²⁰ 15 miles upstream and 10 miles downstream of the barrage along the river and high bank or defence bund to high bank across the river should be carried out every year as soon as the river subsides after the floods and must be completed by November¹²¹.

7.36.25. *Annual Headworks Report* is based on preliminary survey of river 15 miles upstream and about 10 miles downstream of the barrage. It carried out soon after the floods and it describes marked changes in the River course that occurred after the last survey, behavior of its major creeks and their likely future effects, other data including statistical record about monsoon, rainfall, River supplies and Canal discharges. River behaviour during the floods i.e. river approach on the upstream and downstream of the barrage action sustained by various training works. This report is prepared by Executive Engineer and submitted to higher authorities by middle of November¹²².

7.36.26. *Annual River Survey Report* should also be completed by November-December every year. Report describes likely effect of changes in river course and contains recommendations for any additional training works so that the same (after necessary approval of estimates etc) may be executed before next flood season. This report be submitted by Executive Engineer to his higher officers by end of December.

7.36.27. *Annual Closure Report* is to be prepared by the Executive Engineer and submitted at the end of each closure period. This report describes the background, detail of various repairs carried out and the method adopted for the same as well as the repairs that could not be carried out but were either planned or approved along with their likely effects.

7.37. *[SIND] BUND MANUAL*¹²³ is enlightening and instructive for the flood manager especially in the context of pre flood preparedness. It is an accepted position that Sind Bund

¹²⁰ 1. Examine the new emerging river pattern to study the river approach towards the Barrage and the training / protection works on the basis of Annual Headworks Report.

ii. Observe sounding and probing in all parts of the Barrage and its appurtenances to ascertain extent and nature of damage if any. (S.No.(i) & (ii) will form part of Annual Headworks report).

iii. Chalk out a program for repairs to restore the health of the Barrage to enable it to face the high flows and floods of the next season.

iv. All the above exercise including execution of the works has to be gone through in a very limited period of a few winter months and in any case the Barrage has to be made fit for facing the next high flow period. To meet these objectives in a systematic manner, a number of reports have been prescribed.

¹²¹ Paragraph No.6.4.2.

¹²² Paragraph No.6.4.2 (1).

¹²³ Mark 38- Government of Sind, Public Works Department, Central Designs Division, Mechanical & Research Circle, Karachi Printed at the Sind Government Press 1954. Following the breach in the Sukkur Begari Bund and the consequent floods of 1942, there was constituted by the Sind Government a Court of Inquiry into matters connected with the floods, under the Public Inquiries Act, 1940. There was, also, a Technical Inquiry into the causes of breaches in River Bunds in Sind and steps required to minimize the danger of a recurrence.

The Court of Inquiry remarked that though now regarded as a complete guide in all matters pertaining to the construction and maintenance of bunds, the Bund Manual manifestly required revision. It considered there were doubtless matters in which the Manual can be improved and that it required re-editing and keeping upto date.

3. The recommendation to revise the Bund Manual, made both by the Court of Inquiry and the Technical Inquiry, was accepted by the Indus River Commission at their meeting on 26th October, 1943. They suggested that an officer on Special Duty may be appointed to revise the Bund Manual.

The present edition of the Bund Manual is the result of that decision.

Manual is used as a guidebook by the I & P Department. However, most disappointingly its wisdom has fallen on deaf ears. Some of the important instructions of the Manual, which went unnoticed, are reproduced hereunder:

7.37.28. *Proposals for Wetting Bunds (PARA 28)*: Adequate arrangements for soaking are an essential pre-requisite of a safe bund, for the consolidation or compaction of a bund depends on the soaking, which helps settlement and discloses faults which can be made good or leaks which can be filled before the main rise of the river. Therefore, every proposal for a new bund or a loop bund is incomplete without the attendant proposals for sufficient arrangements for early wetting and consolidation of a bund, unless the bund is likely to get automatically soaked with the early levels obtaining in the river on account of low-lying and near the bund on the river side.

7.37.29. In case of existing bunds, too, wherever arrangements do not already exist, proposals should immediately be made for their efficient wetting wherever necessary. The two principal ways of wetting bunds in Sind are:-

- (a) Wetting channels, and
- (b) Flooding of a compartment through a bund sluice in the front bund.

7.37.30. While (a), wetting channels, can be used for soaking both front and loop bunds, method (b) is available only for wetting the loop or retired bund. In other words, while the loop bunds can be wetted by either method, the only arrangement possible for wetting front bunds is by means of wetting channel.

7.37.31. *Wetting channels are of two kinds:-*

7.37.31.1. Gravity channels excavated from the river lip (which is generally higher than the other ground) to the bund along the lowest contours, to lead flow water early against the bund, in advance of the sudden over-topping of the higher ground near the river edge causing a rush of flow against the bund.

7.37.31.2. High level artificial wetting channels, made by adding a trench bund to a main bund (see Chapter IX para.99). In rare cases, it may be possible to get flow water in these channels with the river levels obtaining at the beginning of the season; but generally, water is lifted into the wetting channels by means of pumps. A centrifugal pump worked by a suitable engine is placed on some canal, or special channel from the river and water pumped thence into the wetting channel.

7.37.32. The Indus River Commission have, therefore, enjoined that:- "In all cases of front bunds the river water should be brought to the bunds sufficiently early

through leading channels. Where, in case of important bunds this is not possible wetting trench bunds should be provided¹²⁴.”

7.37.33. *Presence of Maintenance Establishment Required on Bunds (PARA 103):* The principal maintenance of bunds comes during high water when the safety of the bund is threatened. Frequent inspections, particularly in case of new bunds or dangerous sections of old bunds, and constant attendance on the bunds, within their charge, by everybody from the humblest beldar to the Executive Engineer are essential.

7.37.34. Patrolling by beldar commences as soon as water comes against a bund. From that time onwards, until water has finally left the bund, all the establishment engaged on the maintenance of bunds, from the beldar upto the Sub-Divisional Officer, must be present on the bunds within their jurisdiction.^{124-A}

7.37.35. *Unremitting Patrolling During High Abkalani Essential (PARA 105): The first line of defence, when the river is in floods, requires close and constant patrol and unremitting supervision, both by day and night, by adequate, trained staff¹²⁵.* A stitch in time saves nine: timely warning and timely action, which efficient, unremitting patrolling alone can provide, will save a dangerous situation while complacency born of a false sense of security following a series of low rivers, may lead to disaster. Continuous vigilance in patrolling everywhere is, therefore, enjoined on all the staff, particularly during the night and in the early hours of morning when breaches most frequently occur with the slackening of supervision. (*emphasis supplied*)

7.37.36. The temporary headquarters of the Overseer, Sub-Divisional Officer and Executive Engineer should, as far as possible, be in the centre of the active bund line in their charge. Katcha landhis should be constructed for the overseer in the center of his section, if no pucca landhi exists. The Executive Engineer and the Sub-Divisional Officer should, whenever necessary and as far as possible, patrol frequently at night^{125-A}.

7.37.37. *Wetting of Front Bunds and Loop Bunds with Wetting Channels (PARA 110):* The wetting of the bund is an essential process in the maintenance and in the safety of a bund, particularly in the excessively dry climate of Sind. However carefully the bund may have been constructed, with thorough clod-breaking, ramming, and rolling, perfect compaction, so that there will be not cavities or no settlement, however small, cannot be expected, unless the soil is also ideal for bund

¹²⁴ Bund Manual, Government of Sind, Public Works Department, Central Designs Division, Mechanical & Research Circle, Karachi Printed at the Sind Government Press, 1954

^{124-A} Bund Manual, Government of Sind, Public Works Department, Central Designs Division, Mechanical & Research Circle, Karachi Printed at the Sind Government Press, 1954

¹²⁵ emphasis supplied

^{125-A} Bund Manual, Government of Sind, Public Works Department, Central Designs Division, Mechanical & Research Circle, Karachi Printed at the Sind Government Press, 1954

construction, since the clayey soils ordinarily met with in Sind are liable to expand and slide when wet and to shrink and crack when dry. The kalarish soils are even more treacherous, leading to hollows in the bund as the salts in the soil dissolve. The conditions to which bunds in Sind are exposed, alternating between excessive and sudden soaking by the river in the flood months and complete dryness during the rest of the year, make the gradual wetting of the bund in advance of the river floods impinging upon a dry and unprepared bund a vital necessity.

7.37.38. The purpose of wetting a bund is to consolidate the bund and render it watertight by enabling leaks to be closed, as the contact of water with the bund during the progress of wetting reveals them, so that they may not develop into breaches¹²⁶. (*emphasis supplied*)

7.37.39. The relative merits of different methods of wetting of bunds have been set out, while dealing with proposals for wetting of bunds (para.29 Chapter IV). During maintenance, whatever artifice is available at hand has to be made use of to the fullest advantage.

7.37.40. A bund has to be wetted throughout its entire length if the wetting is to serve its designed purpose, *since a bund is only as strong as its weakest portion*. The plan for wetting should be carefully thought out so that the wetting of the whole length of bund is completed before the rise of the river.

7.37.41. First of all, water is to be led to the front bund. If the katcha and pucca foreshore on the river side of the bund slopes towards the bund, all that may be necessary is to give cuts to the lip at the river edge, which is generally somewhat higher. If there is low-lying land near the bund on the river side but there is high land between the river and the bund, low level gravity channels have to be constructed along the lowest contours from the high river edge to the bund. If wetting by flow water is not possible, sufficiently in advance of the rise of the river, artificial wetting is possible by lifting water into previously constructed wetting channels (see Chapter IV para.28) by means of pumps; a centrifugal pump worked by a suitable oil engine is placed on some canal or special channel from the river and water pumped into the wetting channel. About 1 cusec per mile of wetting channel is required and more while the bund is new.

7.37.42. Wetting engines should begin to operate about the beginning of May or in sufficient time to enable the water to get to the end of the reach concerned before the water touches the bund and not later than the end of May. As, however, the canals are not generally opened till the beginning of May, in the case of water being taken from a canal, a pipe of sufficient capacity in the bunds, at the heads of the canals, will be required and/or a trench about 3 or 4 feet wide in the center of the canal, with bed level corresponding to suitable river level.

¹²⁶ emphasis supplied

7.37.43. At any rate, pumping should be commenced as soon as water can be obtained from canals or through connecting channels from the river so that the bund may be soaked gradually and the establishment may have sufficient time to consolidate the surface of the slopes of the main and trenching bunds by sprinkling or splashing water over them and also to close any leaks which may develop. As there may be a considerable depth of water in the trench and as it is constructed in made-earth, leaks from the slopes or from the bed are likely to occur. Unless there is some arrangement to arrest it, the whole of the water contained in the trench may then be washed down through the leak and cause much damage. The wetting channel should therefore be provided with temporary bundas at short intervals, say every two furlongs or less, so that if a big leak occurs and the establishment is unable to detect or close it at once while the pumping engine is working, the water in the channel can be held up at the bunda next above the site of the leak. After water is held up at the bunda, the leak can be properly opened and repaired.

7.37.44. The pumps should work throughout the period of rising river. The ideal condition would be that the water level in the trench should always be about 1 foot higher than river water level against the bund while the river is rising and the bund must be wetted artificially at least 6 inches higher than the D.H.F.L. to meet any possible rise in the D.H.F.L. Gauges are provided in the wetting channel opposite every gauge in the front line, with their zeroes at 4 ½ feet below D.H.F.L. (vide para. 48)^{126-A}

7.38. CONCLUSION

7.39. There was no pre flood arrangement in place at Taunsa Barrage. No pre flood inspection as per Regulation and Guideline took place. Pre flood inspection should have identified RD 32-RD 40 along which Tibba Minor runs to be a sensitive area. *A bund is only as strong as its weakest portion.* Special watching hut should have been set up there with proper watching staff. All these strategies would have been possible had the Head PMO, XEN and the SDO took pre flood preparation seriously. On the other hand the head PMO and the XEN has come up with a position which appears to be a cock and bull story on how diligently and carefully they carried out pre flood preparation. The information supplied by them appears to be concocted and does not inspire confidence. It is also noticed that documents including maps and surveys which are to be prepared annually after every flood season were not prepared. The Head PMO and his field formation practically slept through the flood season. The wisdom given in Sind Bund Manual goes unread and untouched.

^{126-A} Bund Manual, Government of Sind, Public Works Department, Central Designs Division, Mechanical & Research Circle, Karachi Printed at the Sind Government Press, 1954

8. FLOOD FORECASTING

8.1. Flood Forecasting has been discussed in detail in the earlier chapter.

8.2. In the context of Taunsa Barrage, I & P department was informed on 28th July, 2010 and a departmental warning was sent out on 29th July, 2010. The flood manager at Taunsa Barrage therefore had ample time to get prepared to combat the exceptional flood heading their way.

8.3. There is no doubt that PMD should have sent coloured alerts on 24th of July, 2010 leading to a more quantitative forecast by 26th July, 2010 had there been QPM radar available covering the upper catchment of Indus and PMD had the capacity to generate hydro-meteorological forecast more efficiently and timely.

8.4. Role of FWC is most disappointing. In case of Taunsa Barrage, FWC issued its first forecast on 2-8-2010 at 0900 hrs.

At Taunsa Barrage

Sr. No.	Location	Flood level	Discharge	Date	Time	Rising/Falling.
1.	Taunsa Barrage	Exceptionally high flood	841399 Cfs	2.8.2010	0900 hours	Rising
2.	Taunsa Barrage	High flood	608205 Cfs	10.8.2010	0600 hours	Falling
3.	Taunsa Barrage	Very high flood	652017 Cfs	10.08.2010	1600 hours	Rising

9. FLOOD FIGHTING

9.1. **Regulation:** According to the [Operation and Maintenance Manual for Taunsa Barrage \(November, 2007\)](#)¹²⁷ prepared under Taunsa Barrage, Emergency Rehabilitation & Modernization Project provides that the pond level should generally be kept at the lowest needed. When warning of flood exceeding 450,000Cfs discharge is received from Chashma or Kalabagh, the pond on upstream should be lowered gradually in advance by about 2 feet to accommodate impact of high flood discharge. Various categories of flood should better be passed on the following levels:

Low flood (250,000 to 375,000 Cusecs) at existing pond level.

Medium flood (375,000 to 500,000 Cusecs) at a reduced level of RL 444.00 (Canal Closed)

High flood (over 500,000 Cusecs) at a pond level up to RL 447.00 (Canal closed)

¹²⁷ Ex I.W. 7/5

9.2. The above Manual further provides that it is not possible that the Pond Level on the upstream of the entire barrage can be kept at the same level. Due to presence of very active eddies and cross currents, the Pond Levels upstream in the right pocket and the left pocket may differ considerably. Therefore, the gauge and Pond Level on the left flank is considered as representative/reference gauge of the pond for all practical purposes¹²⁸.

9.3. Operation and Maintenance Manual states that the XEN Taunsa Barrage Division is the officer in overall control of the barrage. SDO Headworks is the officer in direct control of the Headworks. He shall be responsible inter-alia to issue flood warnings to all concerned. To immediately communicate with the XEN regarding high flood discharge and all events of significant importance like any damage to Headworks, etc. He will not be away from Headquarters during high flood season from July to September, both months inclusive without written permission of the XEN; to stay at all time at the Headworks and to arrange regulation of the barrage and regulators gates under his direct supervision as and when flood discharge is in the high flood or higher limits and to continue till the flood drops below the aforesaid limit. Sub Engineer Headworks is the official incharge of day-to-day management of Headworks and shall work under the SDO Headworks. Other officials at the barrage are Sub Engineer Hydraulic, Sub Engineer Mechanical, Head Jamadar, Naib Jamadar, Head boatman, Headworks Mistri¹³⁰.

9.4. The Manual further provides that on the left side a double system of bunds exists. The left marginal bund (27 miles long) has a much longer system of second defense line bunds at some distance on the countryside to act as second defense. However, the second defense line if not kept under proper vigilance (neglected) can prove to be a false line of safety¹³¹.

9.5. The Manual also indicates high risk exposure areas when it states: Resultantly, seepage from any breach in left side embankment moves on to river Chenab damaging all the infrastructure (public and private) like canals, drains, roads, rail roads rehabilitation and all crops on the way. The structures suffering heavy damages are: Muzaffargarh canal and its system, T.P. Link canal, all roads from Taunsa Barrage to Alipur, the rail roads and allied structures of D.G. Khan, Kot Adu and Layyah Muzaffargarh railway lines, towns of Kot Adu, Muzaffargarh and Mehmood Kot and all village abadies except those located in high mounds¹³².

9.6. This is the area where dedicated and dynamic relief efforts will be required in full. [These losses can be avoided if the instructions contained in the “Flood Fighting Protection / Watching Plan” for protection of flood bunds are implemented in letter and spirit both on LMB and the second defence line system¹³³.](#)

¹²⁸ Volume.1 Main Text para 3.5 of the Operation and Maintenance Manual for Taunsa Barrage, 2007. (Ex I.W. 7/5)

¹²⁹ Operation and Maintenance Manual for Taunsa Barrage (November, 2007) (Ex I.W. 7/5)

¹³⁰ According to Operation and Maintenance Manual for Taunsa Barrage Volume.1 November, 2007. (Ex I.W. 7/5)

¹³¹ Emergency Preparedness Plan Appendix 9, Operation and Maintenance Manual for Taunsa Barrage.

¹³² Emergency Preparedness Plan Appendix 9, Operation and Maintenance Manual for Taunsa Barrage.

¹³³ Ex I.W. 7/6/2

9.7. In the epilogue to the emergency preparedness plan, it is stated: “however, one thing should always be remembered that the plans how so ever good become useless if not followed properly and sincerely¹³⁴.” It is hoped that this plan will be followed in letter and spirit¹³⁵.

9.8. It is mandatory according to this Manual that no Subordinate Staff is allowed to alter or deviate from these principles without the prior written approval of the Executive Engineer Incharge.

9.9. Executive Engineer, Taunsa Barrage Division is the Officer Incharge for the overall control of flood watching arrangement. The Sub Divisional Officers, Headworks Sub Division, Bund Sub Division, Workshop Sub Division and other subordinate staff of the three Sub Divisions, have to work under his guidance and instructions. They are primarily responsible for the flood fighting protective and preventive measures for the safety of the structure.

9.10. *INQUIRY & FINDINGS*

9.11. According to Mr. Muhammad Munir Anjum¹³⁶, XEN, Taunsa Barrage; “the contractor for the labour force for LMB was Malik Brothers who were directed to arrange 300 labourers while the contractor for Machinery for LMB was A.M. Associates. I directed them to arrange 2 Loaders, One Bulldozers, one Excavator, seven Dumpers and 12 Trolleys. 150 labourers were deployed on the LMB on 31.07.2010 and the above machinery was also deployed on the 31st July, 2010.” He continued to submit: “I visited Abbas Wala on the LMB alongwith Head PMO Barrages in the evening of 31.07.2010. The reason for the visit was that Mr. Muhammad Saleem Bhatti, Sub-Engineer informed us over telephone that there was seepage in Tibba Minor at RD 35 – 36. We immediately deployed workers, as well as, Machinery and filled the Tibba Minor with earth and the boiling / seepage was contained in front of us¹³⁷.” (*emphasis supplied*)

9.12. “Ch. Muhammad Afzal, Sub Divisional Officer was visiting Taunsa Barrage because his family resides in the vicinity. I requested Head PMO to appoint Mr. Afzal on the LMB as we were short on staff. He reported some boiling in Tibba Minor at RD 32 – 33 to Mr. Kashif, the new Executive Engineer, at 03:00 p.m. on 2.8.2010. On 2.8.2010 (at about 03:30) the breach on LMB took place”¹³⁸.

9.13. “On 28th and 29th of July, 2010 I being XEN lowered the pond level from RL 447 to RL 446 in order to wash away the silt deposit in front of barrage. I was following the rules and regulations for the Maintenance, Working and Operation of Taunsa Barrage, however, I did not follow the latest manual of Taunsa Barrage issued by Punjab Barrages Consultants in

¹³⁴ Ex I.W. 7/6/2

¹³⁵ Emergency Preparedness Plan Appendix 9, Operation and Maintenance Manual for Taunsa Barrage. Ex I.W. 7/6/2

¹³⁶ I.W.105

¹³⁷ I.W.105

¹³⁸ I.W.105

November 2007”¹³⁹.

9.14. According to Ch. Muhammad Afzal, SDO, “I reached Taunsa Barrage at midnight on 31.07.2010. Immediately, I visited LMB at RD 34-35. Mr. Muhammad Saleem Bhatti, Sub-Engineer alongwith other staff was present. Boiling had been spotted at RD 34-35, which were closed on 1.8.2010. On 2.8.2010 another boiling was discovered at RD 33-34, which was also closed. At 03:45 p.m. on 2.8.2010 I noticed a small boil in Tibba Minor at RD 32. In no time this boiling turned into a spring and within 10 minutes the breach took place and the embankment collapsed at RD-32. In my professional opinion it was a foundational failure because there was old river creek on which the LMB has been constructed and this could have been the reason for the collapse¹⁴⁰.”

9.15. According to the Head PMO all training works came under unprecedented severe river attack including Spurt No.5. It is however pointed out that inspite of flood fighting at Spur No.5, PMO ensured the constitution of dedicated teams to be deputed on the LMB, right side training works and Shahwala Groyne

9.16. According to the written statement filed by Mr. Ijaz ul Hassan Kashif¹⁴¹, Executive Engineer, Small Dams Division, Islamabad he was looking after the condition of Shahwala Groyne and he remained their for watching till noon of 03.08.2010.

9.17. Head PMO admitted in his statement before the Tribunal that “As per regulation 3.4 (Pond Level Limits) of the Operation and Maintenance Manual for Taunsa Barrage the Pond Level was not actually reduced by about 2 ft to accommodate the flow of high discharge when the warning of flood exceeding 4,50,000 Cusecs discharge was received from Chashma and Kalabagh.” He further deposed that on reaching Taunsa Barrage on 31-7-2010 he found out that the Pond Level was 446.20 and he decided to maintain the same. This according to him was necessary to reduce pressure on the training works. The Pond Level was gradually reduced to RL 444.00 on August 05, 2010 and to RL 443.00 on August 06, 2010 to give as much relief as possible to breach site RD 32 – 33 of LMB. While Mr. Munir Anjum, XEN deposed that “On 28th and 29th of July, 2010 I being XEN lowered the pond level from RL 447 to 446 in order to wash the silt deposit in front of barrage.” As per record the Pond Level was not reduced as the Regulation provided. It appears that neither the Head PMO nor the XEN had read the Regulations or were aware what to do with the Pond Level.

9.18. The Daily Log Book of Taunsa Barrage paints a different picture. The extract of the Log Book below shows different pond levels than stated by the Head PMO and the XEN. The Log Book shows that the Pond Level on the right side of the Barrage was reduced to RL 440 on 1-8-2010 and was RL 444.4 on 2-8-2010, while the Pond Area of the left side was maintained around RL 446. The Regulation which requires that the Pond Level should be reduced by 2 ft before the flood approaches the Barrage was violated. Pond Level to be

¹³⁹ I.W.105

¹⁴⁰ I.W. 108

¹⁴¹ Ex. IW.106/1 (Statement of Mr. Ijaz ul Hassan Kashif, Executive Engineer, Small Dams Division, Islamabad)

maintained in flood above 500,000 Cfs is RL 447, which was not the case at Taunsa. The Pond Level during the highest peak on 2-8-2010 was 446.20 on the Left Side and 444.4 on the Right Side. Regulation also mandates that the Pond Level upstream must be kept at the same level. Further, XEN deposed that he reduced the pond level on 28th July, 2010- which is not borne out from the Log Book besides there was no flood warning available with the Department on the said date. The inconsistent information of the two most important persons at the Barrage i.e., Head PMO and XEN is most worrying. The credibility of these senior officers as well as the Log Book become suspect and undoubtedly leads to the conclusion that the Barrage was being poorly managed with no strategy or preparedness whatsoever to face the “super floods.”

9.19. Extract of the Daily Log Book of Taunsa Barrage is as follows:

Sr.#	Date	D/S Discharge at Taunsa	U/S Discharge at Chashma	Pond Level at Taunsa 06:00 a.m.	
				Left	Right
1	25.7.2010	323749	281308	447.50	447.60
2	26.7.2010	283914	281297	447.50	447.60
3	27.7.2010	256029	255736	447.50	447.60
4	28.7.2010	225570	234762	447.50	447.60
5	29.7.2010	258941	507904	447.50	447.60
6	30.7.2010	288502	743548	446	446.50
7	31.7.2010	424391	974214	445.50	445
8	01.8.2010	617602	1000972	446	440

Sr.#	Date	D/S Discharge at Taunsa	U/S Discharge at Chashma	Pond Level at Taunsa 06:00 a.m.	
				Left	Right
9	02.8.2010	798601	736403	446.2	444.4
10	03.8.2010	767351	644476	446	442
11	04.8.2010	790021	601038	446	443.8
12	05.8.2010	721494	525737	444	441.60
13	06.8.2010	692681	468360	443.50	441.10
14	07.8.2010	614418	457035	443	440.6

9.20. According to the work charge register placed on the record 16 persons were employed on work charge basis as Baildars from 1st till 31st July 2010 in the morning and similarly 16 in the night duty. No record showing the muster roll for the month of August, 2010 has been placed before us. No mention of the said workers has been made by any of the officers present on the LMB to depose that the said Baildars were present at the time of breach. The statement of Munir Anjum, XEN that “150 labourers were deployed on the LMB on 31.07.2010” is therefore incorrect according to the record and inconsistent with the statement of the head PMO.

9.21. Secretary I & P Department¹⁴² submitted before the Tribunal that “as far as Flood fighting plan in exceptional high flood is concerned 10 persons are required to be deployed every mile, however, I am not aware if 270 people were deployed on the LMB (length 27 miles).”

9.22. According to the Head PMO¹⁴³ there was no machinery available at the Barrage for flood fighting prior to 28.07.2010. The machinery mobilized from the Machinery Circle of

¹⁴² I.W.6

¹⁴³ Mark-82

Development Zone of the Department on 3rd August, 2010 i.e., after the breach of the LMB. The details of machinery procured vide Job Order No.2/49-W/TSA dated 03.08.2010 is as follows:-

(i)	Front End loader	= 2 No.
(ii)	Dozer	= 3 No.
(iii)	Excavator	= 1 No.

9.23. While four Dozers were mobilized vide Job Order No.107-09/81-WC/TSA dated 10.08.2010. However, according to the Head PMO, Machinery mobilized from the private contractor namely M/s. AM Associates for LMB RD0-80 on 31.07.2010 and have the following details:-

(i)	Loader	= 1 No.
(ii)	Dumper (Truck)	= 4 No.
(iii)	Dumper (Trolley)	= 4 No.
(iv)	Excavator	= 1 No.
(v)	Tractor Trolley	= 1 No.
(vi)	Water Sprinkler	= 1 No.

9.24. For RD 80-134+500, machinery mobilized from the private contractor namely M/s SA Associates on 31.07.2010 details of which are as under:-

(i)	Loader	= 1 No.
(ii)	Dumper (Truck)	= 3 No.
(iii)	Dumper (Trolley)	= 3 No.
(iv)	Excavator	= 1 No.
(v)	Tractor Trolley	= 1 No.

9.25. However, it is submitted that Mr. Muhammad Athar Contractor was engaged on 1st of August, 2010 for the right side Spur (Spur 5), who provided the following machinery:-

(i)	Loader	= 5 No.
(ii)	Dumper (Truck)	= 21 No.
(iii)	Excavator	= 5 No.
(iv)	Tractor with Jack Trolley	= 16 No.
(v)	Water sprinkler	= 2 No.

9.26. The total cost of the machinery for Job Order No.2/49-W/TSA dated 3.8.2010 is Rs.2.80 Million while for Job Order No.107-09 dated 10.08.2010 is Rs.1.20 Million while the cost of M/s A.M. Associates for LMB is Rs.1.00 Million. [The above shows that no machinery](#)

was available at the Barrage on 28th till 30th July, 2010. The machinery obtained from M/s A.M. Associates (Rs.1 Million) and M/s S.A. Associates (Rs.0.84 Million) on 31.07.2010 was at a total cost of Rs.1.84 million. It is clear that the emphasis of the flood fighting was on spur No.5 on the right side. More machinery was also deployed on that side. The cost of the machinery paid to Mr. Muhammad Athar Contractor is Rs.6.01 Million as opposed to Rs.1.84 million paid to the two contractors supplying machinery at the LMB. It also shows that the machinery mobilized from the Machinery Circle of Development Zone was totally ineffective. The Secretary¹⁴⁴ I & P Department submitted: "Concerted effort was diverted on Spur no. 5, on 1-8-2010 because according to head PMO the water flow had a scouring down effect on the said spur and therefore my technical team thought it is best to fight the erosion at Spur no. 5...being a non technical person I had to trust my technical team." This reaffirms that concentration was on Spur no. 5 and not on the LMB.

9.27. According to the Secretary I & P Department: "I am also not aware of the number of machinery deployed on LMB on 1st August, 2010." It is important that requisite machinery for each Barrage is either available with the Development Zone or then the Contractors are arranged in the beginning of the flood season at the nominal rates after complying with the requirement of public tender. At the eleventh hour, engagement of contractors, results in heavy loss.

9.28. Secretary I & P Department¹⁴⁵ deposed before us that: "Ijaz Hussain Kashif was posted as XEN for the last 2 ½ years at Taunsa Barrage, however, due to his request based on family reasons he was transferred in June, 2010 and in his place Mr. Munir Anjum was appointed on 10-6-2010 as XEN on current charge basis. At this stage, Mr. Munir Anjum also held the charge of SDO Bunds and SDO Headworks. Munir Anjum has eight years experience at Taunsa Barrage. He has M.Sc. Hydrology from Malaysia. As Secretary, I & P Department, I felt the importance of the post XEN at Taunsa Barrage, especially at the start of a flood season, therefore, I interviewed candidates for the said post and found Mr. Munir Anjum to be the most competent person available for the said post within the Department. There was no political or bureaucratic interference or influence in the transfer of Ijaz Hussain Kashif or in the appointment of Munir Anjum which was purely done on merit." Head PMO submitted that appointment of Munir Anjum on lookafter charge "was a serious lapse but there was no body in the Department who could have replaced Mr. Ijaz Hussain Kashif. There was acute shortage of XENs."

9.29. Mr. Muhammad Muneer Anjum, was posted as Executive Engineer, Taunsa Barrage Division on 10.06.2010 on "Look after basis" was suspended by the order of the Chief Minister, Punjab on a complaint of one Mehr Ijaz for not attending to Shahwala Groyne on August 01, 2010. Thereafter, Mr. Ijaz-ul-Hassan Kashif was posted as Executive Engineer on the same date. Secretary I & P submitted that "the Chief Minister on the complaint of Ajaz Ahmed Achalana MPA, suspended Munir Anjum on 1-8-2010. Faced with this situation, I immediately handed over the charge to Ijaz Hussain Kashif who happened to be on the

¹⁴⁴ I.W.6

¹⁴⁵ I.W.6

Barrage as an additional support to PMO.” It is astonishing to note that the Chief Minister, Punjab, who was aware of the super flood and had himself visited Jinnah Barrage a day earlier suspended the man Incharge of the Barrage in the midst of super flood which was almost on the gates of Taunsa Barrage. Mr. Ijaz ul Hassan has deposed that he was on the Shahwala Groyne till noon of 3-8-2010¹⁴⁶ therefore the statement of Munir Ajnum that he immediately handed over the charge to Ijaz ul Hassan is incorrect. Therefore, there was no XEN on the Barrage on 2-8-2010. It is important to remind that XEN under the Regulations is the head of the Barrage.

9.30. As both Mr. Muhammad Muneer Ajum, as well as, Mr. Ijaz-ul-Hassan Kashif have deposed that they were not Incharge of the Barrage on 2.8.2010 as Mr. Muhammad Muneer Anjum left the control of the Barrage on 1.8.2010 while Mr. Ijaz-ul-Hassan Kashif stated¹⁴⁷ that “due to dangerous condition of Shahwala Groyne I remained there for watching till noon of 3-9-2010. Then I received a phone call from I & P Department Lahore that day to day look after of Executive Engineer Taunsa Barrage Division has been given to me due to suspension of Executive Engineer concerned, therefore, I reached Taunsa Barrage on same day and reported Head PMO Punjab Barrages for duty...” We feel that such like political intervention by the political leadership in such technical matters during super floods reflects poor governance and should have been resisted tooth and nail by the Secretary, Irrigation & Power Department.

9.31. The professional competence of XEN (Muhammed Munir Anjum) is seriously doubtful. When boils were resurfacing repeatedly in the bed of Tibba Minor at RD 35 and 36 and the said boils were being closed, the XEN should have ensured covering the stretch of Tibba minor that flowed along the LMB i.e., RD 32 to 40. No such effort was made. The XEN failed to understand the pattern behind the developing boils. Had he remembered that the LMB sits on an old creek and had he read the Sind Bund Manual he might have adopted a more robust strategy and probably saved the tragedy that took place.

9.32. The bevy of officers dispatched to the Barrage by the Secretary I & P a night before could not suddenly grasp the situation and the recurring pattern of boils surfacing from Tibba Minor in the selected portion of the LMB where Tibba Minor flows alongside the LMB. Therefore good flood fighting requires good pre-flood preparedness and a good sense of the barrage and its training works. Any such preparation or planning would have quickly revealed to the XEN that the entire bed of Tibba Minor alongside LMB had to be reinforced and carefully observed. The XEN should have also known that LMB sits on an old creek and should have been put on notice on the resurfacing of boils within this portion of the Tibba Minor. Lack of preparation, lack of understanding coupled with poor professional competence resulted in missing out on this important aspect. Had the entire stretch of the bed of Tibba Minor was reinforced on time, the breach could have been avoided. This required solid pre-flood assessment of the area, watching staff familiar with the area, requisite machinery and labour alongwith the flood fighting material. There is little doubt in

¹⁴⁶ Ex I.W.106

¹⁴⁷ Ex I.W.106/1

our mind that it is the sheer incompetence of the officers of the I & P department and their failure to abide by the Regulations that resulted in the tragic breach.

9.33. According to PRO¹⁴⁸, IRI, the importance of Spur no. 5 when compared to the LMB is negligible. Effort on Spur no.5 on the right side according to PRO, IRI was unnecessary. The XEN has deposed that there was sheet piling done in front of Spur no.5 (used for the diversion of the old river) still Head PMO diverted his entire effort on Spur no.5. There is an additional disconnect. The flow of the river was on the left side as no water entered the pond area on the right side as deposed by the Head PMO himself, therefore likelihood of a threatening river action on Spur no. 5 does not look probable. In any case, LMB required more attention of the Head PMO especially after the surfacing of the first boil at RD 35-36.

9.34. CONCLUSION

9.35. Proper flood fighting is not possible without strict observance of the Regulation. The XEN has admitted that the new Regulations were not read by him. In any case, without proper preparation i.e., without adequate labour, flood fighting material, machinery, watching huts and staff and more importantly without having meticulously studied the headworks, identified its high risk area, no flood fighting can even begin to be put in place. Last minute deployment of the ablest flood manager in the Province to the Barrage cannot equal the expertise and understanding of the officers posted on the barrage before the flood season. It is wishful thinking that officers arriving in the nick of time, in harsh weather and pitched darkness can take charge and fight a river already in exceptionally high flood. The message is loud and clear. Department failed to fight the flood as per its Regulations. The regulations have to be followed which were not at Taunsa Barrage.

9.36. The Secretary, Irrigation & Power Department should have appointed a confirmed and a full time XEN at the Barrage. An SDO already holding a dual charge was given an additional “lookafter” charge as an XEN of a Barrage – this is not acceptable. Further, the Secretary should have opposed the suspension of the XEN on 1-8-2010 by the Chief Minister or else should have ensured that the replacing XEN should take charge immediately. The new XEN took charge after the breach had taken place on 2-8-2010.

10. TECHNICAL REASONS OF BREACH OF LMB

10.1. POSITION OF SECRETARY I & P DEPARTMENT¹⁴⁹

10.2. The Left Marginal Bund of Taunsa Barrage has been constructed along the left bank of River Indus to contain the ponded water. The top width of LMB is 25 feet with 3:1 side slope on the river side in un-pitched reach and 2:1 side slope in the pitched portion – the land side slope throughout the length. The salient features of LMB are given below:

¹⁴⁸ Ex I.W. 139/2

¹⁴⁹ Ex I.W.6/1

Total Length	:	RD 134+000
Stone Pitched Length	:	RD 0 to 34+000
Un-pitched Length	:	RD 34+000 to 134+000
Design Capacity	:	1.0 Million Cusecs
Free Board	:	6 feet above HFL

10.3. The Left Marginal Bund of Taunsa Barrage breached at RD 32-33 around 4 PM on 2.8.2010, when the discharge in the River Indus was approaching 10.85 lac cusecs i.e., at the breach point which is 1 in 1000 years flood by some estimates. 3-Hourly hydrograph from 1 to 5 August, 2010 has been prepared which depicts intensities and long duration of the discharges ever seen. A Superintending Engineer Inayat Ullah Cheema and a Sub Divisional Officer, Mohammad Afzal, was deputed especially on LMB for intense watching of the bund along with staff and earth moving machinery. Army Jawans, which were requisitioned by the Executive Engineer in accordance with the Flood Fighting Plan on 1.8.2010, were also there right on the Bund. The breach speedily developed to 1000 ft and 1.25 lac cusec discharge diverted, which after breaching banks of Taunsa Panjnad Link Canal and Muzafargarh Canal, flooded a vast area in District Muzaffargarh.

10.4. POSITION OF HEAD PMO

10.5. The causes of the breach as reported by the Head PMO / Project Director, Punjab Barrages¹⁵⁰ are summarized below:

- (i) The earthen embankment did not leak or fail anywhere. So much so that no seepage at toe was seen on earthen un-armoured bund though freeboard was badly encroached. Leakage did take place only in stone pitched armoured portion (RD 0-34+500). The bund failed in stone pitched armoured portion by sudden collapse.
- (ii) It has been determined that failure of LMB was due to seepage. The embankment was not overtopped and there was a freeboard of 4.5 ft when it breached. Similarly no slope collapsed anywhere and structural failure is also ruled out.
- (iii) At about 4 PM on 2. 8.2010, the water level speedily rose and the freeboard, which was kept originally 6.0' above highest flood level of 1992 (RL 457.25'), reduced to 4.5'. Suddenly intense bubbling started on right prism side of the adjacent channel (Tibba Minor). A dumper was present at RD 32 of the bank. SDO immediately directed the dumper to reach the site, but it took a few minutes that the whole bank collapsed in a width of about 40 ft. The breach then developed speedily.

¹⁵⁰ Ex I.W. 7/3



(iv) When the discharge in the river reached 10.85 lac cusecs, the hydraulic gradient still remained covered all along and there would have been no chance of breach, as also experienced in un-pitched reaches of the bund. But due to cutting of slope to 2:1, the hydraulic grade line at this mighty unprecedented discharge, went uncovered at toe in prism of the adjacent minor, which runs adjacent to the toe from RD 32 to 44 LMB. Piping started here as evidenced by the SDO in charge. The bank thus failed. Had there been no pitching with 2:1 slope in this reach, that situation could have not arisen.



- (v) The cause of the breach is thus providing stone pitching on inner side by cutting down the slope from 3:1 to 2:1, making upstream interface of the embankment with water virtually naked and the highest ever water level attained due to unprecedented, unpredictable flood of the order of 10.85 lac cusec.

10.6. FINDINGS OF THE DEPARTMENTAL ENQUIRY COMMITTEE¹⁵¹

10.7. An Enquiry Committee was constituted to probe into the causes of breaches at LMB of Taunsa Barrage. The findings of the Inquiry Committee regarding causes of breach in the LMB of Taunsa Barrage, as brought out in their Report are summarized below:

- i. The perusal of technical sanction for the work of raising and strengthening of Left Marginal Bund and allied components of Taunsa Barrage reveals that x-sections do not show existence of Tibba Minor & the drain running parallel along outer toe of the Left Marginal Bund. Therefore, the hydraulic gradient of 1:6 was not covered and seepage started on the countryside and bubbling was noticed in the prism of the Tibba Minor. This seepage was further increased with the rise in floodwater on riverside when the free board was reduced from 6 ft to 4.5 ft .
- ii. Other reasons given by the Committee are: No adequate and timely arrangements were made for procurement of flood fighting material, employment of work charged establishment, earth moving machinery, establishment of flood fighting camps, availability of reserve stock of stone and deployment of proper staff to fight the flood. Therefore at the time of occurrence of emergency, the situation could not be saved and ultimately resulted in to the failure of Left Marginal Bund.
- iii. Had the previous slope of 3:1 maintained on river side between RD 0+000 to 34+500, the hydraulic conditions would have been much favorable whereas the desired result could not be achieved even after providing stone pitching with side slope as 2:1 in this reach.
- iv. 18 No. flood camps were to be established on Left Marginal Bund as per provisions indicated in the flood fighting plan. Practically till 01.08.10, there were only 4 flood camps established at site with deficient flood fighting material as the arrangements to procure flood fighting material or earth moving machinery were started on 02.08.2010.
- v. The maintenance of Sanawan Flood Bund, being the second defence line was totally ignored due to which, the flood water after occurrence of breach in Left Marginal Bund immediately rushed towards Sanawan Bund which could not with stand against the hydro static pressure and was washed away / breached.
- vi. It is pertinent to note that inspections of bunds which were required to be done before the on set of flood season were not carried out at any level by the Departmental concerned officer.
- vii. Maintenance and upkeep of Sanawan Bund having its position as second defence line of Left Marginal Bund was totally ignored for the last many years other

¹⁵¹ Annex P of Ex I.W. 6/1 - comprising: i) Mr. Murtaza Khursheed (Convener), Addl Secretary (Tech), I&P Dept. ii) Mr. Shafqat Hussain Bhatti (Member), SE Lower Jhelum Canal Circle & iii) Mr. Zahid Bashir (Member), SE Faisalabad Drainage Circle

wise after the failure of Left Marginal Bund the damages could have still been contained. This negligence caused havoc alongwith irreparable huge loss to the vast area, damage to the standing crops, collapsing of houses, and loss of valuable lives in addition to tremendous loss to private and public property.

10.8. *SUBMISSION OF PRO, IRI, I & P DEPARTMENT*¹⁵².

10.8.45. It is apprehended that the breach of the LMB of Taunsa Barrage occurred owing to the hole under stone pitching, which remained un-attended. The inspection of such important structures is carried out after 15th June of each year for catering of any alarming situation and is tackled before commencement of flood season.

10.9. *INQUIRY & FINDINGS*

10.10. The Tribunal constituted a local commission¹⁵³ on 15-10-2010 to carry out survey/investigation regarding the composition and design of the Left and Right Marginal Bunds of Taunsa Barrage with particular emphasis to investigate the cause of breach that occurred in Left Marginal Bund (LMB). The said commission is referred hereunder as the UET COMMISSION.

10.11. The UET Commission visited Taunsa Barrage (both the left and right bunds) on October 20, 2010 to collect the field observations in general and the measurements/collection of soil samples from the breach site on LMB in particular to formulate its findings regarding the matter. Based on field observations, cross sectional measurements, laboratory testing of soil samples and seepage analysis of LMB, following are the findings of the UET Commission:

a) *LMB Site Visit Observations*

i. The total length of Left Marginal Bund is up to RD 134+700 ft out of which the bund is stone pitched up to RD 34+500. Two breaches occurred in LMB, one in stone pitched portion at RD 33+000 which extends to RD 34+000. As per information of the staff on duty, the first breach was triggered at 4 PM on August 02, 2010 which caused a parallel flow to the LMB resulting in an other breach in the un-pitched portion at 10 PM on the same day between RD 34+500 and 39+000. Maximum flood level established at the breached section reported by staff on duty at the time of breaching was about 459 ft above mean sea level, whereas, the RL of top of the stone pitching is 463.21 ft which means a free board of approximately 4 ft was available at the time of the breach. In order to plug the two breaches, an inside ring bund is being

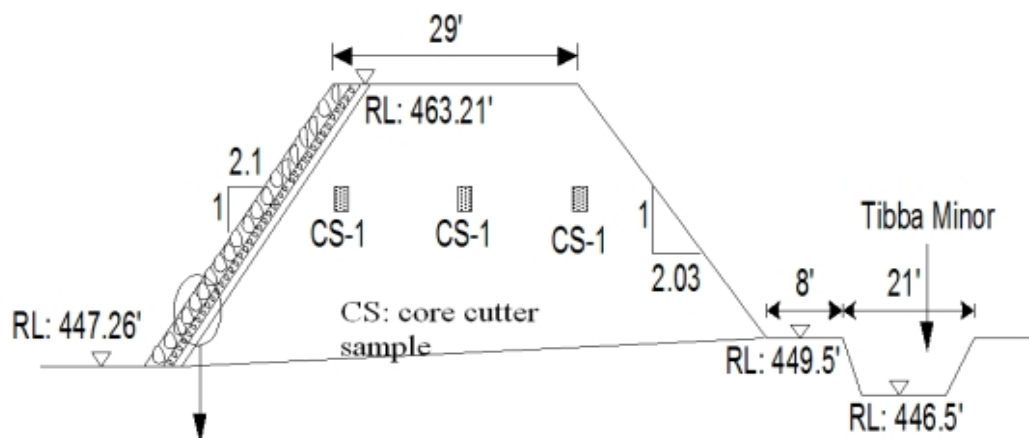
¹⁵² Mark 43

¹⁵³ The Commission comprised the following (i) Engr. Khayyam Qaiser, Chief Engineer, C & W Department, Govt of Punjab & (ii) Prof. Dr. Khalid Farooq, Department of Civil Engineering, UET Lahore, (iii) Mr. Imran Shahbaz, Civil Judge, Kot Adu (Report at Ex.I.W 110/1)

constructed between RD 32+500 and RD 39+700.

b) *X-Section of LMB at RD 33+000 (Stone Pitched Portion)*

i. Figure 2 shows the cross section of LMB at the breached section. The x-section is drawn as per measurements made at the time of the visit. Three core cutter samples were procured from the face of the breached section (RD 33+000) in order to characterize the material of the bund. The samples were approximately taken from mid height, one sample from central portion, one from river side and one from the opposite side, the approximate location of the samples recovered is indicated in Figure 1. Plate-1 shows the view of the breached section at RD 34+000. It is worth mentioning here that an irrigation channel named as Tibba Minor is flowing in close proximity of the LMB at the breached portion as shown in Figure-1 and can also be seen in Plate-1. Plate-2 shows the close view of the face of breached section at RD 33+000 in which it can be observed that tree roots have penetrated in to the bank which might have contributed in seeping the water through the bank leading to initiation of piping process.



Stone Pitching (from top to bottom)

1 ft Stone Layer: 12 inch dia stone

6" layer of coarse filter : 1.5" - 0.5" gravel

6" layer of fine filter: 0.5" - 1/8" gravel

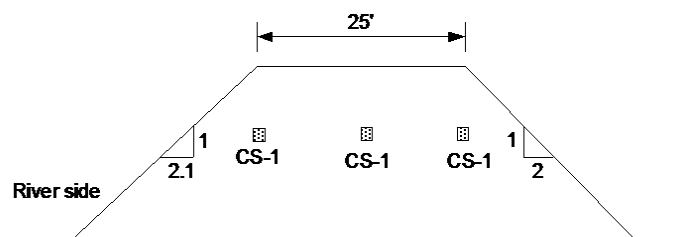




Photo showing view of face of pitched breached section (RD 34+000)



Closer view of face of pitched breached section at RD 33+000

c) *Construction of Ring Bund*

i. As mentioned earlier, an inside ring bund is being constructed between RD 32+500 and RD 39+700 to plug the two breaches. It has been observed during the visit that the construction of the ring bund is being made by loose dumping of borrow material with out any proper compaction. This observation is very serious from engineering point of view as construction of a water retaining earth structure with out performing proper compaction is not acceptable by any standard of civil engineering. The central part of the bund is being constructed by using clayey soil which has lot of lumps; its loose dumping will definitely constitute a highly porous structure favoring seepage of water through the body of the bank. The other material which is being used in construction of shoulders of the bund is sandy soil which is being borrowed from the down stream area of the breached section where lot of sandy material is deposited. This material is also being dumped without any compaction resulting in a very loose earth embankment.

d) *X-Section of LMB at RD 39+000 (Un-pitched Portion)*

i. Figure 2 shows the cross section of LMB at RD 39+000 (Un-pitched portion). The side slope on the river side is 1V:2.1H, whereas the side slope of the opposite side is 1V:2H. The core cutter samples to determine the in-situ density of the bank material were procured at the locations shown in the Figure 2. Plate-4 shows the photograph of the breached section.



Photo showing face of un-pitched breach section at RD 39+000

e) **Laboratory Tests and Results**

i. Following laboratory tests were conducted at Geotech Lab of UET Lahore on core cutter samples taken from both the breached sections in order to classify the bank material and to determine its relative compaction and permeability characteristics.

- Sieve analysis
- Hydrometer analysis
- Atterberg limits
- Standard Proctor test
- Falling head permeability test.

ii. Based on grain size analysis and atterberg limits, the soil samples taken from both the x-sections are classified as silt (ML) with about 10 % sand. As far as the type of the material used in the construction of bund is concerned, usually clay or silt is used for the construction of river dikes which may be dredged from the river or transported from adjacent lands. However, the material used in such construction must be highly compacted. The relative compaction required for the construction of such earth banks is specified in the range of 93~95% of standard Proctor density (Ref: Earth Manual, US Dept of the Interior, 2nd Edition, page 257). In order to ascertain the relative compaction of the bank material, standard Proctor test on both the material was conducted in the laboratory. Based on the results of core cutter and laboratory compaction test, relative compaction of both the section was determined¹⁵⁴. The relative compaction of bank material at both the sections is between 82% and 88%. These values are on lower side showing poor or no compaction during the construction of the bank. *As mentioned earlier that no compaction is being performed in the construction of ring bund and this was confessed by the engineer at site that in constructing such banks, there is no provision of compaction in the prevalent specifications of I & P department. This is a serious flaw in the construction on the part of concerned department.*

iii. In order to assess the permeability of the bank material, falling head permeability test was performed on the soil samples taken from both the sections¹⁵⁵. The permeability value for both the samples lies between 5.41×10^{-6} and 8.38×10^{-6} cm/sec. These values are typical for silt and sandy silt material, which has been used in the construction of LMB.

f) **Seepage Analysis**

i. The seepage analysis was performed for both the sections using computer software seep/w. In order to perform the analysis, the embankment was modeled using the actual geometry of the x-section and the soil

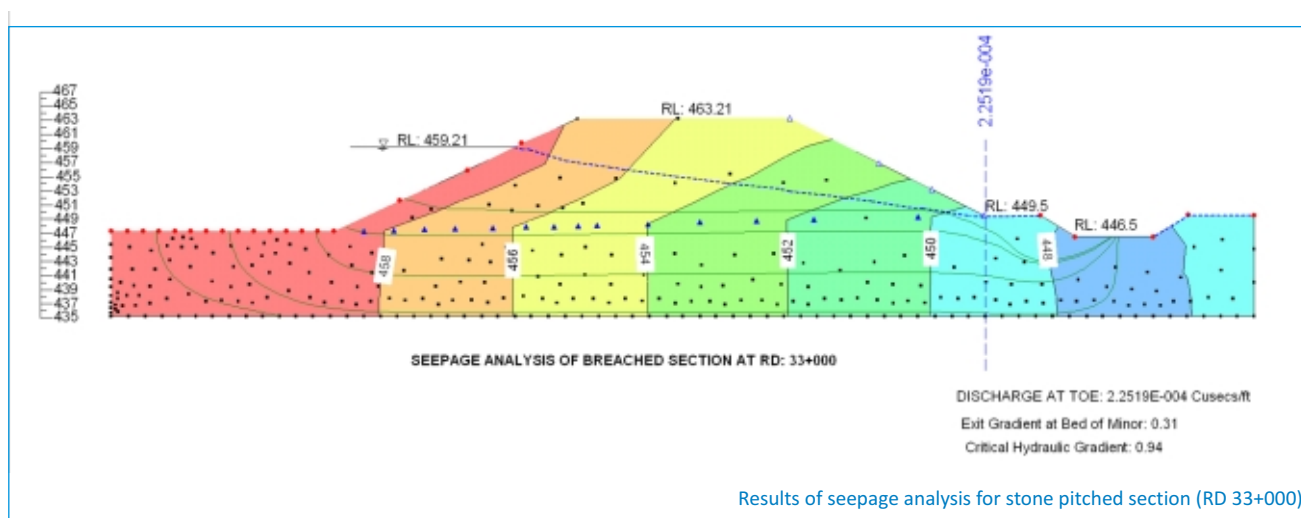
¹⁵⁴ See Table 1 of the UET Report (Appendix 3)

¹⁵⁵ see Table 2 of the UET Report (Appendix 3)

properties determined through field and laboratory testing. Figures 3 and 4 shows the results of seep/w for stone pitched and unpitched section, respectively. It is to be pointed out that the permeability value of bed soil below the bank is assumed to be 1×10^{-4} cm/sec which is typical value for silty sand/sand.

ii. In case of stone pitched section, due to the proximity of Tibba minor to the toe of the LMB, the flow lines tend to emerge from the bed of the minor. The exit gradient at the bed of the minor is maximum and its value is 0.31. The critical hydraulic gradient of the bed material is approximated to be 0.94 (considering in-situ density of bed material as 94 pcf), which gives a safety factor (see equation 1 below for safety factor) of 3 against piping of the bed material. To be safe against piping action on downstream side of an earth structure usually safety factor of 4 is considered adequate (Ref: Book by BM Das, *Advanced Soil Mechanics*, pp 131-137)¹⁵⁶.

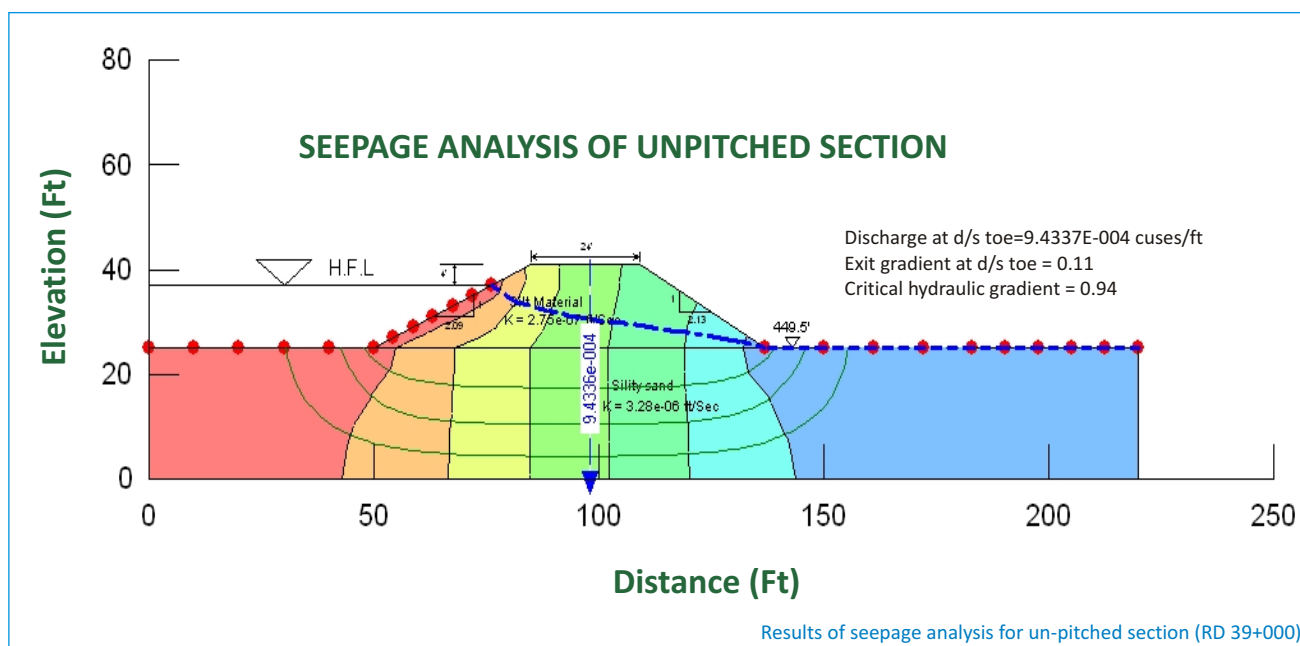
iii. The results of the seepage analysis indicate the probability of piping action to be started in the bed of the Tibba minor. This has also been confirmed by the Engineer (Ch. Afzal, SDO Taunsa Barrage) on duty at the time of the breach that sand boiling was observed in the bed of the Tibba minor few minutes before the actual breach started.



¹⁵⁶ The factor of safety against piping can be calculated by using the following equation.

- i. $FS \text{ against piping} = i_{cr}/i_{exit}$ -----(1)
- ii. Where, i_{cr} = critical hydraulic gradient and is a function of specific gravity and void ratio or compacted density of the soil in the field. For a particular soil type compacted in the field, its value remains constant. The critical hydraulic gradient is calculated by the following equation.
- iii. $i_{cr} = (Gs-1)/(1+e)$
- iv. Where Gs is specific gravity of soil and e is void ratio of the soil and depends of compacted density of soil. The void ratio can be calculated as: $e = (Gsg_w/g_d) - 1$
- v. i_{exit} = is the gradient of flowing water at exit point on the down stream side of the embankment. It is defined as the ratio of maximum head on up stream side to length of flow path ($i_{exit} = h/L$).
- vi. To ensure no piping condition on down stream side of hydraulic structure, a factor of safety of 4 is commonly recommended.

iv. The seepage analysis on unpitched section (RD 39+000) shows almost stable condition as far as piping action is concerned as exit gradient at d/s toe is very low (0.11). It appears that after the first breach, parallel flow started to the river side of the bank which might have eroded the bank leading to final collapse. As told by staff on duty that breaching of unpitched portion occurred about 5-6 hours later the first breach of pitched portion.



g) *Evaluation of LMB based on Federal Flood Commission (FFC) Design Criteria for Flood Protection Structures*

i. Section 5 of FFC Second Flood Protection Sector Project-Package B describes the types, specifications and design criteria for various flood protection structures. In this section, the sub-section 5.2.4 is about Marginal Bunds.

ii. The cross-section of LMB at pitch portion (RD 33+000) is in line with FFC standard, whereas in case of un-pitch section at RD 39+000, the riverside slope should be 1V:3H, whereas it is 1V:2.1H, i.e., steeper than the FFC standard.

iii. According to FFC standards, the x-section of the bund should satisfy the hydraulic gradient of 6:1 drawn from the design flood level. Further, the hydraulic gradient (6:1) from design flood level should exist a minimum of two ft below NSL at landside toe of the embankment. The section of LMB fulfills this requirement. This requirement is to ensure that phreatic line (top seepage line) should not intersect with landside slope face so as to avoid piping of the slope material.

iv. Section 5.4.3 describes the design requirement to ensure the stability of foundation soil due to piping phenomenon.

v. According to Section 5.4.3 of FFC standards, detailed subsurface investigation will be needed for proper foundation evaluation. If required, the particular foundation will be treated to enhance its stability against piping. These specific designs may include:

- Reworking of the foundation soil
- Grouting of the armoured river bed to the required extent
- Where required, provision of a suitable cutoff.
- Inverted filter layer at the foundation.

vi. The foundation investigations shall (should) be planned to provide information about type and nature of the materials in the river bed. These investigations are carried out through boreholes, test pits, trenches and field and laboratory testing.

vii. As a general rule, the depth of subsurface investigation should be at least equal to the height of the embankment. The investigation will essentially provide the following information:

- Type of subsoil
- Permeability of river bed material
- In-situ density

viii. Based on foundation investigations, the safety of foundation against possible piping on the landside toe must be evaluated. [This aspect of foundation evaluation against piping seems to be ignored during the revamping/rehabilitation phase of LMB in 2007-2008.](#)

h) *Right Marginal Bund Visit Observations*

i. During the visit of RMB, it was observed that flood water did not enter in to the pond area surrounded by Spur # 1-A and T head Spur-5 and the pond area surrounded by Spur # 1-A and Spur # 2-A due to the construction of illegal bund near the usual path of the river¹⁵⁷. Plate-5 and 6 shows the presence of illegal bund which precluded the entry of water in the pond area as mentioned above. However the pond area between Spur # 2-A and Shank of Spur # 2 was inundated to about 7 to 8 ft depth. The Plates-7 and 8 show the photos of the area and the water mark on the slope and the water gauge.

¹⁵⁷ see Index Plan attached in the UET Report – Appendix 3 (Ex.I.W. 110/1)

- ii. Another painful observation made during the visit of RMB was that a number of trees from the bank have been illegally cut by local people showing looting of national property with out any fear.



Photo showing presence of illegal bund between Spur # 1-A and T head Spur-5



Photo showing presence of illegal bund between Spur # 1-A and Spur # 2-A



Photo showing presence of flood water in area between Spur # 2-A and Shank of Spur # 2 and water mark on the bank



Photo showing water mark on a gauge area between Spur # 2-A and Shank of Spur # 2



i) **Summary**

i. The results of the seepage analysis on stone pitched portion indicate the probability of piping action started in the bed of the Tibba minor. The field observation of sand boiling at the bed of the minor prior to the breach substantiates the results of the seepage analysis. However, the seepage analysis of section without considering the presence of Tibba minor shows stable foundation condition which implies that major cause of LMB breach at RD 33+000 (pitched section) was the initiation of piping in the bed of Tibba minor leading to complete collapse of LMB.

ii. Evaluation of LMB based on Federal Flood Commission (FFC) Design Criteria for Flood Protection Structures shows that as far as the geometric design of LMB is concerned, it is according to the FFC standards, whereas the evaluation of foundation stability against piping as laid in FFC standards seems to be ignored during revamping/rehabilitation phase of LMB in 2007-2008.

iii. The side slope of LMB at pitched section (RD 33+000) on both sides is 1V:2H, whereas the side slope of un-pitched portion (RD 39+000) on the

riverside is 1V:2.1H against specified value of 1V:3H, and on the natural landside the slope is 1V:2H.

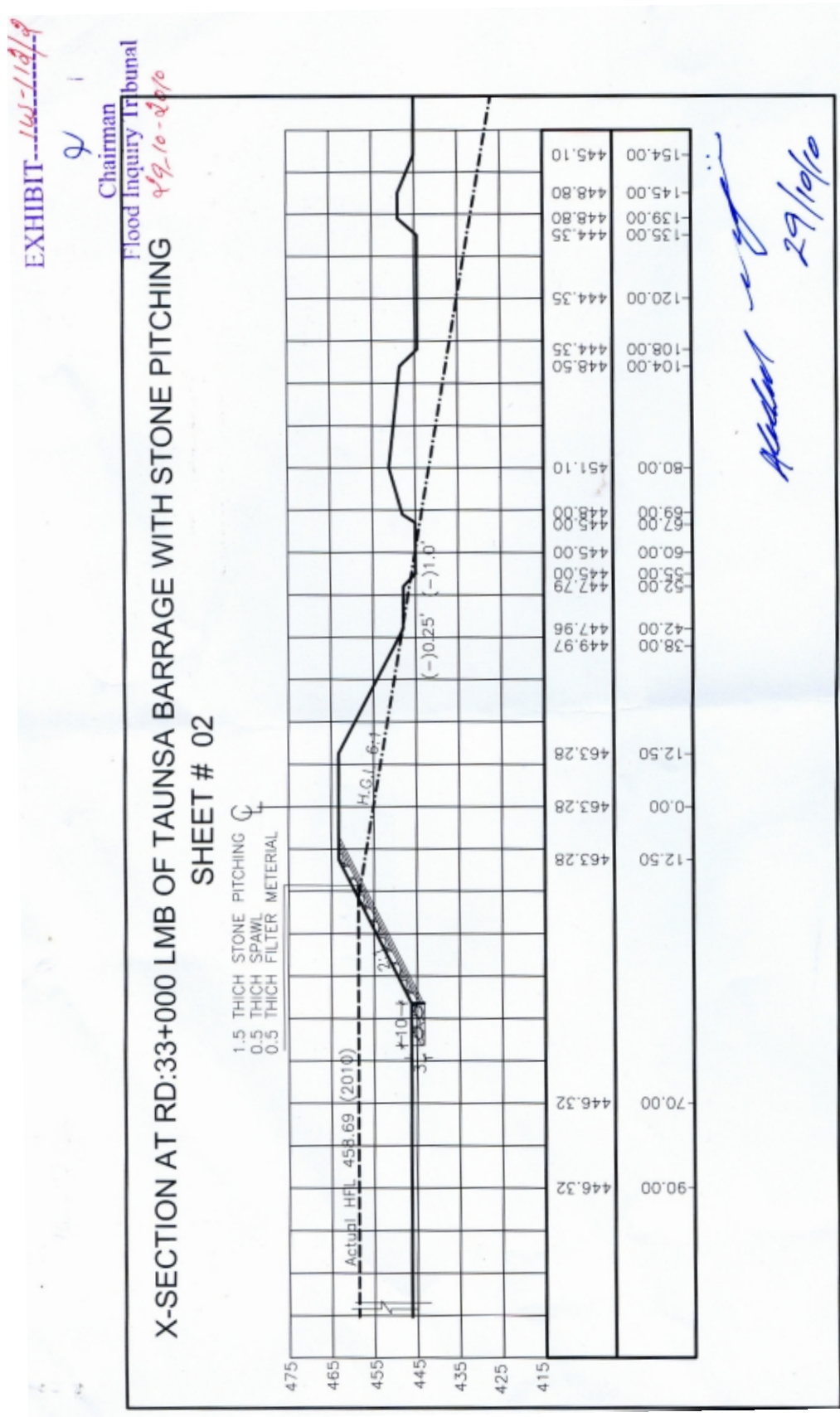
- iv. The soil used in the construction of LMB at both the sections is classified as Silt (ML) which is acceptable material for the construction of river banks/dikes.
- v. The relative compaction of LMB material at both the section varies between 82 and 88%. This value is lesser than the acceptable value which is 93~95% of standard Proctor method.
- vi. The construction of ring bund is being made with out proper compaction control which is a serious construction flaw.
- vii. During the visit of Right Marginal Bund (RMB) and associated Spurs, it was observed that flood water did not enter in to the pond area surrounded by Spur # 1-A and T head Spur-5 and the pond area surrounded by Spur # 1-A and Spur # 2-A due to the construction of illegal bunds near the usual path of the river. These illegal bunds must be removed.
- viii. The pond area between Spur # 2-A and Shank of Spur # 2 was inundated to about 7 to 8 ft depth. The water gauge installed in this pond area shows the water mark at RL of about 450 ft
- ix. Lot of KIKAR trees along the RMB have been cut illegally by the local people.

10.12. Head PMO conceded in his statement¹⁵⁸ that the design of the LMB was faulty. He further stated that Irrigation Department for the purposes of embankments do not consider the underground flow or exit gradient. The practise of the department consistently has been to work out the hydraulic gradient and as long as it is under the toe of the outer slope the design of the embankment is considered to be correct. According to Head PMO, the flow of Tibba Minor where the breach took place was not considered while designing the LMB, in fact the Consultant Ch Abdul Majeed was not given the correct map, which reflected the flow of Tibba Minor alongside LMB in RD 26-50. Head PMO¹⁵⁹ made a categorical statement: "I admit that the presence of Tibba Minor was not considered in the actual design this is one of the major reasons for the collapse of the LMB." This was not PMO's position in the written statement filed before us.

10.13. Design of LMB prepared by Ch Abdul Majeed.

¹⁵⁸ I.W. 7

¹⁵⁹ I.W.7



10.14. FEDERAL FLOOD COMMISSION'S DESIGN CRITERIA AND METHODOLOGY (referred to as FFC Manual¹⁶⁰)

10.15. FFC's Design Criteria and Methodology provides the complete design for setting up an embankment. The UET Report shows that the I & P Department has failed to follow the design criteria. Reference is made to para 5.4.3 of the FFC's Manual.

10.16. **PARA 5.4.3. of the FFC's Manual - FOUNDATION STABILITY:** The stable side slopes of embankment depends upon the strength of the fill material and foundation characteristics. The foundation soil determines the rate of under seepage, formation of boils on the landside natural surface, the settlement of the embankment and stability of side slopes.

10.17. **SIND BUND MANUAL¹⁶¹:** is instructive on the cause of breach of the LMB. Para 118 of the Manual gives the *Common Causes of Failures of Bunds*:

“... the main causes of breaches in the past are:-

- erosion of main and loop bunds by the river;
- failure of bund sluices, resulting from the undercutting of sluice foundations, etc.
- **development of leaks into breaches due to inefficient patrolling.**

10.18. Development of leaks into breaches, may itself be due to one or other of the following reasons:-

- Each of these causes and the necessary remedial measures to counteract them are considered, *seriatim*, below¹⁶²:
 - a. inadequate freeboard;
 - b. inadequate cover over the saturation line with consequent heavy percolation;
 - c. unequal settlement due to lack of wetting arrangements, such as wetting trenches or failure to lead water from the river through cuts in the lip of the river banks to wet the bunds before the river rises;
 - d. **lack of arrangements to arrest the development of leaks, e.g., sandcores or diaphragm walls, in bad soils;**
 - e. inadequate supervision and materials on site.

10.19. **Leaks PARA 127;** Leaks may become serious, leading to their development into breaches, either owing to lack of arrangements arresting their development, such as sandcores and diaphragm walls and pre-wetting measures, or due to inadequate supervision and materials on site. Here, prevention is better than cure; but, no matter how much money

¹⁶⁰ Ex I.W 103/2

¹⁶¹ Bund Manual, Government of Sind, Public Works Department, Central Designs Division, Mechanical & Research Circle, Karachi Printed at the Sind Government Press, 1954- at Mark 38

¹⁶² *ibid.*

is spent on the strengthening and perfection of the bund line, it will still always be at the mercy of the combination of a rat, a dark night, and a careless patrol beldar. A rat hole, if not closed at once and thus allowed to develop, will ensure the failure of the bund, however perfect it may be. In other words, no bund line can be considered safe against all possible conditions to which it may be subjected.

10.20. **Causes of Leaks.** Leaks are caused by:-

- treacherous character of the soil used, viz. kalar, hard clay or cracked soil, in the body of the bund;
- cracks in the bund or ground and cavities on account of excessive drying or lack of pre-wetting and compaction;
- faulty construction of bund, i.e., clods not having been properly broken and ramming and rolling insufficiently done;
- the presence of rat or snake holes in the bund section;
- the roots of big or small trees under the seat of the bund not having been properly removed during construction;
- **the seepage through bund not having been perfectly controlled in time.**

10.21. **Underground Leaks or “Blow-Outs”.** PARA 128

- Even with properly designed and constructed bunds and careful patrolling, water may leak through a sand stratum under the bund and break through the ground surface downstream of the bund in the form of a bubbling spring. When such underground leaks occur, a stream of water gushes through the ground like a fountain, carrying with it a quantity of sand which is mainly deposited around the edge of the hole, and because of their appearance, these leaks are called “blow-outs”. The blow-out may be as large as 3 or 4 feet in diameter, and it may occur at a considerable distance away (say 50 feet to 200 feet, sometimes even more) from the downstream toe of the bund.
- The danger of such “blow-outs” is maximum, where the bund crosses the dry-bed of a *dhoro* and there is an underlying layer of sand below the seat of the bund, which outcrops to the surface, downstream of the bund. Underground leaks also occur where deep borrow pits are too near the line of the bund, particularly when such pits exist on its land side or on both sides.
- One such leak, leading to a breach, occurred at mile 13/4 of the Left Bank Bund near Moro in 1942, resulting from cracks developing where the bund crossed the dry bed of a “dhoro”. A whirlpool developed on the riverside some distance from the bund and water flowed from the bed downstream of the bund which quickly collapsed.
- If the water flowing from an underground leak is clear, there is no danger of

the bund failing immediately, but when the water is muddy it indicates that the bund is being undermined and that failure by subsidence is imminent. The nearer the downstream face of the “blow-out” is to the toe of the bund the greater the danger of an early collapse of the bund.^{162-A}

10.22. How to Close an Underground Leak PARA 129

- Since underground leaks are caused by the fact that the soil particles cannot offer the necessary resistance to the static pressure due to the head of the water against the bund, the method of stopping them is to build a “ring bund” of earth-filled gunny bags around them and allow the water to pond up, creating a head on the land side sufficient to stop the flow of silt. When the seeping water is altogether stopped there may be danger of blow-outs taking place outside the ring bund. It is, therefore, necessary to be on the look out for similar underground leaks in the vicinity. The same method is useful in case of leaks whose upstream face cannot be traced. The subsequent treatment is similar to that for leaks whose upstream face can be detected. As soon as the river levels subside, longitudinal “nallis” have to be constructed to trace the course of the leak. Having done so, “nallis” have to be constructed, right across the embankment, with bed lower than the bottom level of the leak, and the leak filled up with selected sand or earth, duly watered and rammed. In case of important or dangerous bunds, where such blow-outs are found to occur frequently, at high water, the areas subject to such underground leaks should have permanent “ring bunds” constructed around them.

10.23. NATIONAL FLOOD PROTECTION PLAN¹⁶³

10.24. The National flood Protection Plan, 1978 provides that it is desirable to explore the foundation to ascertain the soil type of strength to detect permeable soil layers. Strength of the foundation must be established to assure that the foundation will support the superstructure without excessive differential settlement. Permeable sand layers may permit considerable under seepage and lead to sand boils and excess water accumulation on the landside of the bund.

10.25. FFC REASONS FOR CAUSES OF BREACH OF LMB.

10.26. According to Chairman, FFC, “the prime reason for breach at LMB at Abbaswala was poor maintenance. Infact Lala Creek passes through the toe of LMB which resulted in cavitations leading to eventual settlement of Bund.”

^{162-A} Bund Manual, Government of Sind, Public Works Department, Central Designs Division, Mechanical & Research Circle, Karachi Printed at the Sind Government Press, 1954

¹⁶³ Mark 60/2 (National Flood Protection Plan 1978 Main Report)

10.27. GATE OPENINGS OF TAUNSA BARRAGE

10.28. Complaints had been received by the Tribunal that the gates were not properly opened by the officers in charge of the barrage when the first peak reached Taunsa.

10.29. We called for the Daily Log Book and the Flood Register from the Barrage and examined it in detail. The extract below is the data picked from the Daily Log Book and the Flood Register. The statements of Head PMO and the XEN (reproduced above in this report) have also been matched with the Daily Log Book.

Daily Log Book																Flood Register	
Sr.#	Date	D/S Discharge	U/S Discharge at Chashma	Pond Level at Taunsa 06:00 a.m.		Average Gate Opening			Canals			Rain Fall	State of Weather	XEN	U/S Discharge	Pond Level	
				Left	Right	Right Under Sluice	Main Weir	Left Under Sluice	M.C	D.G.	T. P.						
1	25.7.2010	323749	231308	447.50	447.60	1.5. to 3.5	2 to 5	1.5 to 3	Open	Open	Open	Nil	Cloudy	Mr. Munir Anjum	343549	447.50	
2	26.7.2010	283914	281297	447.50	447.60	2 to 2.5	3 to 4	1.5 to 3	Open	Open	Open	Nil	Clear and Hot Day	Mr. Munir Anjum	303714	447.50	
3	27.7.2010	256029	255736	447.50	447.60	2 to 2.5	2.5 to 3.5	1.5 to 3	Open	Open	Open	Nil	Cloudy	Mr. Munir Anjum	272529	447.40	
4	28.7.2010	225570	234762	447.50	447.60	2 to 2.5	2.5. to 3.5	1.5. to 3	Open	Close (1200)	Open	Nil	Cloudy	Mr. Munir Anjum	242070	447.50	
5	29.7.2010	258941	507904	447.50	447.60	2 to 3	2.5 to 3.5	1.5 to 3	Open	Close	Open	Nil	Cloudy	Mr. Munir Anjum	270441	447.50	
6	30.7.2010	288502	743548	446	446.50	2.5 to 3	3 to 6	1.5 to 5	Open	Close	Open	Nil	Cloudy	Mr. Munir Anjum	299502	446	
7	31.7.2010	424391	974214	445.50	445	3 to 5	5 to 10	1.5 to 7	Close	Close	Close	Nil	Clear	Mr. Munir Anjum	424391	445.50	
8	01.8.2010	617602	1000972	446	440	3 to 7	6 to 13.5	3 to 7	Close	Close	Close	Nil	Clear	Mr. Munir Anjum	617602	446	
9	02.8.2010	798601	736403	446.2	444.4	5 to 9	8 – F	3 to 8	Close	Close	Close	Nil	Cloudy	Mr. Munir Anjum	798601	446.2	
10	03.8.2010	767351	644476	446	442	5 to 9	9 to 14	3 to 8	Close	Close	Close	Nil	Cloudy	Mr. Munir Anjum	767351	446	

Daily Log Book															Flood Register	
Sr.#	Date	D/S Discharge	U/S Discharge at Chashma	Pond Level at Taunsa 06:00 a.m.		Average Gate Opening			Canals			Rain Fall	State of Weather	XEN	U/S Discharge	Pond Level
				Left	Right	Right Under Sluice	Main Weir	Left Under Sluice	M.C	D.G.	T. P.					
11	04.8.2010	790021	601038	446	443.8	5 to 8	9 to 13.5	3 to 8	Close	Close	Close	Nil	Cloudy	Mr. Munir Anjum	-	-
12	08.2010	721494	525737	444	441.60	5 to 8	9 to 13.5	2 to 7.5	Close	Close	Close	Nil	Cloudy	Mr. Munir Anjum	-	-
13	06.8.2010	692981	468360	443.50	441.10	5 to 8	9 to 13	2 to 7.5	Close	Close	Close	Nil	Clear	Nil	-	-
14	07.8.2010	614418	457035	443	440.6	3 to 8	7 to 12	2 to 4	Close	Close	Close	Nil	Cloudy	Nil	-	-
15															
16	10.8.2010	614015	755744	442.50	441	3 to 8	9 to F	4 to 9	Close	Close	Close	Nil	Clear	Mr. Ijaz-ul-Hassan Kashif	614015	442.50
17	11.8.2010	741614	776512	443	440.4	6 to 9	10 to F	6 to 9	Close	Close	Close	Nil	Clear	Mr. Ijaz-ul-Hassan Kashif	-	-
18	12.8.2010	761574	795356	443	441	6 to 9	10 to F	7 to 11	Close	Close	Close	Nil	Clear	Mr. Ijaz-ul-Hassan Kashif	761574	443
19	13.8.2010	773612	679571	443	441	6 to 9	F	7 to 9.5	Close	Close	Close	Nil	Cloudy	Mr. Ijaz-ul-Hassan Kashif	773612	443
20	14.8.2010	769110	579126	443	441	6 to 7	8 to F	7 to 9.5	Close	Close	Close	Nil	Cloudy	Mr. Ijaz-ul-Hassan Kashif	769110	443
21	20.8.2010	475309	433402	440	435	7 to 8	5 to 9	2 to 5	Close	Close	Close	Nil	Clear	Mr. Ijaz-ul-Hassan Kashif	747446	437.40

10.30. The data above reveals that :-

21.5.1 The pond level was not reduced prior to coming of the flood as

21.5.2 The weir gates and the under sluice gates were not opened fully or as per regulation inspite of fact that the canals were closed. The Daily Log Book shows that the gates were opened in full when the second peak hit Taunsa. The flood managers at Taunsa were not prepared and failed to regulate the gates when the highest first

peak hit the Barrage and after learning the lesson at the expense of the breach in the LMB opened the gates when the second peak reached Taunsa. The flood managers failed to regulate the gates as per regulation.

21.5.3 On the critical dates i.e., 2.8.2010 upstream discharge at 06:00 a.m. was 7,98,601 Cfs which rose to 8,98,414 Cfs¹⁶⁴ at 12 noon and continued to be the same till 1900 hrs and then suddenly at 2000 hrs a discharge of 9,59,177 Cfs is recorded in the Flood Register. According to the Flood Register the breach took place at RD-32 on the LMB at 1600 hours and records a discharge of 1,25,000 cfs from the said breach. The discharge from the breach has no effect on the discharge from the Barrage which remains intact at 8,98,414 Cfs. The Flood Register also shows that as upstream discharge rose from 8,98,414 Cfs to 9,59,177 Cfs at 2000 hours till 2300 hours and was finally reduced at 2400 hrs to 9,34,116 Cfs. The pond level, however, is recorded to have remained static at RL 446.80 from 0900 hrs till 1900 hrs and from 2000hrs till 2300 hrs the Pond Level was reduced to RL 446.60 and at 2400 hrs it was recorded as RL 446.40. Therefore, it is not clear how the discharge at the breach was calculated to be 1,25,000 Cfs and how come the same had no effect on the upstream discharge at the Barrage. The figure of 1,25,000 Cfs does not inspire confidence.

21.5.4 The overwriting in the flood register, as well as, the discharge recorded in the Daily Log Book on 2.8.2010 is 7,98,601 Cfs while the discharge on 3.8.2010 is 7,67,351 Cfs, therefore, we are of the view that the discharge recorded as 9,59,177 Cfs at 2000 hours on 2-8-2010 is not credible and appears to have been inflated just to match with the design capacity of the Barrage ($959177 + 1,25,000 = 1,084,177$). Even if 1,084,177 Cfs is correct the flood was within the design capacity of 11 lac Cfs.

21.5.5 In his written submission, Mr. Muhammad Muneer Anjum, Executive Engineer stated that he was suspended on 1.8.2010, however, the Daily Log Book shows signatures till 4.8.2010, while the signatures of his replacement i.e., Mr. Ijaz ul Hassan Kashif appear on the Daily Log Book on 7.8.2010 when according to the statement of Mr. Ijaz ul Hassan Kashif, he was at Shahwala Groyne till noon of 3-8-2010. It appears that there was no duly appointed XEN at the Barrage on 2-8-2010. Master of the ship was missing when exceptional high flood was passing through the Barrage. Such like lapses at one of the most critical Barrages during the most critical times is criminal.

10.31. *INQUIRY & FINDINGS*

10.32. The technical report as well as the depositions made before us by the officers incharge have pointed out that boiling was noticed in the bed of Tibba Minor. Boiling noticed at two places earlier in the bed of Tibba Minor was closed by the field staff.

10.33. The Departmental Inquiry committee mentions the importance of Tibba Minor but

¹⁶⁴ Flood Register of Taunsa Barrage

does not explain the technical reasoning as given by the UET Commission i.e., the seepage was from right under the embankment and it was the exit gradient rather than the hydraulic gradient, which became the cause of the breach. One of the causes of breach of an embankment is sub-surface failure or Piping accompanied by levee boils. Undersurface seepage resurfaces on the landside in a volcano like cone of sand. This results in erosion of the levee toe or foundation resulting in the sinking of the levee/embankment. As the upward pressure of water is more than the downward pressure from the weight of the soil. Facts recorded at RD 32 of the LMB show that the breach was a result of under-seepage which resulted in the boils that surfaced in the bed of Tibba Minor. An able flood manager should have covered the entire bed of Tibba Minor which alongside the LMB (i.e, RD 32-44).

10.34. Tribunal is also of the view that the boiling at RD 32 could have been checked had the pre flood preparation pointed out the vulnerability of the LMB from RD 32-44 which flows along the Tibba Minor. This makes this part of the LMB more exposed and vulnerable. The pre flood strategy should have identified Abbaswala to be the portion of the LMB that required a constant watch.

10.35. Once boils were witnessed, steps should have been taken to cover the entire stretch of Tibba's bed. Had the officers been trained and aware of the Sind Bund Manual and the FFC Manual, the developing pattern of boils or blow outs at RD 35-36 should have been understood and appropriate remedy taken.

10.36. Poor flood fighting arrangements added to the above and resulted in the breach.

10.37. We are of the view that had there been trained flood managers equipped with the proper flood manuals, the boils at Tibba Minor could have been attended to in time and the breach could have been avoided.

10.38. **CONCLUSION**

10.39. A portion of LMB runs alongside Tibba Minor (RD 32-44) While designing or rehabilitating LMB this aspect and the fact that LMB sits on an old creek was not factored in. The design criteria of the FFC has been followed to the extent of Hydraulic Gradient being in the ratio of 1:6 and must be under the countryside of the embankment. The department has miserably failed to comply with the other design requirement given in the FFC design criteria manual as well as in the National Flood Protection Plan, 1978. This aspect has been totally ignored. The officers who deposed before us were not aware of the foundational failure and restricted their submissions to the hydraulic gradient. The boils evidenced close to RD 32 in the bed of Tibba Minor made out a case of foundational failure. The Staff on duty should have immediately covered their entire bed of the Tibba Minor in the reach that runs alongside the LMB. This would have been the first reaction. However, this would have been possible only if during the pre flood inspection the sensitivity of this portion of the LMB was discussed or if the XEN and SDO had chalked out a strategy for the flood season identifying critical areas. The dream team of the best officers sent a night before, even though some of

them patrolled the LMB a night before and also were aware of the boils coming out the bed of Tibba Minor did not suggest a strategy. It might not be expected of an outside officer to tell the connection between a boil, the old creek passing under the LMB and the proximity of Tibba minor in pitched darkness.

10.40. Under the rehabilitation work of Taunsa Barrage, the PMO failed to provide the relevant data to Abdul Majeed who designed the LMB without factoring in Tibba Minor and the fact that an old creek passed under the LMB. Needless to say that it was also the responsibility of Abdul Majeed to have conducted a field survey to assess for himself the surrounding of the LMB, which he failed to do. All these lapses have added up and culminated into the breach of LMB.

11. ENCROACHMENT IN POND AREA

11.1. *I & P DEPARTMENT'S POSITION*¹⁶⁵: Pond area is located on upstream side of the barrages to accommodate the ponded water within the Marginal bunds in order to feed the off-taking canals. The extent of inundation of the pond area depends upon the pond level, river morphology and flood discharges. The required pond area in case of each barrage is acquired by the Government.

11.2. The main function of a barrage or a weir is to raise the water level (head up) so that it can be easily diverted into canals for the purposes of irrigation. Barrage can also provide storage and can therefore be used for flood mitigation. Once the water is raised upstream it requires room to spread out and retain its pond level. This area or space is called the POND AREA. It has no other technical function but to absorb the raised water as per barrage regulation. The Pond Area has to be empty at all times and it mostly used as a wildlife sanctuary.

11.3. For the construction of Taunsa Barrage and its training works, an area of **11,559 Acres 18 Marlas** of land was acquired in District Muzaffargarh and **11,316 Acres 4 Kanals and 9 Marlas** of land was acquired in Dera Ghazi Khan District in the year, 1957 by Irrigation and Power Department. The acquisition proceedings were completed in the year, 1963.

- 1.3. Zamindars of pond area in Dera Ghazi Khan District did not accept compensation of their land acquired by Irrigation and Power Department. They also did not collect the compensation instead approached the Government for release of their land. In a meeting of Council of Ministers held on 28.09.1963, it was decided by the Governor that only such areas may be acquired which remain under water throughout the year and the remaining area should be released. Resultantly **9,707 Acres 1 Kanal and 3 Marlas** of land of Dera Ghazi Khan District was released to the original land owners under the following conditions:-

- i. The landowners would not make any claim against Government for loss of

¹⁶⁵ EX I.W.6/1

crops, etc. due to inundation.

- ii. The landowners would allow Irrigation and Power Department to excavate earth, etc. whenever necessary for construction and maintenance of the Barrage/Training works.

11.5. In this way the total pond area that remained with Irrigation Department was **13168 Acres 4 Kanals and 4 Marlas** of land.

11.6. During the year 1978 the pond area mentioned above alongwith state land/other land measuring **3,057 Acres 3 Kanals 14 Marlas** i.e. total **16,225 Acres 7 Kanals and 18 Marla** was declared as Game Sanctuary vide Forestry and Wildlife Department's Notification No.SO.FT(Ext.)/XII-8/72 dated 15.06.1978, initially for a period of 5 years. This period was further extended for another 5 years and this process is continuing till today with similar extension. The Forestry and Wildlife Department asserted that no cultivation should be allowed in the Game Sanctuary and instead wild Jungle and Sarcanda growth be allowed to provide good habitat to the wildlife, like food, grazing and shelter, etc.

11.7. Later, on the representation of the original land owners, case was re-examined and the Secretary (Colonies) Board of Revenue, Punjab vide his letter No.4015-98/3028-CLV dated 19.10.1998 after approval of the then Chief Minister issued policy letter in which it was instructed that land may be leased out to its original owners on 15 years lease scheme. It was also directed that in the meanwhile it would be seen that if the land can be reverted back to the original owners which is no longer required by the acquiring agency i.e., Irrigation and Power Department. After issuance of this policy letter from the Board of Revenue, Punjab Lahore the proceedings for leasing out the land were initiated by the Irrigation and Power Department with the assistance of Revenue Department. **The land measuring 9,225 Acres was leased out to its original owners out of 16,225 Acres. Rest of land is still under the control of I & P Department and this land is not cultivable.**

11.8. In the year, 1999 the Secretary Wildlife denotified the above land measuring **9,225 Acres** from the area of Game Sanctuary vide his Notification dated 24.03.1999 on the request of Irrigation and Power Department.

11.9. Vide notification dated 4-7-2008 of the Forest, Wildlife and Fisheries department the land owned by the I & P Dept adjacent to the Pond Areas of the head works and barrages was handed over to the Wildlife & Parks Department for conservation of wildlife through the establishment of private game reserves. I & P Department vide notification dated 6-11-2002 has already stopped the leasing of the pond areas and banned the cultivation in the wildlife potential areas/headwork's/barrages. Therefore, the lease right of the pond areas associated with the wildlife potential areas/headwork's/barrages is transferred to the Punjab Wildlife and Parks Department for the conservation of wildlife through the establishment of private game reserve under section 20 of the Punjab Wildlife (Protection, Preservation, Conservation and Management) (Amendment) Act, 2007.

11.10. According to Mr. Muhammad Nawaz, Supervisor¹⁶⁶: “ in 2002 once again 16,225 acres were declared to be pond area and wildlife sanctuary, however, after, the said notification no effective action was taken to clear the pond area/declared wildlife sanctuary from the illegal cultivators/encroachers. In fact only 7,000 acres area is with the Wildlife Department. We have written to the Director General, Wildlife Department, but there is no progress in this regard.”

11.11. Secretary I & P Department¹⁶⁷ deposed that: “As far as the illegal possession and agriculture in the Pond Area is concerned, I am afraid the Government approach regarding this has been oscillating like a pendulum. However, since 2009 the Pond Area has been handed over to the Wildlife Department to be treated as a wildlife sanctuary. It is correct that even today the Pond Area is in the possession of illegal encroachers and I frankly admit that the said encroachers might be holding possession in collusion with the I & P department. I admit that there are standing crops in the said Pond Area and the area has good soil for agriculture.”

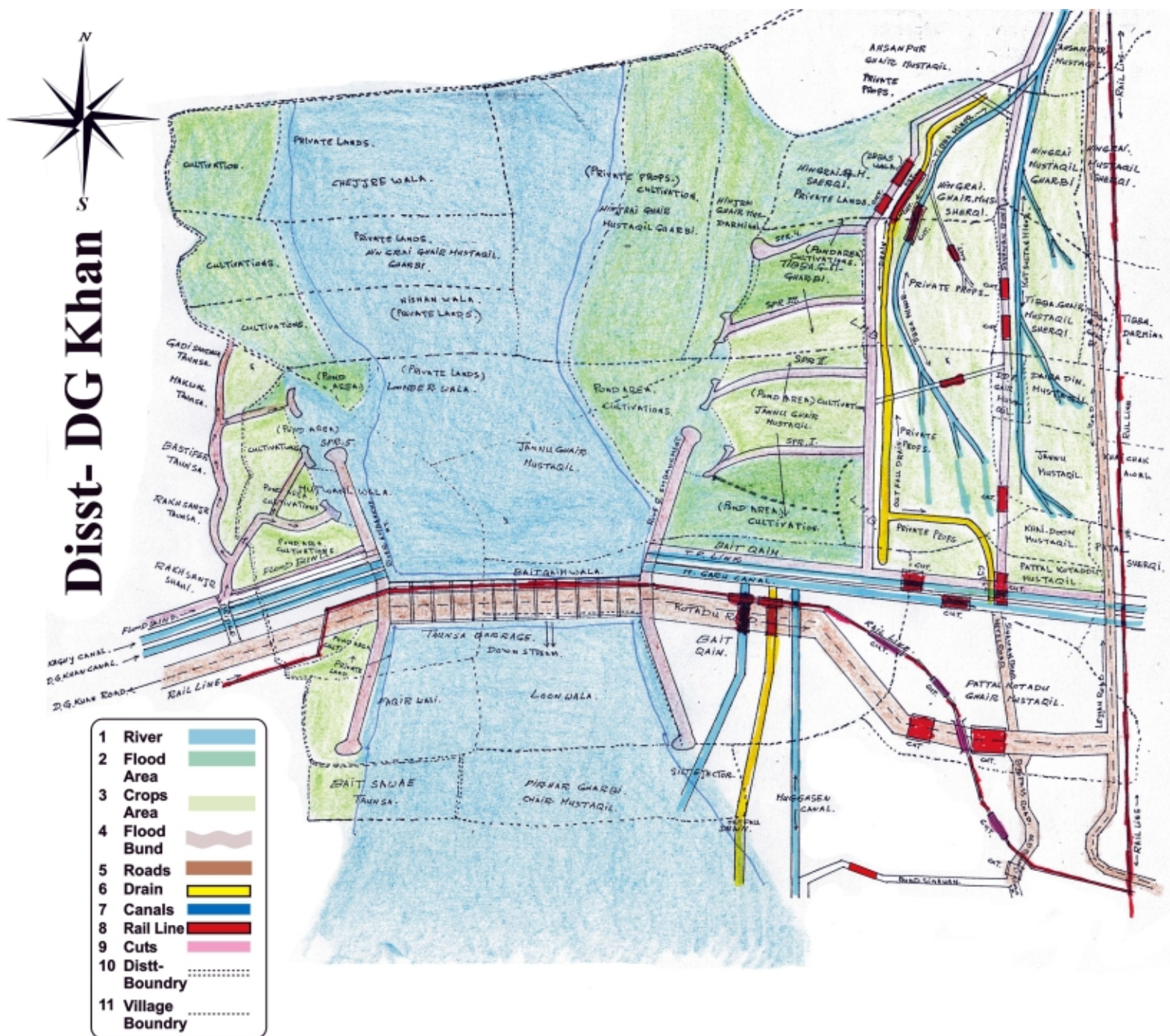
11.12. According to the DOR¹⁶⁸, District Muzaffargarh extends into the pond area on the right side of the Taunsa Barrage and falls within the Mauza Matwani. The pond area on the right side is under the ownership of the I & P Department, however, the Pond Area has been unlawfully cultivated by Syeds and Baloch Sihanis, who are shown as encroachers in the revenue record. This is because they are not lawful lessees of the area as per revenue record. Similarly the Pond Area on the left side along LMB also belongs to the I & P Department and is being cultivated by Hinjras, Gadies and Baryars, who are shown as lessees/encroachers in the revenue record. The map below clearly shows the illegal cultivation in the pond area:

¹⁶⁶ I.W. 67

¹⁶⁷ I.W. 6

¹⁶⁸ I.W.87

Structure Network of Taunsa Barrage In District-Muzaffargarh



11.13. **JINNAH BARRAGE:** Total pond area of Jinnah Barrage is 3,893 Acres which was acquired by Irrigation and Power Department at the time of construction of said Barrage. However it has been handed over to Wildlife and Fisheries Department vide No. SOP(WL)12-1/2002-III for upkeep now as game sanctuary.

11.14. Malik Ghulam Mustafa Khar¹⁶⁹ stated: “The joint holding of the Khar Family is around 3,000 to 4,000 acres, which is situated on both sides of Magasson Canal downstream Taunsa Barrage. As far as the Pond Area is concerned both sides are being illegally cultivated primarily by the Hinjra Family who enjoy a strong political position in the area. They have control over 16,000 acres of pond area.

11.15. According to the statement of Malik Ahmed Yar¹⁷⁰ of the Hanjra family:

“We are cultivating 1 to 2 squares of land between Spur No.2 and Hockey Spur. I know that the said land has now been handed over to the Wild Life Department, Government of the Punjab. I am aware of the notification of the Government of the Punjab whereby the said land has been handed over to the Wild Life Department, however, our contention is that this land has been leased out to us and . . . there is litigation pending before the Hon'ble Lahore High Court. As a sitting MPA, I undertake that once this matter is decided in the Court, we shall immediately vacate this land.

In the Bela, government maintains a *Shikargah* and my family uses this *Shikargah* once in a while like other members of the public. The other families cultivating within the Pond Area (on the left side) are the following:-

- Gadies
- Baryar
- Chandia
- Nutkani

We are cultivating sugarcane, cotton, wheat and sesame in the above mentioned land. Our total family holding in the area is 30 to 40 squares of land.”

11.16. Answering questions posed by the Tribunal, Malik Ahmed Yar deposed:

Q.No.1: The memo of parties in W.P. No.4919/09 shows that you are not a party to the litigation before the Lahore High Court and, therefore, the interim relief does not extend to Hanjra family?

Ans-1 It was my impression that the above mentioned litigation (Writ Petition No.4919/09) has been filed on behalf of all the families in the Pond Area, however, according to the memo of parties it is only the Baryar family who are the petitioners of the said petition. Now I understand that the stay order does not extend to the Hanjra family. I shall peruse the notification in this regard and will try to vacate the Pond Area as soon as possible.

¹⁶⁹ I.W.127 (ex Governor, Punjab)

¹⁷⁰ I.W. 128 (s/o Malik Muhammad Ajmal, Caste Hajnra, r/o Hanjra House, Daira Deen Panah)

11.17. According to Muhammad Mansoor Ashraf Barar,¹⁷¹

“I am cultivating three squares of land in the Pond Area on the left side of the Taunsa Barrage. My entitlement is based on the Memorandum dated 24.02.1999 whereby the said land has been leased out to me for a period of 15 years. I also have litigation pending in the Lahore High Court, Lahore. In the pond area we have cultivated sugarcane, cotton crops and sesame. Cotton crop has been totally damaged, sugarcane and seismic are still existing.

The so called private bunds between spurs have not been constructed by me or my family. These bunds were constructed by the Department with the help of NESPAK. **We have no use of these embankments and have no objection if these bunds are removed.** We deposit Rs.100/- per acre (which started @ Rs.6/- per acre). We deposited the annual lease amount with the Irrigation & Power Department at the Barrage Headquarters with the concerned XEN/SDO. For the last two years the Department is not collecting the said fee because they informed us that the said land has been transferred to the Wildlife Department.

I understand the legal position and shall vacate three squares of land in the Pond Area, which I am cultivating after harvesting the standing crops within two months from today.

11.18. According to Statement of Syed Saleem Ahmed Gillani¹⁷²

“The entire area on which the barrage was built was owned by the Syed family. From the right river bank till Indus Highway and enclosed by D.G. Khan/Kachi canal belongs to Syed family. Syed family is the Syed Gillani family. This land and Pond Area was acquired by the Irrigation Department because under the Agreement said land has been leased out to us for 15 years. We are entitled to hold the same till 2010. We alongwith Baryar family have taken this matter to the Hon'ble Lahore High Court. The total Pond Area, which is now the ownership of Irrigation Department and cultivated by Syed family, is between 2000 to 2500 kanals. We grow cotton in the said area....From 1985 to 1997 Ghulam Mustafa Khar (the then Honorary Warden), as well as, Ghulam Maladi Khar took possession of this land, however, it was returned to us in 1997. The private Bunds were set up by “Khar family” during the above said period. **The Bunds have no importance to us and can be removed at any time.** We sow Rabi crops and, therefore, we have no utility of these Bunds. I undertake that whatever is the final legal position after the litigation **we shall abide by that and vacate the land if the said litigation is decided against us.** The remaining area behind the Pond Area is approximately 1,000 acres cultivated by our family and we have cultivated sugarcane and cotton in the said land.

¹⁷¹ I.W. 129 (son of, Muhammad Ashraf Barar r/o Mustiqal Janoo, Daira Deen Panah, Tehsil Kot Addu).

¹⁷² I.W. 131 (s/o Syed Muhammad Akbar Gillani, Caste Syed r/o Sanjar Syedan, Tehsil Taunsa, District D.G. Khan).

I am of the view that Pond Area should be utilized for Rabi crops because the said cultivation does not require setting up of Bunds and does not stand in the way of the floods. On the other hand, such agriculture adds to national economy and is beneficial for the country. Since 1997 the water has not come into the Pond Area of the right side of embankment. In my non-technical view, flow of the river has shifted on to the left side.

11.19. Mr. Irfan Saeed, Additional District Judge and Registrar of the Tribunal was appointed as Local Commission to report on the status of Pond Area by carrying out detailed physical examination of the area covering the following terms of reference. The summary of the his Report¹⁷³ is as under:

Sr. No.	Mandate/TOR given to Commission	Report/Status
1	To inspect the "Pond Area" on left and right sides of the Barrage.	<p>On 05.10.2010, inspected LMB including Abbaswala Cut (the breach) comprising two breaches there, one measuring 4800-ft and other measuring 1000-ft having intervening 700-ft LMB intact. Observed privately constructed bunds (illegally) covering the pond area, linking the Spurs at LMB. Also observed cultivation there.</p> <p>Almost similar position at the right side of the Barrage.</p> <p>Details are available in the report duly supported with the photographs and on some occasions, with the movies.</p>
2	To inspect the Baila in the middle of the river.	<p>Observed human habitat, ranches, grazing livestock. Interviewed locals and also noticed an illegally installed fishing net. A concrete bridge (commonly known as Hockeywala Pull) and a metalled road leading towards Daira Deen Panah in the Baila, allegedly constructed by the District Government under the instructions and guidance of Malik Sultan Hanjra who was District Nazim of Muzaffargarh.</p>

¹⁷³ Full Report at Mark 78- Appendix 4

Sr. No.	Mandate/TOR given to Commission	Report/Status
3	To report on the status of possession of the pond area by local residents.	The Commission also observed the cultivation in the Pond Area on both sides of the Barrage. On the right side, mostly Syed whereas on the left side, the Hanjras, Gurmanis, Nutqanis, Baryars are in possession of the Pond Area.
4	To inspect whether the said local residents/encroachers have set up private bunds in the area.	Almost between each Spur on both sides of the Barrage, the local residents have set up private bunds in the area. Details have already been given in the instant report, duly supported with the photographs and the movies.
5	To inspect T.P. Link.	The Commission also inspected the Taunsa Punjnad (TP) Link and met the locals who informed that the same was breached on three points which were rehabilitated by the department. The right embankment of the TP Link was the common embankment of TP Link and Mozaffargarh Canal.

11.20. Pond Area has never been a source of flood mitigation and cannot be considered as a storage area for the purpose of flood. According to an estimate, total Pond Area at Taunsa Barrage is around 16,000 acres, which cannot hold more than 16000 Cfs of water which is inconsequential during super floods¹⁷⁴.

11.21. **POND AREA LITIGATION:** Malik Ahmed Yar¹⁷⁵ (Hanjra) deposed that W.P. no. 4919/2009¹⁷⁶ is pending before the Multan Bench of the Hon'ble Lahore High Court. Perusal of the petition and the memo of parties reveal that the petition has been filed by the Baryar family.

11.22. According to the memo of parties, all the petitioners are Baryars. The interim relief granted in the above writ petition on 18-6-2009 was: "No adverse action shall be taken to the extent of petitioners in the meanwhile." This relief pertains to the petitioners i.e., Baryars only and does not extend to the other families occupying the POND AREA.

11.23. Information sought¹⁷⁷ from the Additional Registrar, Multan Bench of the Lahore High Court revealed that a similar petition W.P. 1833/2003 titled *Bashir Ahmed vs Government of Punjab* was dismissed for non-prosecution on 3-3-2005 and that there is no other identical petition on the record except [W.P. no. 4919/2009](#) filed by the Baryar family.

¹⁷⁴ I.W.6

¹⁷⁵ I.W. 128

¹⁷⁶ Ex I.W. 128/1 & 129/2

¹⁷⁷ This information was procured over Telephone by the Staff Officer of the Tribunal.

11.24. *CONCLUSION*

11.25. We are of the view that the Pond area has been illegally encroached upon by the local influential's who carry out agriculture in the said area and have also built zamindara bunds for the protection of their crops. I & P department has failed to make any concerted effort to remove the said encroachers. Some members¹⁷⁸ of the I & P Department maintain active interest in the agriculture in the POND AREA.

11.26. Wildlife and Fishers Department has also failed to get the POND AREA cleared.

11.27. POND AREA at Taunsa Barrage is therefore not an empty space that can fully absorb and pocket the excess water due to heading up at the Barrage or due to floods. Even though POND AREA is not designed for storage, still it has to be clear at all times. We do not envisage the POND AREA encroachments to be an immediate cause of breach of LMB during the recent exceptionally high floods, however, the impact and effect of an encroached pond area on the current breach or the hydrological dynamics of the river cannot be ruled out.

12. MISMANAGEMENT & ROLE OF PMO

12.1. According to the Head PMO¹⁷⁹ for Punjab Barrages, Irrigation & Power Department, Lahore, Project Management Office ("PMO") was created by the Government of the Punjab vide Notification No.SO(E-I)2-1/2001, dated May 04, 2005. Most of the Barrages have outlived their useful lives and exhibit technical and operational deficiencies and considering their strategic importance in the irrigation system, they need to be rehabilitated / remodeled on priority basis be taken up by Irrigation & Power Department. A comprehensive project by the name of "[Punjab Barrages Rehabilitation and Modernization Project](#)" was approved by ECNEC to rehabilitate the following six barrages namely:

- i. Jinnah;
- ii. Taunsa;
- iii. Khanki;
- iv. Balloki;
- v. Sulemanki;
- vi. Islam;

12.2. Taunsa Barrage was the most problematic and sick barrage and its safety was at stake as determined in the detailed study carried out by the Consultants Joint Venture of M/s NDC and NESPAK. The World Bank was approached and in the aide memoire, the Bank required that a dedicated PMO should execute this project, which was then created by the Punjab Government. The Government also directed that the PMO would subsequently be responsible for rehabilitation of the remaining five barrages also. The following are the

¹⁷⁸ I.W. 59 & I.W. 60

¹⁷⁹ I.W.7 & Ex I.W.7/4

functions of the PMO:

- a. Preparation of Terms of References (TORs), Request for Proposals (RFPs) and procurement of consultants;
- b. Review of feasibility studies, detailed design, PC-Is, Prequalification (PQ) and bidding documents for barrage projects;
- c. Assigning finances;
- d. Procurement of contractors;
- e. To oversee the construction supervision consultants during implementation of barrage projects;
- f. Environmental and social impact mitigation measures;
- g. Monitoring and reporting project implementation progress;
- h. To act as client for contract management;
- i. Financial management i.e., disbursement and re-imbursement from financiers; and
- j. Coordination with Public Sector Development Programme (PSDP) for emergent repairs on barrages

13. INQUIRY & FINDINGS

13.1. According to the written submission Chairman P & D Department¹⁸⁰, rehabilitation and modernization of Punjab Barrages under the phased programme was planed as an outcome of a detailed appraisal undertaken by Irrigation & Power Department, Government of the Punjab and consultants in 1998. In the first phase rehabilitation and modernization of six barrages has been envisaged in following order of priority:

- i. Taunsa
- ii. Jinnah
- iii. Islam
- iv. Balloki
- v. Khanki
- vi. Sulemanki

¹⁸⁰ Ex I.W. 137/1

13.2. Credit implementation for Taunsa Barrage Emergency Rehabilitation and Modernization (TBERM) project costs Rs.11.232 billion through World Bank and JICA financing in April, 2005. The project was effectively completed by December, 2009. In view of the vital importance of barrages as strategic assets, establishment of an adequately staffed Project Management Office (PMO), to be transitioned eventually into the Punjab Barrages Management Organization (BMO) for long term institutional strengthening of the I&P Department, was covenanted in the Project Agreement as part of the Loan Agreement signed with the World Bank.

13.3. The skeletal PMO existing at the stage of project preparation was later on expanded to have adequate number of qualified professionals headed by a project Director. The PMO, by virtue of its Taunsa Barrage implementation experience, has gained the rare and invaluable experience of executing civil and electro mechanical construction works besides acquiring training in operation and management of barrages and gaining valuable expertise in handling social environmental and resettlement issues on large scale. I&P Department aided by PMO has also prepared a post completion O&M plan for Taunsa Barrage and has devised a barrage specific yardstick for taking up maintenance requirements.

13.4. Prior to the Taunsa Barrage rehabilitation project the Barrage was being operated and maintained by Taunsa Barrage Irrigation Division under Chief Engineer, D.G. Khan Zone. To ensure smooth implementation of construction operations, the Taunsa Barrage Division was transferred en-block to PMO, Punjab Barrages. The Division, since the afore-cited arrangement, is handling all functional issues of barrages operation.

13.5. The Chairman, P&D in response to a question raised by the Tribunal responded in the following manner:¹⁸¹

Question	Response
On the conceptual background of success and failure of PMO Barrages as an institution in the context of Barrage Management and what future role does PMO have considering the experience of the recent floods?	<ol style="list-style-type: none"> 1. PMO-Punjab Barrages was established as part of the 'Project Agreement' of Taunsa Barrage Emergency rehabilitation & Modernization (TBERM) Project on the requirement of financing agency (i.e. World Bank) at the time of Appraisal of TBERM Project in 2004. 2. The basic concept was to create a dedicated unit to manage the "Taunsa Barrage Rehabilitation and Modernization Project" in an efficient way because the existing zone-wise execution and O&M activities were overstressed and often experienced as sub-optimal as the zonal Chief Engineers usually remain overburdened with routine tasks/ schemes and normally do not have enough expertise to handle the mega and complex barrage rehabilitation & modernization projects in the desired

¹⁸¹ Ex I.W 137/1

Question	Response
	<p>efficient manner. In addition, available staffing and working capacity of Irrigation Zones is generally inadequate. It was, therefore, considered vital to create a dedicated modern management unit i.e. PMO with adequately staffed, engineering, financial, management and environmental sub units to run the project in accordance with the scheduled phasing and project execution requirements under the Credit Agreement. The PMO is responsible for overall project coordination, management and monitoring, procurement and financial management, work programme preparation, progress reporting environmental monitoring and evaluation and other project related activities.</p> <p>3. The PMO worked well on TBERM Project and most of the civil works of the project were completed a year ahead of schedule. World Bank Mission in its Aide-Memoire (March 25-April 1, 2008) commended the GO Punjab, particularly PMO / IPD for the timely completion of majority of project activities and achievement of the project development objectives ahead of time.</p> <p>4. The role of PMO for passing the flood 2010 at Taunsa Barrage, however, remained constrained mainly due to:</p> <ol style="list-style-type: none"> Intermittent and distant monitoring of flood situation. Depletion of PMO's engineering and support staff over time. Delays/shortfalls in efficient mobilizing of manpower as per SOPs at the critical hour of subsidence of Left Marginal Bund (LMB) <p>5. With a view to realize benefits from the competence and substantial experience gained by PMO during TBERM Project, World Bank in their Project Appraisal Document for Jinnah Barrage maintains that the PMO setup for Taunsa Barrage Project shall be continued for execution of Jinnah Barrage Project for its eventual transformation in to the Barrage Management Organization (BMO) during the implementation period of PBIP-II Project.</p> <p>6. P&D Department supports continuation of present role of PMO as the project execution/ implementation and management organization for all future barrages rehabilitation projects in Punjab. Failures such as indicated in Para 4 above, however, need to be thoroughly analyzed by I&P Department to reframe the role of PMO Barrages in barrages operation and flood mitigation, particularly in passing high/ very high floods. Hazards of the recent floods demand developing a fail-safe and well-knit organizational structure comprising a robust linkage between PMO / future BMO and the Chief Engineers of respective Irrigation Zones.</p>

13.6. According to Naseer Ahmad Gillani¹⁸², Chief (Water) Planning Commission, Government of Pakistan, Islamabad: As far as PMO is concerned, the view of Planning Commission is that PMO was to act as a capacity building arm of the Department and over the years would develop expertise in the rehabilitation of the Barrages, so that it can be useful for rehabilitation of other Barrages. However, it was not the understanding of the Commission that the PMO would also take over the management of the Barrages and if this has happened it is a matter of the provincial governance.

13.7. *MAJOR FUNCTIONS OF THE PMO.*¹⁸³

- Development of *Project Management Information System*.
- Monitoring of Selected Mega Projects using *Modern Project Management Techniques*
- Facilitation in Procurement Processes
- Facilitation and Co-ordination between Executing Field Zones and Supervisory Consultants.
 - Federal PSDP Funded Mega Irrigation Projects
 - Irrigation System Rehab. Project.
- Lining of Channels in Punjab
- Provincial ADP Projects (>Rs.100 M) ADP
- Special Assignments.

13.8. *DEPARTMENTAL ENQUIRY COMMITTEE*¹⁸⁴ submitted that Taunsa Barrage is located at about 500 Km from Lahore. As far as the undertaking of rehabilitation project of Taunsa Barrage through PMO was concerned, it was the right decision of the department due to which the project was completed successfully and every one involved in the project was fully committed and made responsible to undertake the frequent visits to the site. The extended period of the project expired on 30-04-2010. Thereafter the administrative control of Taunsa Barrage was required to be reverted to D.G. Khan Zone for the better command and control over the performance of the Barrage but unfortunately it was not done so till today. The head quarter of PMO Barrages being at a distance it lost proper control over Taunsa Barrage Division which is also one of the reason for mismanagement experienced during Flood, 2010.

13.9. Secretary I & P Department¹⁸⁵ deposed that: “Project Management Office (PMO) was an outcome of an agreement arrived at between the Government of the Punjab and World Bank in the year 2004. The thought at that time was that the proposed rehabilitation work at the Barrage should be handled by a separate unit. This view existed because at that time the department was of the view that the zonal formation headed by Chief Engineer was concentrating more on a canal regulation and not much attention was being paid to the Barrages. PMO was established in the year, 2004 in this background. Incidentally first

¹⁸² I.W. 143

¹⁸³ Ex.I.W.140/1

¹⁸⁴ Annex P – Ex I.W. 6/1

¹⁸⁵ I.W.6

project handed over to the PMO was Taunsa Barrage. As per Agreement, once Barrage had undergone rehabilitation work, it was handed over to the PMO and it was to stay with the PMO for all times even after the completion of the rehabilitation work. Administratively, PMO has its Head office in Lahore with its own secretariat comprising directors, etc. As far as filed formation is concerned, existing formation at the barrage headed by XEN comes under the control of the PMO. In my view, the primary concentration and responsibility of the PMO has been the supervision of the feasibility works at the Barrage. In addition to the Taunsa Barrage, Head PMO also looks after the rehabilitation work at eight other barrages. Therefore, time of the Head PMO is spread over nine barrages. As a consequence, I feel that day to day management gets automatically sidelined as has been noticed in the recent floods. The weak management of Head PMO was visible when I saw the level of Barrage security. Oil and gas pipelines pass over the Barrage but there is neither effective security at the Barrage nor are there any plans for the same. Secondly, I noticed that the Barrage has an open public access including the control room. This aspect of the matter has not been attended to by the PMO. The location of the Head Office of the PMO is in Lahore. Distance of office of PMO and the Barrage weakens his control and level of vigilance over the Barrage. All these weaknesses were not brought on the table within the department previously but have now clearly surfaced after the recent floods and require serious deliberation. The performance of PMO has not been institutionally monitored by the department, however, this aspect also requires a revisit. Regarding the recent floods, Head PMO visited Taunsa Barrage for the first time on my direction just a day before the recent flood reached Taunsa Barrage.”

13.10. CONCLUSION

13.11. It can be safely concluded that Head PMO failed in managing the Barrage. The lack of interest, poor management, lack of strategy and poor flood management is abundantly clear from the evidence discussed in this chapter. We are of the view that had the PMO focused on barrage management and had ensured proper pre flood inspection and had chalked out a robust flood fighting plan, LMB and District Muzaffargarh could have been saved.

13.12. What has been more disturbing is that instead of accepting failure of governance and poor management, Head PMO in collusion with the XEN, Muhammed Munir Anjum has concocted stories to establish that pre flood inspection was properly carried out at Taunsa Barrage and all was well. This has badly tarnished the credibility of Head PMO besides attracting criminal liability for misleading the Tribunal.

14. CONTROL ROOM

14.1. During investigating at the Taunsa Barrage regarding the record of the gate openings of the Barrage we sent for the record of the control room. We were informed that after the Rehabilitation, a new control room has been installed and the barrage gates can be opened electronically through the control room and the entire record is duly logged. However, when we sent for the record, we were told that the control room is not functioning and therefore

print out of the data is not possible.

14.2. We were surprised that a newly installed control room was not functional. We dug deeper.

14.3. INQUIRY & FINDINGS

14.4. According to Mr. Ghulam Akbar¹⁸⁶, Sub Engineer Head Works: “Electronic system [of maintaining the gates of the Barrage] was in operation on 01.08.2010, when I left the control room at 01:00 p.m. to attend to emergency operation on Spur no.5 . . . I returned to the Control Room the next day on 2-9-2010 when I found that electronic system had stopped working due to some fault in the system.”

14.5. It is surprising to note that report called for by Mr. Ghulam Akbar Sub Engineer from Mr. Amjad Masood on 2.8.2010¹⁸⁷, has been placed on record and is dated 24.07.2010. Amjad Masood (late) pointed out that the following accessories are required to be placed for the system to continue. The accessories are as follows:

3 voltage controller [sic] Device 380-440 v 50/60 HZ AC 15:3A/250v DC 13:2A/24V
0.1A/250v MAX 8A/250V MoDE No- RM4TR32 Telemecanique-1 No,
Megmatic [sic] Relay, IEC/EN 60947-5-1 Ie AC 12:10 A U1:690v Siemens-3 No,
Signal Telecom cable faulted [sic] at DAP 11 to DAP 12
Megmatic Relay, IEC 60947-5-1, JSC 8201-5-10 AC 15 110 v 6A 220 v 5A DC 13 110v
0.2A LH 16A Un-AX4 MJTSUBTSHI-30No.

14.6. According to Mr. Muhammad Mumtaz Khan¹⁸⁸, Gate Operator, Taunsa Barrage “I was brought in by Consortium of Kurimoto Ltd. & Taisei Corporation (Japanese Company) who were engaged to install 28 gates on the left side of the Barrage as well as provide electronic opening system. After the Japanese left this year in March, I was retained by the I & P Department as there was no trained gate operator with the Department. The electronic gate opening system for the remaining gates was provided by the Chinese Company namely China National Electric Wire & Cable Import/Export Corporation (CCC), therefore, in the control room there are two different gate opening systems, one is provided by Consortium of Kurimoto Ltd. & Taisei Corporation and the other by China National Electric Wire & Cable Import/Export Corporation (CCC). I am in a position to operate both these operating systems. After the Japanese left the project I joined the Department on 17.07.2010 at the Barrage. [The electronic gate opening system was not working when I joined on 17.07.2010 and the control room was non-functional on 17.07.2010 and the gates were operated physically from the Deck of the Barrage.](#)”

14.7. According to Rai Hamid Mehmood¹⁸⁹, Executive Engineer, Taunsa Barrage “I took

¹⁸⁶ I.W. 73

¹⁸⁷ Ex.I.W.73/1

¹⁸⁸ I.W. 74

¹⁸⁹ I.W. 75

charge as Executive Engineer Taunsa Barrage on 3.9.2010. I have no knowledge when the control room stopped functioning. After taking charge, I informed Project Director, but there has been no development regarding the same.

14.8. According to Shafiq Ali¹⁹⁰, Deputy Director Electrical, PMO, "I was appointed on contract basis as Deputy Director Electrical with PMO on 02.05.2009. My assignment was to look after the electrical part of the rehabilitation work being carried out at the Taunsa Barrage which was supposed to have been completed in December, 2009. When I joined in May, 2009 the control room alongwith remote service of opening the gateways was operative. That after February, 2010, I visited the barrage once or twice, however, I was given other specific tasks and did not visit the Control Room. I, however, visited the control room on 01.08.2010 when I visited the barrage due to heavy flood. While at the barrage, I was asked to inspect the Control Room by the Head PMO and I found out on 01.08.2010 that the Control Room was not working. With the help of available staff by using UPS, we started the system, however, it was found that remote operation system in Control Room was not working due to some defect in the power relays in LCP (Local Control Panel) caused by voltage problems. After my inspection, I communicated my observations to Rao Muhammad Riaz, Director Mechanical PMO. The Director Mechanical then called Mr. Song of China National Electric Wire & Cable Import/Export Corporation (CCC) on the same day i.e. 01.08.2010 and informed him of the problem being faced in the Control Room. When the Control Room was taken over from Chinese by XEN (Barrage) even at that time it did not print out the data history stored in the memory of the system due to some bugs in the software. The Punjab Barrages Consultant (PBC) was also duly informed of this. Director Mechanical, PMO has taken up the matter with the Chinese company in writing. Roughly cost of the control room is 30/40 million."

14.9. *REPORT OF THE CONTROL ROOM - LOCAL COMMISSION:*¹⁹¹ On 11-10-2010 the Tribunal constituted a local commission headed by Malik Imran Shahbaz, Civil Judge 1ST Class, Kot Addu, Naseem Abbas, I.T. Expert, Lahore High Court, Lahore and Mr. Shafiq Ali, Deputy Director (Electrical), P.M.O. for Punjab Barrages. The Local Commission was directed to activate the Control System and obtain the data stored in the Data Memory of the System through a print out. The Commission visited the Control Room, Taunsa Barrage on 12.10.2010 and submitted the following report:

- i. HRC&DAS (Hoist Remote Control & Data Acquisition System) was not in operating condition and the Central Control Room was also locked at the time of our visit at Taunsa Barrage.
- ii. The system (HRC&DAS) was not under the control of any expert/technical/qualified person for its operation and maintenance purpose.
- iii. After hectic effort, partial data of 31.07.2010, 01.08.2010 and 07.08.2010 was

¹⁹⁰ I.W. 77

¹⁹¹ Ex I.W. 77 /1 - Appendix 5

collected. The perusal of said data showed that (HRC&DAS) was not functional during flood days and the computer was switched on for a short span of time by some untrained person and computer collected some partial and incomplete data on 31.07.2010, 01.08.2010 and 07.08.2010. It has been noticed that millions of rupees were spent on this project but the same was not used during the heavy flood days.

iv. The software applications i.e., EDC Service (Engineering Data Control Service) and EDMIS (Engineering Data and Information Manage System) were not working due to certain faults in software and hardware and the requisite information/data history could not be collected.

v. The partial data of the abovementioned dates was not collected in proper format (Software Generated Report), as the partially collected data was retrieved from the Log History File.

14.10. **STATEMENT OF PMO¹⁹²**: As reported by the Deputy Director Electrical PMO: “Hoist remote control and date acquisition system was installed at Taunsa barrage under Taunsa Barrage Rehabilitation & Modernization Project, ICB-Contract # 02 and the system was handed over to XEN Taunsa Barrage on February 05, 2010.

The electronic control room has multiple functions including;

- Monitoring of the barrage and canal gates, and associated hardware.
- Remote control of the barrage and canal gates.

The remote control function was performing satisfactorily at the time of system handed over to the barrage operators. The monitoring function also allows the storage of date and its retrieval. This function is accomplished through software and hardware. This module was also functioning but some software correction was required to be made for which suitable deductions were proposed by the Consultants and made good from the contractor's bill. Later the electronic control room Taunsa Barrage was checked on 1.8.2010 before the flood and flowing faults were found in the system:

- a. Remote operation of the barrage gates was not functional due to faults developed in magnetic (contact) relays in the local control panels because of voltage fluctuations at site.
- b. Water discharge calculation and monitoring date as displayed on the workstation terminal was also showing incorrect values due to incomplete data received through sensors.

¹⁹² Ex I.W. 7/4

Moreover, during the flood (after breach of LMB) out of the two power supply feeders for the barrage, one on the left bank was completely damaged and second feeder was severely disturbed having frequent and excessive shut downs and voltage fluctuations. The generators were, therefore, used making electric supply off and on frequently, which also caused more bugs in the software. With such interruptions the UPS system for central control room also developed faults. Software applications installed on the Workstation terminals i.e. EDC Service (Engineering Data Control Service) and EDMIS (Engineering Data and information Management System) are also not working. It may also be mentioned that the control room was understaffed as requirements for adequately qualified staff proposed by the consultants for proper functioning of the barrage control and monitoring system were not fulfilled. The electronic and computerize system is intricate. Suitable experts are being sought. However, two computer operators were appointed for central control room operation from July 21, 2010 on work charge basis having diplomas in computers. One died recently.”

14.11. PMO submitted that it is to be noted that, at the time of taking over in February 2010, the system output printing module was found to be slow and unable to print quick changes in information. However, the remote control and data storage including display on workstation, was working satisfactory.

14.12. The Defect Liability Certificate (DLC) was therefore issued on March 30, 2010, with the condition that the contractor will rectify the problem within one month, with his guarantee cover extended. Later, on expiry of guarantee, an amount of [Rs.12,528,529/-](#) is still with the PMO. The system is highly complicated and the contractor had to get specialist form China which he could not due to local security uncertainties. The issue is still alive as a dispute to be resolved in the Dispute Review Board (DRB). The formation of DRB is in process and its recommendations will decide the issue. Due to above, the contractor's final payment certificate has yet to be finalized and the discharge certificate is still withheld. The finalization will be done after decision of DRB. The Contractor submitted his final statement to the Engineer and upon disagreement between the Engineer and the Contractor, the final statement was converted into interim payment certificate (IPC) No.27. One of the matter on which the agreement could not be reached was of control room. The tender rate of control room was [Rs.69,454,050/-](#) and the payment made in last interim payment certificate No.27 is [Rs.55,263,240/-](#). Due to above, the contractor's final payment certificate has yet to be finalized. The approval of the final bill has not been given and the discharge certificate is still withheld. The finalization of the process of final statement / bill will be done after decision of DRB. The Director Mechanical / Deputy Director Electrical information that the defect in the system occurred on 20.07.2010 as reported by Sub Engineer, Headworks Section. The Chinese contractor has promised to call the experts form China within 20-30 days to set right the system.

14.13. **CONCLUSION**

14.14. It is admitted that the Control Room is not functional. Inability to retrieve the record

of gate openings during exceptionally high flood makes it probable that the control room was never functional. During the exceptional high flood it would have been easier to control the gates through the control room rather than going up the deck and operating the gates. Secondly, it is also disturbing that PMO took over the charge of the Control Room without carrying out any pre-trial inspection. It also makes the role of the consultant dubious and irresponsible. This matter requires further investigation and a third party validation on the completion of the rehabilitation project at Taunsa Barrage.

15. POLITICAL INTERFERENCE

15.1. It has been alleged that the breaching section on the right side of the training works (RMB) was not operated in order to save the land of the Khosas and therefore the LMB was breached.

15.2. INQUIRY & FINDINGS

15.3. In order to address the above allegation, we perused the revenue record of Districts Muzaffargarh and D G Khan to independently assess the location of land holding of the KHOSA Family. The land holding of Sardar Zulfiqar Khan Khosa and his family were identified and mapped to check their location from the Barrage and particular from the area upstream and downstream the RMB and the D G Khan Canal which could possibly have been the breaching site.

15.4. According to Muhammad Sohail Khawaja¹⁹³, District Officer (Revenue) D.G.Khan, a small portion of land is owned by Khosa family in *Basti Peer* and *Meeras Gurmani*. The other significant holdings of Khosa family are not close to River Indus and are in *Rakh Chabri Zareen* which is not a river affected Mauza. The largest landowners in District D.G.Khan are the *Legharis*, however, their land is not close to River Indus.

15.5. According to the statement of Farooq Bilal Khosa^{193-A} the holding of the Khosa family is in Basti Peer which is 5 to 6 k.m. downstream Taunsa Barrage and is far away from the river bank. He further deposed that lands of Sardar Zulfiqar Khan Khosa are in Mauza Bahadar Garh that is even further far away from the River bank. He deposed that Khosas had no land in the Pond Area or in the vicinity of the Link Bund.

15.6. Syed Saleem Ahmed Gillani¹⁹⁴ of the SYED family, cultivating land in the POND AREA on the right side of the Barrage stated: "I am of the view that no political interference by any of the political families in the area has been used resulting in the breach of the LMB. The cause of the breach is the unprecedented flood. Sardar Zulfiqar Ali Khan Khosa is a close family friend, however, he has no land in this area and has no business interest in our cultivation. It is not in my notice that any political family including Hanjra or Khar family have

¹⁹³ I.W.84

^{193-A} I.W.130

¹⁹⁴ I.W. 131 (s/o Syed Muhammad Akbar Gillani, Caste Syed r/o Sanjar Syedan, Tehsil Taunsa, District D.G. Khan).

recently played any active role in the appointment of officers i.e., XEN, SDO and SE at the Barrage.”

15.7. On the basis of the above statements the record was perused and the following information was culled out:

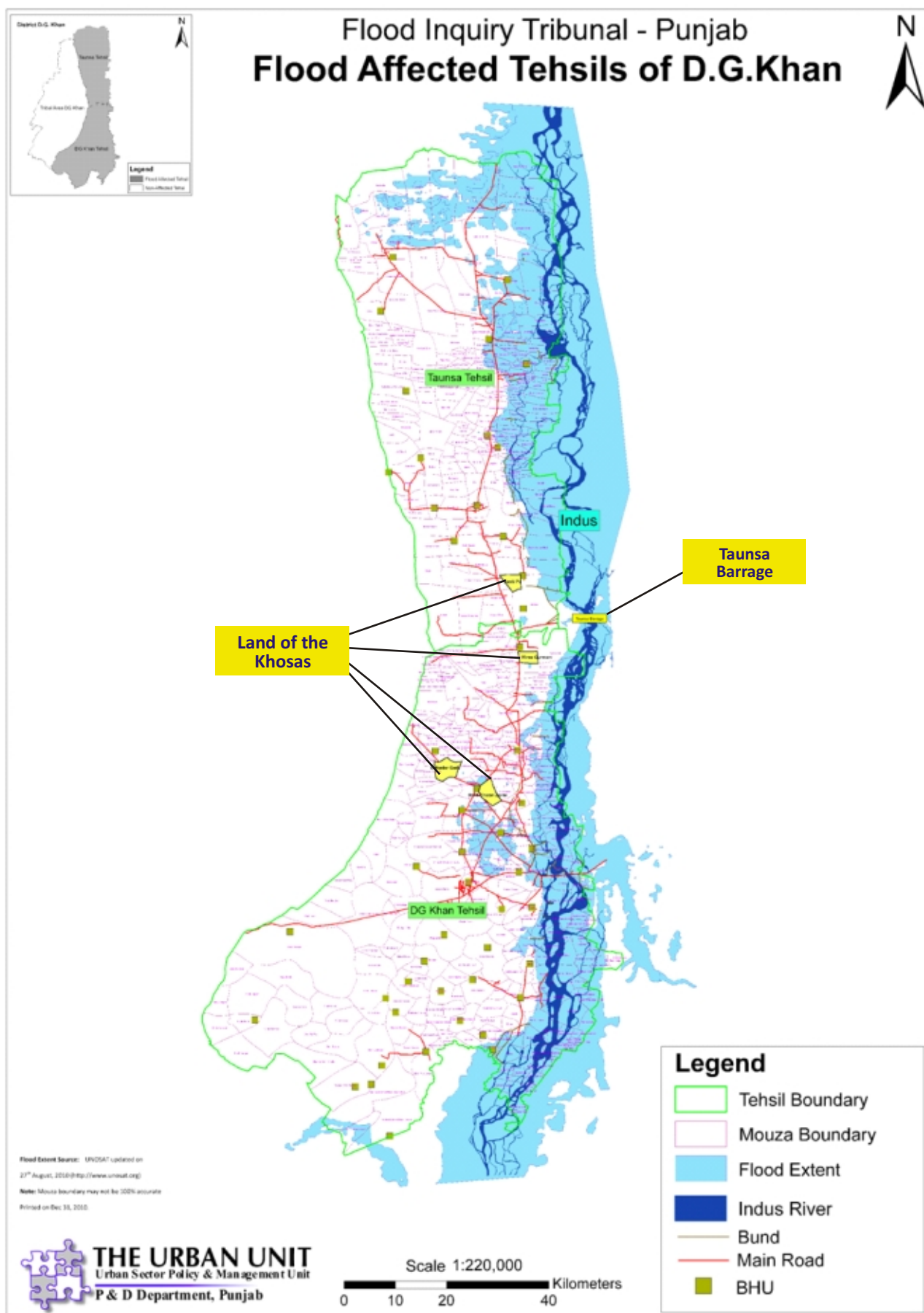
Detail of ownership of Khosa Families¹⁹⁵:

DETAIL OF OWNERSHIP OF KHOSA FAMILIES IN MAUZA CHAK BAHADUR GARH, TEHSIL & DISTRICT DG.KHAN			
Sr.No.	Name of Owner	No.Khata	Land in Acres
1.	Sardar Aurangzaib Khan Khosa s/o Sardar Taj Muhammad Khan Khosa	120	62 Acres
2.	Sardar Sher Nadir Khan Khosa s/o Sardar Taj Muhammad Khan Khosa	139	42 Acres
3.	Sardar Mohsan Atta Khan Khosa s/o Sardar Atta Muhammad Khan Khosa	119	42 Acres
4.	Sardar Ghulam Haider Khan Khosa s/o Sardar Atta Muhammad Khan Khosa	49	61 Acres

DETAIL OF OWNERSHIP OF KHOSA FAMILIES IN MAUZA RAKH CHABRI ZAREEN TEHSIL & DISTRICT DG.KHAN			
Sr.No.	Name of Owner	No.Khata	Land in Acres
5.	Sardar Zulfiqar Ali Khan Khosa s/o Sardar Dost Muhammad Khan Khosa	45-48	35 Acres

¹⁹⁵ Mark 116

DETAIL OF OWNERSHIP OF KHOSA FAMILIES IN MAUZA RAKH CHABRI ZAREEN TEHSIL & DISTRICT DG.KHAN			
Sr.No.	Name of Owner	No.Khata	Land in Acres
6.	Mst.Nadira Najam ud Din w/o Sardar Zulfiqar Ali Khan Khosa	39-44	40 Acres
7.	Sardar Hisam ud Din Khan Khosa s/o Sardar Zulfiqar Ali Khan Khosa	46-47-50	40 Acres
8.	Sardar Muhammad Muhayu-ud-Din Khan Khosa s/o Sardar Hisam ud Din Khan Khosa	43	26 Acres
9.	Sardar Muhammad Umar Khan Khosa s/o Sardar Hisam ud Din Khan Khosa	42	27 Acres
10.	Sardar Dost Muhammad Khan Khosa s/o Sardar Zulfiqar Ali Khan Khosa	47-52	43 Acres
11.	Sardar Muhammad Usama Khan s/o Sardar Dost Muhammad Khan Khosa	51	29 Acres
12.	Sardar Muhammad Samood Khan Khosa s/o Sardar Dost Muhammad Khan Khosa	41-49	32 Acres
13.	Mst.Zahra d/o Sardar Saif ud Din Khan Khosa	40	35 Acres



15.8. The plotting on the above map shows that the land of the Khosa are not in the vicinity of the barrage or fall in waterway of the proposed breaching section under the flood fighting plan.

15.9. Record also reveals that the river has a leftward flow and even of the breaching section on the right could have been operated the need did not arise as the water never touched the right marginal bund. There can be several different reasons for this one being the morphology of the river, the exceptional discharge, the closure of the right gates and also perhaps the zamindara bunds on the pond area on the rightside. However, we are satisfied that it wasn't the case where the breaching section could have been operated and was not operated.

15.10. We, therefore, hold that according to the evidence placed before us and on the basis of our own physical examination of the various locations at the Barrage show that no political influence was used to cause the breach of LMB or to resist the operation of the proposed breaching section. The lands of the Khosas do not fall within the watercourse of the proposed breaching section.

15.11. The only political influence that comes to fore is the possession of the Pond Area. Both sides of the Barrage and the illegal cultivation of the same. Except for Baryar family who have procured a stay from the Hon'ble Lahore High Court (discussed above) the rest of the families are cultivating the area with the strength of their economic and political muscle besides collusion with the officials of the I & P department.

16. ROLE OF CONSULTANTS

16.1. Taunsa Barrage was rehabilitated in the recent past with a cost of approx Rs. 11 billion. In this context the Tribunal has noted with concern the omission in strengthening and rehabilitating the embankments and the failure to identify a well-defined Breaching Section as part of the Rehabilitation & Modernization project.

16.2. **REHABILITATION OF EMBANKMENTS:** On November 12, 2010 the consultants were directed to elucidate, whether rehabilitation of embankments was included in their scope of services. The consultants reply submitted vide reference No.NDC/ADMN/1181 dated November, 22, 2010¹⁹⁶ carries the following :

- The consultants scope of services did include inter-alia, the adequacy of training/protection works.
-the consultants finalized the study report on fast track and submitted the draft feasibility for Taunsa on July, 03, 2004 for which consultants original assignment schedule was by December, 31, 2004.

¹⁹⁶ Ex I.W. 144/3

- The appraisal mission....endorsed the proposal of the preparatory mission of June, 2004 and did not include river training works.
- POE suggested that LMB should be raised for a flow of 100,000 cs (design flood for the barrage). Irrigation and Power Department and the Consultants are of the opinion that the marginal bund is now at level that would sustain 100 years flood. Hydraulic model studies are suggested.

16.3. During the proceedings Mr. Ijaz Ahmed Khan¹⁹⁷, Director, National Development Consultants, Lahore stated that:- “We have pointed out in the Executive summary of the feasibility report that the marginal bund would sustain 100 years flood which means that it is fit to handle 8,32,000 cs of discharge. Joint venture had, therefore, impliedly pointed out that training work was not up to the mark and required upgrading.”

16.4. INQUIRY & FINDINGS

16.5. The consultants have tried to prove that rehabilitation of the embankments and protection works could not be undertaken due to the role of the Donors and PID. In fact deployment of consultants was made, keeping in view of their technical expertise to assist the project. The consultants have admitted a crucial lapse on the design of the project and in keeping the embankments/protection works at a lower capacity i.e. 832, 000 cs in comparison to that of the main weir considered at 1,000,000 cs. The collapse of the LMB has disproved that assumption of the consultants. It also casts doubts on the professional ethics of the consultants.

16.6. **BREACHING SECTION AT TAUNSA:** The position paper dated November, 22, 2010 submitted by the NDC carries the following references:

- Consultants TORs...included, among other “studies of Breaching Section.”
- ... since the entire protection works...were excluded from the TOR...the breaching section also got excluded automatically.
- ...breaching sections can also cause heavy agriculture, infrastructure and livestock losses like those experienced in 1992 due to breaching of RMB of Trimmu Barrage.
- We feel that no new breaching sections be recommended and those already approved had to be reconsidered and replaced by properly designed bypass systems comprising spill weirs, conveyance channels and necessary cross-drainage structures.

¹⁹⁷ I.W.144

16.7. INQUIRY & FINDINGS

16.8. Change in the original consultants TOR is quite disturbing. We believe that the assumption of losses due to breaching section is not relevant. BREACHING SECTION is like a “safety fuse” and moreover the spill is routed through a pre-planned area, which is to remain clear and cause minimum damage. Obviously, the situation at RMB of Trimmu Barrage cannot be applied to Taunsa.

16.9. We consider that the consultants have been trying to present irrational reasons to cover-up their mistake.

16.10. **CONTROL ROOM.** With reference to status of the Central Room the consultants have presented in their reference dated November, 22, 2010

“The control room was functioning properly when the works were taken over by the Employer (PMO) at the end of December 2008. Since the staff deployed by the department needed further training hence the consultants had to instruct the contractor to keep operating the system with available staff of the Client to ensure effective hands on training. The Contractor remained at site upto April, 21, 2010 and operated the system with available staff of the Client. When the reports came in February 2010 that the printing module is not working properly i.e. is slow, the Engineer asked the Contractor to rectify and they promised. But according to the contractor due to security situation, his specialist staff could not return to Pakistan. As reported by the barrage staff verbally, the control room displaying system except the Printing Module was working satisfactorily still July 20, 2010.”

16.11. To analyse the situation the tribunal has examined the “Consulting Services Agreement” between the PMO and Punjab Barrages Consultants signed during May, 2005. Appendix A which outlined the TOR with an initial cost of Rs.157.72 Million which was ultimately revised to Rs.186 Million during March 2010. It is quite odd that the scope of the Consultant's Services was curtailed and simultaneously the costs were enhanced. Items xii & xiii of Section 3.1 and items iii, iv, viii & ix of Section 3.2 of the Agreement provide as under:

SECTION 3.1.

- xii) Assist Employer/Client in taking over the contract work and prepare items of work to be completed by the Contractor during maintenance/defects liability period;
- xiii) Upgrade the existing “Operation and Maintenance Manual” to the international standards and provide 10 copies for the use of Employer/Client for operation and maintenance of the barrage. The O&M Manual will include an Instrumentation Plan and an Emergency Preparedness Plan. The Consultants shall also train the barrage operational staff in operationalizing the Operation and Maintenance Manual.

SECTION 3.2

- iii) Testing and commissioning of M&E equipment in association with the Employer/Client;
- iv) Measurement and verification of work quantities and certification of Contractors invoices;
- viii) Assist Employer/Client in taking over the contract work and prepare items of work to be completed by the Contractor during maintenance/defects liability period;
- xi) The Consultants shall ensure deployment of competent staff to supervise high-tech electrical/mechanical activities like installation of modern vibrating wire or such other piezometers, automated gate operation, etc.

16.12. CONCLUSION

16.13. The Consultants were fully responsible to verify proper performance of the Control Room and simple deduction of [Rs.12,528,529/-](#) from the final bill to accept the equipment with defects is highly questionable.

17. RECOMMENDATIONS (Taunsa Barrage)

17.1. On the basis of the inquiry and findings discussed in this chapter we **recommend** as follows:

Penalties

17.2. The Competent Authority to initiate departmental disciplinary proceedings against Secretary I & P Department¹⁹⁸ under relevant service laws for **inefficiency**.

17.3. The Competent Authority, on the basis of the inquiry and findings above, initiate process to terminate the contract of employment of Head PMO¹⁹⁹. The competent authority to initiate civil proceedings for recovery of damages against Head PMO for the loss caused to the life and property of the people of District Muzzafragarh and the loss caused to the Barrage.

17.4. Competent Authority to initiate departmental disciplinary proceedings against XEN²⁰⁰ under PEEDA ACT, 2006 for **misconduct and inefficiency**.

17.5. Competent Authority on the basis of the inquiry and findings above and the damages recorded in Chapter 7 (below) to initiate criminal proceedings under **sections 166, 167, 283, 322, 427 and 431 of PPC** against the above named Head PMO and XEN.

17.6. Till the conclusion of the departmental inquiry Mr. Rab Nawaz, Secretary I & P be immediately replaced, so that the Department does not face the next flood season (2011) under his stewardship.

17.7. To immediately suspend the above named XEN till the departmental action and the criminal proceedings are concluded.

17.8. That all the current assignments of Head PMO be withdrawn immediately and the role of PMO to be reconsidered by the Provincial Government. We recommend that the active management of the Barrages must remain with the C.E.'s concerned and the role of PMO should be restricted to rehabilitation work subject to the undermentioned recommendations.

17.9. Detail audit / third party validation of the Taunsa Rehabilitation Project to be conducted to assess the following in particular;

17.9.46. Whether, as planned, PMO gained experience and capacity during Taunsa Rehabilitation Project and is fully able to handle future Rehabilitation Work (

¹⁹⁸ Mr. Rab Nawaz

¹⁹⁹ Ghulam Hussain Qadri

²⁰⁰ Mr. Muhammed Munir Anjum

at Jinnah and other Barrages) independently without reliance on outside consultants? If not, why ?

17.9.47. Whether the taking over of the Rehabilitation Project from the contractors by PMO was in accordance with the contract ? whether the control room was taken over after due diligence and verifying the performance of the control room? If the audit reveals that there have been lapses, Government of Punjab to take strict action against the delinquents.

17.9.48. To verify and assess the purpose, reasons and results of the expenditure incurred on O & M of LMB and Sanawan Bund. If it is discovered that the said funds were squandered and did not serve any useful purpose the senior management incharge of the Barrage at the time be criminally prosecuted under the law.

Reform

17.10. A detail [Post Flood Report](#) along with all the post flood surveys and maps must be prepared so that a proper flood management strategy can be evolved for the next flood season.

17.11. Flood Manual (as a subset of an Integrated Flood Management Plan) be developed including instructions from the exiting flood fighting plans, Guidelines, Manual of Irrigation Practice (M.I.P), Sind Bund Manual and other related instructions available on the record. The flood managers to be put through proper training on the Flood Manual and all the flood managers to have a copy of the Flood Manual at all times.

17.12. Proper training and pre-flood rehearsals as instructed by the new Flood Manual shall be mandatory so that the flood fighting strategy is practical and functional prior to the actual floods.

17.12.1 I & P Department to develop an online [Flood Website](#) that gives real time details of the pre-flood preparation, flood forecasts, early warnings, flood fighting preparation and the flood relief work as it takes place. This will act as a good self-regulating tool for the I & P department and will be beneficial for the people.

17.13. Bund Management to be introduced. One option is to divide the long bunds into manageable segments and the vigilance and supervision of the said segments be delegated to the local residents who have their land abutting to the said embankment. These locals, having stake in the life and health of the said bund, can be officially nominated as “Bund Watchers” under law or policy, creating obligations and corresponding incentives. Obligations to regularly watch the health of bund (in their area) and regularly report to the Department. During flood season, be part of the flood fighting team of the I & P Department. Timely inform the department of any emergency so that breaches can be

avoided. In return, the Bund Watchers can be given incentives in the shape of crops, etc alongwith necessary communication tools (cell phones) so that they can timely inform the Department during floods and also act as early warning centres. Without local participation of the key stakeholders no effective monitoring can take place as I & P Department does not have the capacity to police bunds that run in several kilometers as has become evident in the Floods under inquiry.

Pond Area & Belas

17.14. I & P Department to develop in association with Wildlife & Fisheries Department, detailed POND AREA & BELAs Regulations for its management and supervision. POND AREA & BELAs to be properly mapped (through GIS) and additionally monitored through remote satellite sensing with the assistance of SUPARCO, WWF or the Urban Unit (P & D Department).

17.15. Revenue Record of the area to clearly identify and show the said areas to be POND AREA in use by the Wildlife and Fisheries Department. The Pond Area should be handed over to the Wildlife & Fisheries Department, who with the help of WWF and other reputable NGOs²⁰¹ should develop the Pond Area into a wildlife sanctuary.

17.16. Encroachments in the Pond Area should not be allowed at any cost and must be immediately cleared. These environmental pockets (Pond Area) must be protected and encouraged to support the growth of biodiversity and wildlife in the country. Pond Area can showcase a rich and wide range of wildlife, which needs to be encouraged. Technically, POND AREAS must remain free from human settlements and must be well regulated so that their service to the Barrage for maintaining the required pond level is never impaired.

17.17. I & P Department and the Wildlife and Fisheries Department will also allow public access to the Pond Areas (subject to regulation). This will encourage students and researchers from Universities and NGOs to carry out research of this rich biodiversity and multiple ecosystems.

17.18. Belas may be used as Eco-public parks (during limited hours and months) so that public can enjoy healthy entertainment and also get to know and learn from their rivers. Pond Areas and Belas to be incorporated in the Integrated Flood Management Plan.

17.19. The *zamindara* bunds or private bunds in the pond area to be immediately demolished so that there is no resistance to river water flowing into the pond area.

17.20. Provincial Government and in particular I & P Department shall vigilantly attend to [W.P. 4919/2009](#) pending at the Multan Bench, of the Hon'ble Lahore High Court, so that the petition is decided in accordance with law before the start of the next flood season i.e., 15th

²⁰¹ working in the related field.

June, 2010. The urgency in the matter shall be placed before the Hon'ble Lahore High Court, Multan Bench by the I & P Department through an appropriate application by making





CHAPTER 5

The Indus, which is warm, offers those who drink from it the courage and heroism of a lion.¹

JAMPUR FLOOD BUND & FAKHAR FLOOD BUND

1. INTRODUCTION

1.1. **JAMPUR BUND** is 51 Km long and was constructed during 1958 to protect Jampur Town National High Way and adjoining abadies, network of irrigation channels and important infrastructures from the flood of River Indus. Before the construction of this bund, vast cultivated area and thickly populated abadies came under the attack of river spill and damaged thousands of acres of standing crops, Jampur Town and National Highway². According to the flood Fighting Plan, 2010 Jampur Flood Bund (RD 0-170720) is a flood protection bund for the safety of Jampur Town, other allied abadies, irrigation network and other infrastructures³.

1.2. **FAKHAR FLOOD BUND**⁴ is 8 km long and is situated at right edge of River Indus and at a distance of 1 Km from Kot Mithan which is under administrative control of District Rajanpur. This Bund was constructed during 1990 to protect the city of Kot Mithan, adjoining abadies, fertile lands and network of irrigation channels. The Bund was constructed by Zila Council and handed over to Irrigation Department. **Its parameters are not in conformity with those prescribed by Federal Flood Commission.** The Chenab and Indus rivers have their confluence just a few kilometers upstream of this town and the accumulated water passes through this area. On 4th August, 2010, peak discharge of more than 1.20 million cusecs passed through this reach and attained a height more than the existing top level of the embankment. The observed level HFL was reported as RL 304.85 ft⁵ which resulted in overtopping and in the breach of the Bund.

1.3. Design parameters of the two flood embankments are as follows⁶:

Sr. No.	Description	RD	Top width (ft)	Side Slopes	Designed Top level	previous H.F.L.
1	Jampur Flood Bund	0-171000	20'	3.1 : 2.1	378.0	373.00
2	Fakhar Flood Bund	0-25000	15'	3/ 1.5	306.35	301.35

¹ Shane Mountjoy, Rivers in World History, The Indus River, Chelsea House Publishers, Philadelphia (2005)

² Ex I.W. 30/2

³ Flood Fighting Plan 2010, Jampur Construction Division, D.G. Khan (Ex I.W. 30/1)

⁴ Ex I.W.6/1 – Position paper of Secretary I & P.

⁵ According to the Flood Fighting Plan the designed Top Level of Fakhar Flood Bund is RL 306.35 – it is therefore confusing how overtopping took place at RL 304.85

⁶ Ex I.W. 30/1

2. NATURE OF BREACHES

Sr. No.	Location	Design.	Length of the bund	Date of breach	Time of breach	How was breach reported (name of the person officer)	Time & date when the officer of the Department reached the breached portion (brief explanation of the support / human resource/ machinery mobilized by the Department during this time)	Size of breach in meters.	Pre-flood inspection details (attach all the reports 2010)	Officers incharge during flood (name of the officers)	Detail work force and inventory of machinery employed at the bund prior to the breach as part of the flood fighting along with date and time.	Estimate cost of repair of the breach	Latest and last HFL at the breach (give years)	Total flow of water by the embankment prior to the breach
1.	2	3	4	5	6	7	8	9	10	11	12	13	14	15
A	Jampur Flood Bund													
1.	11575	Reach RD. 5-25, Top width 16ft with 3:1 side slop on both sides, top of bund Av. Level 372, HFL 367.	170720ft.	02.08.2010	9.30 a.m.	Relevant Officers / officials were present at site.	Relevant Officers / officials were present at site. 2 No. camp at RD. 24 & 95 were fixed from 15 July 2010 well equipped by required flood watching & fighting material. 4 No. Tractor, 1 excavator with labour was hired through contractor from 31.07.2010.	9.45	Attached.	Saif Ullah SDO, Mechanical Sub Division, Abid Rasheed, XEN: Jampur Construction Division.	2 No. camp at RD.24 & 95 were fixed from 15 July 2010 well equipped by required flood watching & fighting material. 4 No. Tractor, 1 excavator with labour was hired through contractor from 31.07.2010.	Rs.20,00 million.		900000 cusecs in River Indus
2	11610			02.08.2010	9.30 a.m.			9.76						
3	11715			02.08.2010	9.30 a.m.			16.77						
4	12000			02.08.2010	9.30 a.m.			7.32						
5	12500			02.08.2010	9.30 a.m.			10.97						
6	12730			02.08.2010	9.30 a.m.			5.64						
7	17500			02.08.2010	11.00 a.m.			38.72						
8	18430			02.08.2010	9.30 a.m.			28.96						
9	18565			02.08.2010	10.00 a.m.			27.46						
10	18655			02.08.2010	10.00 a.m.			22.56						
11	18780			02.08.2010	11.50 a.m.			30.49						
12	18900			02.08.2010	10.50 a.m.			8.84						
13	19010			02.08.2010	10.30 a.m.			10.67						
14	19326			02.08.2010	10.30 a.m.			6.09						
15	19463			02.08.2010	10.55 a.m.			28.66						
16	19669			02.08.2010	10.55 a.m.			36.58						
17	20400			02.08.2010	10.30 a.m.			13.72						
18	20450			02.08.2010	10.30 a.m.			12.8						
19	20500			02.08.2010	10.30 a.m.			112.00						
20	23250							100.00						
21	35500	Top width 20 ft, side slope 3:1 both sides, top level 368.86, HFL 363.86			02.08.2010			10.00 a.m.						

Jampur Construction Division, Dera Ghazi Khan,
Project Circle, Irrigation, Dera Ghazi Khan, D.G. Khan
Irrigation Zone, Dera Ghazi Khan.

Detail of discharge at the time of breach	Reasons for the breach	Damage / loss caused	Current status and departmental plans for the future	Any other comments
16	17	18	19	20
7300 cusecs.	There was sudden surge of 5-6 ft water along the bund/ embankment composed of local treacherous soil & being dry on first wetting contracted. This caused arching action forming an open pipe and caused leakage as if an open connection existed from the water side to the outer side & eventually developed into breach.	Not assessed	RD. 0 – 35500 has been restored temporarily. Permanent restoration is required. Department has prepared a plan for re-construction / rehabilitation of embankments according to the latest flood heights & criterion to be approved by FFC.	Breaches are restored temporarily. Permanent restoration / rehabilitation will be carried out after approval of DC-I by the competent forum

Sr. No.	Location	Design.	Length of the bund	Date of breach	Time of breach	How was breach reported (name of the person officer)	Time & date when the officer of the Department reached the breached portion (brief explanation of the support / human resource/ machinery mobilized by the Department during this time)	Size of breach in meters.	Pre-flood inspection details (attach all the reports 2010)	Officers incharge during flood (name of the officers)	Detail work force and inventory of machinery employed at the bund prior to the breach as part of the flood fighting along with date and time.
1.	2	3	4	5	6	7	8	9	10	11	12
B	Fakhar Flood Bund										
1.	2-3	Top width 15 ft: RL 306.35 HFL 301.35.	24250 ft.	Breached on 04.08.2010	6.00 to 10.00 a.m.	Relevant Officers/officials were present at site	Concerned Officers/officials were present at site. 1 No. camp at RD. 14 was fixed from 15 July 2010 well equipped by required flood watching & fighting material. 7 No. Tractor with trolleys, 1 No. excavator with labour was hired through contractor from 31.07.2010	i. 4.57 ii. 24.39 iii. 30.4 iv. 8 v. 9.15	Attached	Saif Ullah, SDO, Mechanical Sub Division, Abid Rasheed, XEN: Jampur Construction Division.	1 No. camp at RD. 14 was fixed from 15 July 2010 well equipped by required flood watching & fighting material. 7 No. Tractor with trolleys, 1 No. excavator with labour was hired through contractor from 31.07.2010.
2	3-4			Breached on 04.08.2010	6.00 to 10.00 a.m.			12.2			
3	4-5			Breached on 04.08.2010	6.00 to 10.00 a.m.			45.73			
4	5-6			Breached on 04.08.2010	6.00 to 10.00 a.m.			45.73			

Estimate cost of repair of the breach	Latest and last HFL at the breach (give years)	Total flow of water by the embankment prior to the breach	Detail of discharge at the time of breach	Reasons for the breach	Damage / loss caused	Current status and departmental plans for the future	Any other comments
13	14	15	16	17	18	19	20
Rs.6.33 million	304.10	9000000 cusecs in River Indus.	240 Cs: 900 Cs: 1000 Cs: 400 Cs: 500 Cs: 1500 Cs: 3000 Cs:	The flood height at this site was more than the existing top level of the embankment by 1.5 ft and the water over flowed in between RD.0-6 & ultimately breached at different location within the	Note assessed.	Not restored, to be restored on receipt of funds. Department has prepared a plan for reconstruction/rehabilitation of embankments according to latest flood heights & criterion to be approved by Restoration / rehabilitation will be carried out after approval of PC-I by the competent forum.	

RELIEF CUTS IN THE EMBANKMENTS,

Jampur Construction Division, Dera Ghazi Khan, Project Circle, Irrigation, Dera Ghazi Khan, D.G. Khan Irrigation Zone, Dera Ghazi Khan.

Sr. No.	Location	Design.	Length of the bund	Date of relief cut	Time of relief cut	How relief cut was reported (name of the person officer)	Time & date when the officer of the Department reached the relief cut portion (brief explanation of the support / human resource/ machinery mobilized by the Department during this time)	Size of relief in meters.	Pre-flood inspection details (attach all the reports 2010)	Officers incharge during flood (name of the officers)	Detail work force and inventory of machinery employed at the bund prior to the relief as part of the flood fighting along with date and time.	Estimate cost of repair of the relief cut	Latest and last HFL at the relief cut (give years)
1.	2	3	4	5	6	7	8	9	10	11	12	13	14
A Jampur Flood Bund & allied Structure.													
1.	129	Top width 15 ft: Top RL 352.11 HFL 348.11	17 0720 ft.	10.08.2010	1.00 p.m.	Sub Engineer, In charge with establishment was present at site.	Sub Engineer, Incharge with establishment was present at site.	70	Attached	Saif Ullah, SDO, Mechanical Sub Division, Abid Rasheed, XEN: Jampur Construction Division.	2 No. camp at RD 24 & 95 were fixed from 15 July 2010 well equipped by required flood watching & fighting material. 4 No. Tractor, 1 excavator with labour was hired through contractor from 31.07.2010.	Rs.0.625 million. (Breach + Relief cut)	348.6
2	155-156	Top width 15 ft: Top RL 343.52 HFL 339.52		10.08.2010	1.00 p.m.			40					340.3
3	155-156	Top width 15 ft: Top RL 343.52 HFL 339.52		10.08.2010	1.00 p.m.			22					340.3
4	164	Top width 15 ft: Top RL 342.10 HFL 338.10		10.08.2010	1.00 p.m.			60					338.8
5	169	Top width 15 ft: Top RL 341.10		10.08.2010	1.00 p.m.			20					337.1

Total flow of water by the embankment prior to the relief cut	Detail of discharge at the time of breach	Reasons for the relief	Damage / loss caused	Current status and departmental plans for the future	Any other comments
15	16	17	18	19	20
Scattered, not measurable	200Cs:	Release of ponded water to river side	Not assessed.	Not restored. To be restored on receipt of funds. Department has prepared a plan for reconstruction / rehabilitation of embankments according to latest flood heights & criterion to be approved by PFC.	Restoration / rehabilitation will be carried out after approval of PFC by the competent forum.
	1000 Cs:				
	250 Cs:				
	1500 Cs:				
	250 Cs:				

Sr. No.	Location	Design	Length of the bund	Date of relief cut	Time of relief cut	How relief was cut (name of the person officer)	Time & date when the officer of the Department reached the relief cut portion (brief explanation of the support / human resource/ machinery mobilized by the Department during this time)	Size of relief cut in meters.	Pre-flood inspection details (attach all the reports 2010)	Officers incharge during flood (name of the officers)	Detail work force and inventory of machinery employed at the bund prior to the relief cut as part of the flood fighting along with date and time.	Estimate cost of repair of the relief cut
1.	2	3	4	5	6	7	8	9	10	11	12	13
	Fakhar Flood Bund.											
1.	7-8	Top width 15 ft Top RL 306-304 HFL 301-299	24 250 ft.	16.08.2010	1.00 p.m.	Sub Engineer, In charge with establishment was present at site.	Sub Engineer, In charge with establishment & Civil Administration was present at site.	91.46	Attached	Saif Ullah, SDO, Mechanical Sub Division, Abid Rasheed, XBN: Jampur Construction Division	1 No. camp at RD. 14 was fixed from 15 July 2010 well equipped by required flood watching & fighting material 7 No. Tractor with trolleys, 1 No. excavator with labour was hired through contractor from 31.07.2010.	Rs.6.33 million (Breach + Relief cut)
2	12-13			16.08.2010	3.00 p.m.			92				
3	13-14			16.08.2010	5.00 p.m.			61				
4	15-16			17.08.2010	9.00 a.m.	Sub Engineer, In charge with establishment was present at site.	Sub Engineer, In charge with establishment & Civil Administration was present at site.	12.2				
5	19-20			16.08.2010	11.00 a.m.			54.87				
6.	20-21			16.08.2010	12.00 a.m.			138				
7.	21-22			16.08.2010	11.00 a.m. 2.00 p.m. 6.00 p.m.			i.61 ii.4.57 iii.18.2 9				
8.	22-23			17.08.2010	11.30 a.m.			iv.22.8 6				
9.	23-24			16.08.2010	11.50 a.m. 3.00 p.m. 7.00 p.m.			i.30.5 ii.15.24 i.45.73 ii.53.35 iii.38.7 2 iv.12.2 0				

Latest and last HFL at the relief cut (give years)	Total flow of water by the embankment prior to the relief cut	Detail of discharge at the time of breach	Reasons for the relief cut	Damage / loss caused	Current status and departmental plans for the future	Any other comments
14	15	16	17	18	19	20
304	900000 cu-secs in River Indus.	9000 Cs:	Release of ponded water to riverside	Not assessed.	Not restored. To be restored on receipt of funds. Department has prepared a plan for reconstruction/ rehabilitation of embankments according to latest flood heights & criterion to be approved by FCC.	Restoration / rehabilitation will be carried out after approval of P.C. by the competent forum.
		9200 Cs:				
		6000 Cs:				
		700 Cs:				
		2000 Cs:				
		1200 Cs:				
		8000 Cs:				
		300 Cs:				
		500 Cs:				
		800 Cs:				
303		3000 Cs: 400 Cs:				
		2000 Cs: 5000 Cs: 4000 Cs: 600 Cs:				

3. DEPARTMENTAL WRITTEN SUBMISSION⁷:

The super flood, after crossing Taunsa, engaged the protection bunds in DG Khan, Rajanpur and Rahimyar Khan Districts with discharges of 1.20 Million cusecs (according to the statement of the XEN the flood was around 7 lac cusecs at the time of the breach⁸). The situation became more critical due to continuous heavy rainfall and high flows in hill torrents. Strenuous efforts were made to save the bunds through day and night watching.

3.1. However, Jampur flood bund and Fakhar Flood bund could not withstand the thrust of flood water and breached, inundating the towns. The causes of breaches in Jampur and Fakhar Flood Bunds, details of relief cuts and details of staff or machinery deployed, as reported by Chief Engineer Irrigation DG Khan are given below⁹:

3.1.1. Jampur flood bund has been constructed on the right side of Indus River to protect Canal infrastructure, roads & Jampur town & other small village abadies on the right bank of the river. The length of the embankment is RD 170+000 and it is composed of local treacherous soil. The second defence embankment named as Gaddan Bund is also in place having a length of 19,500 ft to take care of high flood events, besides a wetting channel covering a partial reach from RD 38 - 54 which is non functional. The existing parameters of the embankments are not in conformity with those prescribed by the Federal Flood Commission.

3.1.2. On 2nd of August, when high flood was passing downstream Taunsa - Guddu reach, there was sudden surge of 5-6 ft of water which accumulated and started running parallel along the embankment between RD. 0 - 35. The soil was completely dry and first wetting resulted in cracks / arching action forming an open pipe and at first wetting water flowed out as if an open connection existed from the water side to the land side washing out the soil and eventually developed into several breaches (19 nos.) between RD. 11 - 24 and one at RD. 35. This reach is without any wetting channel although the soil is poor in nature and treacherous.

3.1.3. The Sub Divisional Officer, Mechanical Sub Division, Sheikh Saifullah along with supervisory staff engaged the contractor and deployed 1 No excavator, 7 No. front blade tractors besides labourers and made strenuous efforts to plug these gaps, but the continuous precipitation / rainfall hampered the activities and the machinery could not work because of slippery conditions.

3.2. *Fakhar Flood Bund:* 3 Nos. excavators and 14 Nos. tractor trolleys were engaged to take care of the eventuality and departmental functionaries Executive Engineer, Abid Rasheed, SDO, Aga Ihsanullah alongwith S.ENG were on the spot but the tragedy could not be averted as the bund could not sustain the onslaught of gushing flood water. Most part of

⁷ EX I.W. 6/2

⁸ I.W.30

⁹ Ex I.W. 6/1

the town is situated between RL 298 to 304 ft i.e., below the observed HFL. After the receding of the flood, relief cuts were made at RD 6-7, 8-9 & 12-13 to drain off the water.

4. PRE FLOOD INSPECTION OF JAMPUR AND FAKHAR FLOOD BUNDS.

4.1. I & P Department constituted Team no. 3 comprising Ehsan Ahmed Khan, XEN and Abdul Rashid Alam, S.ENG for Pre-flood inspection of the Bunds and Spurs of D.G. Khan, Irrigation Zone on Jampur Flood Bund (17100 feet) and Fakhar Flood Bund (25000 feet) which flows in Jampur Division, D.G. Khan. Pre flood inspection report is as follows:

“Keeping in view the history of post flood events, since construction of flood protection embankments along the right side of river Indus at strategic points, no untoward incident has occurred except damages to groynes, riverside slope, apron, pitching of training works. **However, damages to top of bunds and side slopes due to trespassing and heavy rain needs immediate restoration. There are 235 encroachments on the flood embankments which require immediate attention.**”

4.2. INQUIRY & FINDINGS

4.3. Pre-inspection Report of the Departmental Committee shows that the Bund did not meet the design criteria prescribed by FFC and was in a state of total disrepair. There is nothing on the record to show that these observations and concerns of the of the Pre-inspection Committee were addressed. It appears that the departmental pre-inspection is a inchoate, mechanical and a half hearted exercise which carries no credibility or weight.

4.4. There is no central control system within the I & P Department that ensures that the weaknesses highlighted in the Pre-Flood Inspection Report are removed before the flood season. It appears that the office of Chief Engineer (Drainage and Floods) is the central office for all flood related matters but its performance in the recent floods and the deposition of the C.E. (D & F) before the Tribunal has shown that this office is miserably incompetent, disturbingly ineffective. In fact, the said office is practically oblivious to the preparedness and capacity of the flood fighting field formation of the I & P department. Chief Engineer (D & F) has cut a sorry figure before us. I & P Department has not placed any document on the record to show the deficiencies pointed out in the departmental Pre-Flood Inspection Report were plugged before the commencement of the flood season.

4.5. According to the Flood Fighting Plan, 2010¹⁰ the flood fighting strategy for the above mentioned embankments was that by 1st of June, the strength of the existing establishment was to be doubled to clear the jungle on slopes and toe of the embankments. Emphasis is laid to locate and puddle the holes of the burrowing animals in order to ensure the safety of the embankments. During floods, upon receiving the forecast, the Sub-Divisional Officer and Sub-Engineer Incharge shall shift their headquarters at site. The staff is to be equipped with

¹⁰ OF JAMPUR CONSTRUCTION DIVISION, DERA GHAZI KHAN – Ex I.W. 30/1

torches, gunny bags, kassies, etc to control seepage / leakage in the embankments. During exceptionally high flood stage the heavy earth moving machinery (Bull Dozers) of the Machinery Circle are to be kept ready and placed on alert at vulnerable sites of Jampur Flood Bund i.e., RD 26, 54 and Fakhar Flood Bund i.e., RD-12000.

1	Jampur Flood Bund RD-24000-95300-104850	3 No.
2	Fakhar Flood Bund RD. 14000	1 No.

4.7. According to the Flood Fighting Plan, labour required during flood fighting is as follows:

Jampur Flood Bund (RD 0-71000)

Sr. No.	Description	Total
1.	Mistri	1 No.
2.	Mate	1 No.
3.	Regular Seasonal Beldar	5 No.
4.	Additional Watching Establishment Mate / Beldar	49 No.
5.	Gauge Reader	2 No.

Jampur Flood Bund (RD 71-171000)

Sr. No.	Description	Total
1.	Mistri	-
2.	Mate	-
3.	Regular Seasonal Beldar	7 No.
4.	Additional Watching Establishment Mate / Beldar	75 No.
5.	Gauge Reader	2 No.

Fakhar Flood Bund

Sr. No.	Description	Total
1.	Beldars	15 No.
2.	Mate/Mistri	1 No.

4.8. The Pre Flood Inspection Report gives a long list of 207 encroachments on the Jampur Bund. The Tribunal traveled the entire stretch of Jampur Bund (entire 51 k.m.) on 6-11-2010 and found the bund encroached with clusters of unlawfully built dwellings and houses on the bund appearing after intervals as we drove over the embankment. No efforts were made to remove the said encroachments. The embankment also appeared unkempt and neglected.

4.9. There is no follow up action on the record to show that after said pre- inspection done in May, 2010, the 207 encroachments were removed or damaged embankments and side slopes, repaired.

4.10. According to Mr. Abid Rasheed, Executive Engineer, Jampur Construction Division, D.G. Khan¹¹ “there was a pre-flood inspection of the Bund in the month of May and June done by me, however, no inspection report was prepared or filed by me. I was incharge of three bunds namely, Jampur Bund, Fakhar Flood Bund and Rojhan Flood Bund and I was myself stationed at Fakhar Flood Bund.” It is surprising that a Pre Inspection Report did not follow the pre inspection allegedly carried out by the XEN. The statement of the XEN therefore does not inspire confidence.

4.11. It is noted that Mr. Abid Rashid, Executive Engineer, had no past experience of the bunds and being Mechanical Engineer by training was handed over the charge of not one but three major bunds including Jampur and Fakhar Flood Bunds. It was a serious lapse to have expected the said XEN to effectively carry out flood fighting as he had no experience of the same.

4.12. The Executive Engineer¹² further submitted that the manpower employed at Jampur Bund was 2 Sub- Engineers, 1 Sub Divisional Officer, 5 Baildars, 1 Mate and 1 Mistri. The breach took place at RD 12 between 09.00 to 10.00 a.m. It is stated that the water flowing in the river alongside the bund was 7 lac cusecs between 09.00 to 10.00 a.m. on 2.8.2010. According to the flood fighting plan 49 persons were required to be mobilized during floods, however, he failed to arrange the same. The water touched the bund at night on 1.8.2010 and all the breaches took place (19 in all) at 10:00 a.m. next day i.e., 2.8.2010. The XEN submitted that : “I think the main problem with the bund was that there was no wetting channel, however, this was not pointed out by me in PC-1 prepared in the year 2008 or highlighted by me to the Department in the pre-flood inspection report or otherwise. *I had no earlier experience of managing bunds. I have done Mechanical Engineering and remained Incharge of Machinery Sub Division; however, the Department had posted me on the bund for the recent floods.*” (emphasis supplied)

4.13. The Tribunal posed the XEN the following questions:-

Q. 1 *How did two sub Engineers inspect and observe 72 km [actually 51km] long*

¹¹ IW-30

¹² (Ibid)

bund?

Ans.1 The Sub Engineers used their personal motorbikes to inspect the bund personally.

Q.2 *At what time was seepage pointed out on RD-12 (Jampur Bund) and who pointed out the seepage?*

Ans.2 The seepage was identified by one Baildar, (at present I do not remember the name of the said Baildar), who informed the Sub Engineer Mr. Tufail Rizvi, who then informed me. We tried but could not control the flowing water and breach took place. At the same time there was heavy rainfall, which disturbed our flood fighting plan. The breach took place at 10:00 a.m. The first breach was at RD-12 at 10:00 a.m.; thereafter 18 other breaches took place.

4.14. According to the Chief Engineer, Irrigation, D.G. Khan Zone¹³, “I also reached Jampur Bund at 9.30 am on 02.08.2010, however, at that time rain had started and the seepage could not be redressed resulting in breaches at 11-RD to 35-RD. One of the reasons is that for the last 15 years the water had not touched the Bund besides the said Bund had no wetting channel. There is no procedure or SOP provided for the relief cuts in the Irrigation Department which were made on the spot under the direction of SDO or XEN whoever was present. The community, mostly present at the time of any relief cut, gets involved but there is no written procedure stating that community has to be involved and their consent is to be sought before making relief cuts.”

4.15. According to the Chief Engineer as far as Fakhar Flood Bund is concerned, the breach was a result of overtopping. The estimated cost of damage to Jampur Bund breach is around Rs 20 million and of the Fakhar Flood Bund is Rs 5 million, respectively. The Chief Engineer also pointed out that the design of Jampur Bund and Fakhar Flood Bund is not in accordance with the design and layout prescribed by Federal Flood Commission.

4.16. It has been admitted by the XEN¹⁴ that the labour as required under the Plan could not be arranged.

4.17. It has been stated that due to heavy rainfall on the 2nd of August, 2010 the so called flood fighting could not be effectively carried out. According to the weather conditions given in the Daily Log Book of Taunsa Barrage (see Chapter 4) there was no rainfall and shows “cloudy” weather on 2-8-2010.

4.18. One XEN has been given charge of three main embankments. Even a team of 12 marked for Jampur Bund or Fakhar Flood Bund cannot possibly monitor or carry out effective watching of the entire embankment. The C.E who traveled with us on the

¹³ IW-23

¹⁴ I.W.30

embankments could not explain how seepage was detected and reported. It is, therefore, safe to assume that the department was informed much later, perhaps after the breach. [The time of breach being 9:30 am \(2-8-2010\) carries little credibility or if the breach did take place at 9:30 am then the presence of the XEN and others is highly doubtful.](#)

4.19. There is no system of attendance during the floods. The flood warning was given out on 29th of July, 2010. Breach took place at Jinnah Barrage on 29th July, 2010. There is nothing on record to establish that the flood fighting strategy was put into action and watching staff had started doing their rounds and the flood fighting material was put out, that the machinery was deployed and the I & P Department was ready to receive the floods. Quite on the contrary there was total inaction on the part of the Department and no steps had been taken. It appears that the officers were pulled out of their slumber after the breach. The post flood narrative submitted before the Tribunal by the I & P Department carries little credibility.

4.20. We traveled on Fakhar Flood Bund and Jampur Bund by car¹⁵. It was a difficult journey in November (2010) when the water had subsided. It is, therefore, not clear to us how flood fighting equipment and machinery could be transported to the critical points on the Bund in the hour of need. The impression given to us by the officers concerned that the machinery was mobilized and the flood managers were present on the spot before the breach took place is not likely and does not inspire confidence.

4.21. How were the I & P Department informed of the breach or likelihood of the breach ? how was the machinery mobilized on a 51 km bund? Who were the officers who managed to cover the entire embankment ? how is it to be ascertained that the officers named were on the spot at 930am ? These questions remained unanswered and it appears that a fabricated story had been concocted to cover the absence of the I & P Department. A post flood stage was set up to show to the Tribunal that all the pre flood preparation was in order but the exceptional size of the discharge caused the breach. We disagree totally. It is poor prevention, vigilance and sheer incompetence of the department that resulted in the damage.

4.22. We are of the view that the present Flood Fighting Plan is no more than a mere theoretical narrative, which has fundamental flaws and is difficult to execute. The Plan fails to provide the strategy to monitor the entire Bund. It is also not difficult to accept that during the time of exceptional high flood, finding labour would be close to impossible. There is also no system through which the department is to be notified of a leakage or seepage in any part of the embankment. The pre-flood inspection on motorbikes looking for burrowing holes is not possible.

4.23. Jampur Bund is around 51 K.M. long and there appears to be no monitoring system in place, firstly numbers of people required as per flood fighting plan were not present on the

¹⁵ in Pajero and Land Rover Jeeps

said bund. While traveling on the said bund we noticed a number of encroachments, which were not removed post pre-inspection report and the matter was not taken up in discussion in any pre-flood meeting at the Provincial level. In any case, it is not possible for staff of 9 to 10 officers to monitor and manage 51 k.m. long embankments. The statement of Mr. Abid Rashid, XEN that the entire bund was inspected on the motorbikes by the S.ENGs does not appear to be correct on the face of it, but even if it is considered to be correct it is not possible for the S.ENGs traveling on the Motorbike to spot rat holes on the sides of the embankments.

4.24. It is repeatedly pointed out that water has not touched the embankments since 1992 and wetting channels should have been provided, but no said request was earlier made by the Chief Engineer, XEN or the SDO. No request was made regarding the facts that the embankments are not in accordance with design criteria laid down by the FFC.

4.25. While traveling on the Jampur and Fakhar Flood Bunds, the Chief Engineer who traveled with us expressed his inability to remove the encroachments. There is no mechanism to note the presence or performance of the said officers assigned or posted at the Bund. There is no reporting system in this regard.

4.26. Post Flood the Department has proposed PC-1 which states that since the construction of the Jampur Bund (in 1958) **no major repair work has been carried out**. Top level of the embankments has been deteriorated due to excessive trespassing. **At present the existing bund is short of its designed parameters and cannot face high flood**. Hence raising of Jampur Flood Bund according to FFC parameters is essential to avoid any dangerous situation during flood season¹⁶. In case of Fakhar Flood Bund PC-1 proposes raising and widening of the said bund in order to avoid any future mishap i.e., the top bund to be increased from 15ft to 20 ft and free board from 5ft to 6ft as approved¹⁷.

4.27. **CONCLUSION**

4.28. We are of the view that the Flood Fighting Plan was not followed. The person incharge being a mechanical engineer with no Bund experience was handed over three Bunds to manage during the recent floods. The problems of encroachment and repair raised in the pre-flood inspection were not addressed. It was reported that 19 breaches took place however not a word appears in how the said 19 breaches were fought. We are of the view that breaches had already taken place when the department reached the site. There was no system of communication shown to us whereby breach in any reach of the embankment could be timely reported to the Department. The level and potential of preparedness of the I & P Department to respond to the flood emergency is seriously missing. Nothing has been shown to us to establish that the farthest reaches of Jampur or Fakhar Flood Bunds could be approached within a certain period of time when the seepage or leakage was identified. On the whole the Irrigation Department were caught unaware and stood unprepared and

¹⁶ PC-1 (I.W.30/2)

¹⁷ *ibid.*

numbed as the flood passed by. The Department and its flood fighting team had no clue what to do. They didn't even flow their own flood fighting plan, no matter how good that was. The heroic flood fighting tales narrated post flood by the officers of the D.G.Khan Zone of the I & P Department have no truth in them.

4.29. From the above, it appears that the Flood Fighting Plan, 2010 regarding embankments is seriously flawed and cannot attend to any breach that takes place during the flood season. One XEN (with a background in mechanical engineering) handling three major embankments is just not humanly possible. It cannot be expected of an SDO to carry out a pre-inspection of 51 k.m. embankments on a Motorbike. The absence of the wetting channel and the flaws in the design parameters as laid down by the FFC are not justifiable. We, therefore, feel that there has been total failure of governance as far as the management of Jampur and Fakhar Flood Bunds are concerned which borders on criminal negligence and serious dereliction of duty.

¹⁵ in Pajero and Land Rover Jeeps

5. RECOMMENDATIONS

Penal

5.1. The encroachments on the embankments and the repairs identified by the Report of the Departmental Pre-Flood Inspection Committee were never plugged or attended to. It was the responsibility of the Secretary I & P¹⁸, C.E¹⁹, C.E.(D & F)²⁰ and XEN²¹ to have ensured the compliance of the Pre Flood Inspection Report. None of the officers bothered to do so. We, therefore recommend initiation of disciplinary departmental proceedings against the abovementioned officers for **inefficiency** under the relevant service laws.

5.2. The XEN²², SDO²³ and S.ENGs²⁴ did not implement the Flood Fighting Plan. There were no watching huts, no machinery deployed and there was no evidence that flood fighting material was brought to the bund to fight the flood on 2-8-2010. We therefore recommend the competent authority to initiate disciplinary departmental action against the above officers for **misconduct and inefficiency** under PEEDA Act, 2006 on the basis of the inquiry and findings of this Report.

Reform

5.3. The entire concept of flood fighting relating to embankments has to be revisited. The existing “cut and paste” flood fighting plan from yesteryears will not do.

5.4. A detailed exercise has to be undertaken to develop innovative ways of flood fighting on long embankments. The option discussed in the recommendations under Taunsa Barrage (Chapter-4) may be read as an integral part of these recommendations.

5.5. The embankments ought to be GIS mapped and constantly monitored with the help of SUPARCO in addition to the on spot physical supervision of the locals.

5.6. The embankments must provide for wetting channels alongwith the necessary infrastructure to keep the said channels functional.

5.7. The embankments must be brought in conformity within the design criteria laid down by FFC.

5.8. Flood Fighting Material and machinery must be shifted to vulnerable points at the

¹⁸ Rab Nawaz

¹⁹ Mehr Muhammed Amin

²⁰ Rafique Ahmed

²¹ Abid Rashid

²² Abid Rashid

²³ Sh Saifullah.

²⁴ Tufail Rizvi, Muhammed Bilal Ali, Ejaz Hameed, Muhamemd Ali, Asif Mehmood Fida and Muhammed Rafique Gabol

start of the flood season so that it can be speedily operationalized in the hour of need. Huts or sheds for housing the said materials and machinery on the strategic spots along the embankments must be clearly mapped and set up in every flood season.

5.9. Flood fighting rehearsals must be undertaken every year at the start of the flood season.

5.10. Appropriate number officers corresponding with the length of the embankment must be posted on each bund.



CHAPTER 6

The Indus is bigger then any river in Europe...This was the river which Alexander crossed with his army, and so entered India.¹

LMB OF GUDDU BARRAGE

CAUSING DAMAGE IN PUNJAB

1. INTRODUCTION

1.1. A portion of the LMB of Guddu Barrage extends into Punjab. Any damage to the said LMB affects the residents of District Rahim Yar Khan (Bhong City) as happened in the recent floods. We therefore felt it necessary to inquiry into the mechanism of supervision of the said LMB and the level of coordination and understanding between I & P Departments of Punjab and Sind.

2. LMB OF GUDDU BARRAGE CAUSING DAMAGE IN PUNJAB²

2.1. Left Marginal Bund is an integral part of Guddu Barrage and falls within the jurisdiction of Irrigation & Power Department, Government of Sindh. LMB from miles No.6-16 (10 Miles) is located in Province of Punjab. However, the entire LMB 0-16 miles is maintained and managed by the Irrigation & Power Department, Sindh. During exceptional high flood of August 2010 LMB was breached at the following locations:-

S. No.	Location / RD	Detail of Breach
1	9 mile 6 furlong of LMB	110 feet
2	10 mile 1 furlong of LMB	140 feet
3	10 mile 4 furlong of LMB	180 feet
4	10 mile 5 furlong of LMB	200 feet
5	13 mile 1 furlong of LMB	250 feet

2.2. Breaches of LMB Sr. No.1 to Sr. No.4 were closed by Irrigation & Power Department, Government of Sindh and breach which occurred on 8.8.2010 opposite Bhong Town at 13 mile & 1 Furlong were closed by the Irrigation & Power Department, Government of Punjab.

¹ Arrian, Anabasis Alexandri, c. 145 CE

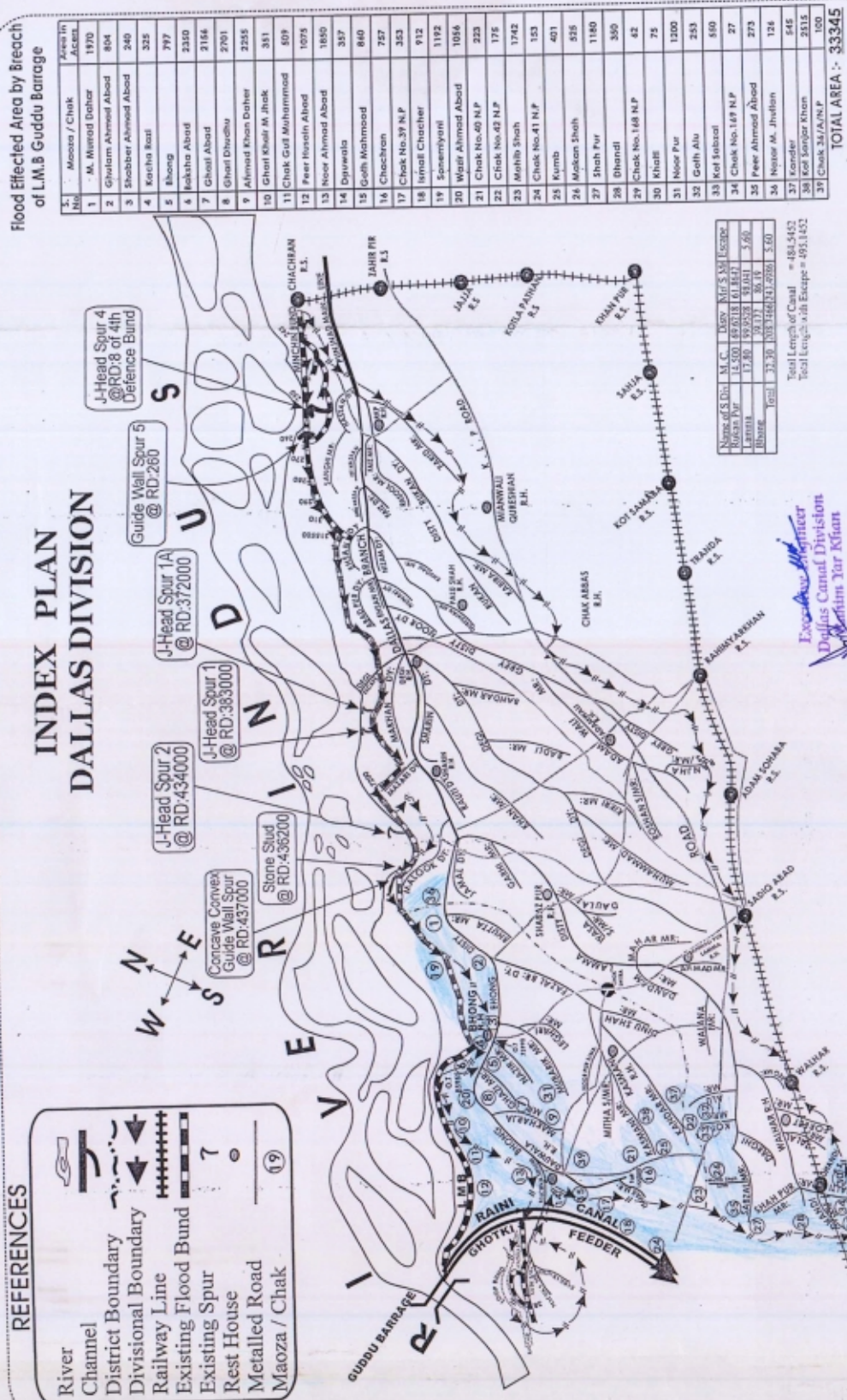
² Mark 122

2.3. The flood flow from these breaches affected the population areas of R.Y. Khan District. The flood entered Bhong Town and also Bhong Distributory System. The flood water inundated large area and damaged villages, crops and other infrastructure of Tehsil Sadiqabad of District Rahim Yar Khan. The flood water also affected Karachi – Lahore National High Way thereby disrupting the flow of traffic. Vide direction of the Secretary, Irrigation & Power Department, Government of the Punjab dated 16.08.2010 the breach in the LMB at 13 mile 1 furlong was closed by the Chief Engineer Bahawalpur. Total 33,345 Acres were inundated due to the said flood water.

¹ Arrian, *Anabasis Alexandri*, c. 145 CE

² Mark 122

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2.4. Brief detail of the flood as given by the Chief Engineer, Bahawalpur Irrigation Zone is as follows:-

- High flood was received on 31.07.2010 at Chachran Town and gauge was 10.20 ft. with the discharge of 8 lac cusecs.
- On 2.8.2010 gauge was 11.5 ft with discharge of 10 lac cusecs;
- On 3.8.2010 the flood turned into exceptional high flood with gauge at Chachran 12.6 ft with the discharge of 12 lac cusecs.

2.5. Finally, the reduction in flood was observed from 10.08.2010 to 12.08.2010. The flood rose again on 13.08.2010 and remained up till 23.08.2010 in exceptional high flood position. Later on the flood subsided and it became normal on 6.9.2010. Chachran gauge reached its highest at 14.6 feet on 07.08.2010.

2.6. *BREACH OF LMB AT GUDU BARRAGE (falling within Punjab)*

2.7. Chief Engineer, Irrigation Gudu Barrage Region Sukkur³ has submitted the Flood Report, 2010⁴ wherein following facts have been highlighted:-

2.7.1. At Gudu Barrage the normal flood was upto 18.07.2010. The river was in low flood from 19.07.2010 to 03.08.2010, then it entered in medium flood from 3.8.2010 to 04.08.2010. It remained in high flood level from 04.08.2010 to 05.08.2010 and crossed in very high and super flood stage on the same day i.e., on 5.8.2010. The river discharge of super flood on 05.08.2010 was recorded at 12:00 mid night to 20.08.2010 at 04:00 p.m. with maximum 1st peak of 11,48,738 cusecs on 08.08.2010 at 11:00 a.m. and 2nd peak of 10,76,728 cusecs on 16.08.2010 at 06:00 p.m. After 20th August 2010 the flood slowly subsided.

2.8. The contribution of Hill Torrents of Sulaiman Ranges below Taunsa Barrage on 8.8.2010 was 240,625 cusecs of eight main hill torrents namely Kaha, Chechar, Vidore, Sori Lund, Sakhi Sarwar, Vehova, Sanghar, Kaura HWT.

2.9. Pond level was kept 1.7 ft below the pond level maintained for regulation in order to accommodate the flood water. Hence no difficulty was experienced at Barrage during super flood and discharge passed smoothly. Upstream left marginal bund falls within Punjab (Districts Rahim Yar Khan & Rajanpur). According to the report since 1999 the river discharge remained less than 6 lac cusecs and main current was on right side, but due to sudden increase in flood discharge upto 1,148,738 cusecs, the main current was shifted to center and the pressure was increased on left side. The left marginal bund was covered by local Zamindara Bund for several years from mile 8/0 to mile 15/7. It was apprehended that "since the bund is privately constructed, therefore, no river bund specifications have been observed and it is always vulnerable at high discharges and in case of failure the population

³ Mark 29

⁴ Mark-29

and cultivation contained in that bund will be damaged but also it is very likelihood⁵ (sic) that the gushing water may below out the left marginal bund.” These apprehensions were communicated to the Secretary, Irrigation & Power Department, Government of the Punjab as well as the Chief Engineers of D.G. Khan Zone and Bahawalpur Zone, but no positive response was received. The apprehension became true when Zamindara Bund breached on the night of 6th and 7th August, 2010, water attacked the main LMB in the night of 7th and 8th August, 2010 between 01:00 a.m. to 04:00 a.m. At 13/0 water overtopped the bund which resulted in breach and remaining 04 leaks developed into breaches at mile 9/6, 10/1, 10/4 & 10/5.

2.10. The works on the breaches were started on 12.08.2010 and all the breaches were plugged upto 22.08.2010 during super and very high flood 2010. It has been suggested in the report 2010 that the Zamindara Bund should be removed alongwith illegal pipes. Since LMB is within Bhong city its width should be increased from 20 ft. to 40 ft.

2.11. Formulation of joint strategy between the two provincial flood managers could have lead to better prevention and effective flood fighting. The resulting damage caused in District Rahim Yar Khan could have been be avoided.

2.12. One of the most common omissions that has surfaced during these floods is the absence of wetting channels. The embankments like Jampur Bund have been dry for years and therefore failed to withstand the watery onslaught.

3. RECOMMENDATIONS

3.1. I & P Department shall immediately⁶ take up the issue of removal of Zamindara Bund, the illegal pipes and other ancillary matters with I & P Department, Sind so that the LMB is properly repaired, Zamindara bund and other impediments should be removed before the start of the flood season 2011. This is essential for the security for the people of Rahim Yar Khan and for the safety of their assets.

3.2. I & P Department to keep an active liaison with the I & P Department, Sind as well as with the administration/management of Guddu Barrage so that a joint flood fighting strategy can be developed for the LMB extending into Punjab.

3.3. A mechanism⁷ between the two Irrigation Departments to be evolved for the future so that issues get expeditiously resolved.

⁵ should be “likely”

⁶ before the start of this flood season

⁷ by constituting an Inter provincial committee or panel of Irrigation officers and experts.



CHAPTER 7

Between Kalabagh and the sea the river gives life as water, to human beings, animals and crops. It also gives death in its catastrophic floods.¹

LOSS CAUSED BY THE RECENT FLOODS IN PUNJAB

1. INTRODUCTION

1.1. During the course of inquiry various departments reported the loss recorded by them in the recent floods. We have documented these figures for three reasons: first, they tend to sharpen the gravity of the tragic event for the readers of this Report. Second, it provides evidence to initiate departmental and criminal proceedings against the delinquents. Third, this document will be useful in formulating future policies.

2. DEPARTMENTAL POSITIONS

2.1. **REVENUE DEPARTMENTS:** Revenue departments of the under-mentioned Districts appeared and placed before us the details of the loss suffered:

2.2. **DISTRICT MIANWALI²:** Total number of houses is 11,093 out of which 5,986 have been damaged which are 54% of the total number of houses. The human mortality during the recent floods was 12³.

2.3. **DISTRICT D.G.KHAN⁴:** has two tehsils namely: Taunsa and D G Khan. In D.G.Khan District 10,152 houses have been damaged partially while 37,892 houses have been fully damaged. The total area affected in Acres is 516,126 and persons affected are 166201, total number of affected villages is 619. There is no Bund alongside Indus River in the entire District except Shero Bund which is also called Jampur Bund when it runs into District Rajanpur. Portion of the said Bund in District D.G. Khan was not affected in the recent floods.

2.4. Report on loss/damage to crops and houses due to recent floods-2010⁵.

¹ Jean Fairley- The Lion River- The Indus.

² Ex I.W. 85/3

³ MARK 92

⁴ I.W. 84

⁵ EX I.W. 84/3

Sr.#	District	Villages affected	Persons affected	Area affected (acres)	Cropped Area affected (acres)	Houses damaged		Govt. Building damaged
						Partially	Fully	
1.	D.G. Khan	619	166201	516126	329235	10152	37892	255

2.5. Damages caused by hill torrents/ rains in tribal areas of the district⁶:

Total No. of Villages	Total Affected families	Houses damaged		Area / Crop affected
		Partially	Fully	
335	6823	2703	5731	The land being Shamlat, the losses of crop / land cannot be ascertained.

2.6. Summary of katcha & pacca houses damaged⁷.

Name of Tehsil	No. of Villages Affected	No. of Houses Damaged Partially.		No. of Houses Damaged Completely.		Total House damage
		PACCA	KATCHA	PACCA	KATCHA	
D.G. Khan	159	281	901	1360	14589	17131
Taunsa	122	160	1202	79	8991	10432
Total	281	281	2103	1439	23580	27563

2.7. **DISTRICT MUZZAFARGARH**⁸: According to the District Officer (Revenue) Muzaffargarh, major portion of the damage (90%) is caused due to breach in the LMB while the remaining 10% damage has been caused by the exceptional high flood.

1.	Total number of Villages - 984	Total number of villages affected - 589
2.	Total Population (3.5 million)	Affected 2.5 million
3.	Total Houses damaged	1,31,293
4.	Roads affected	578 km

⁶ EX I.W. 84/4

⁷ EX I.W. 84/4

⁸ I.W. 87

5.	Schools Affected	782
6.	Total area used for agriculture	13,20,624 acres
7.	Total area damaged	5,88,865 acres
8.	Health Units affected	16
9.	Death toll of the livestock	2,127
10.	Animal affected	25,42,092
11.	Human death toll	68

- 3. HEALTH DEPARTMENT⁹:** In the seven worst flood hit districts of the Punjab, there are total 472 health facilities¹⁰ out of which approximately 57 health facilities have been damaged, mostly being District Health Units.

Category Wise Health Facility Damage¹¹

District	THQs ¹²		RHCs ¹³		BHUs ¹⁴		Dispensaries	
	CD	PD	CD	PD	CD	PD	CD	PD
R.Y. Khan	-	-	-	-	-	5	-	-
DG Khan	-	-	-	-	1	5	-	-
M Ghar	-	1	-	4	1	9	-	-
R Pur	-	1	-	-	-	8	-	3
Layyah	-	-	-	-	6	6	-	-
Mianwali	1	1	-	2	-	3	-	-
Total	1	3	-	6	8	36	-	3

Key: CD Completely damaged (>40% damages), PD Partially damaged (<40% damage) All made functional

⁹ EX I.W. 98/2

¹⁰

Sr.no	Health facilities	Nos.
(i)	BHUs	385
(ii)	RHCs	62
(iii)	THQs	18
(iv)	DHQs	07

¹¹ EX I.W.98/2

¹² Tehsil Headquarter Hospitals

¹³ Rural Health Centres

¹⁴ Basic Health Units

3.1. The incidence of disease recorded between 1st August and 22nd October 2010 in the eight under mentioned districts is as follows¹⁵:-

District	ARI	Injuries	Skin	PUO	Eye Ear	AWD	Others	Total
Bhakkar	4,544	65	5,118	1,253	603	1,095	6,415	19,093
D.G. Khan	62,755	2,857	70,710	20,460	6,999	5,617	38,529	207,927
Khushab	5,164	505	5,060	2,379	742	1,908	11,788	27,546
Layyah	40,032	6,004	47,986	15,060	13,471	4,608	81,698	208,859
Mianwali	27,020	3,895	31,883	4,596	6,190	5,072	40,176	118,832
Muzafargarh	132,505	21,251	137,184	97,610	57,536	92,424	142,287	680,797
R. Y. Khan	44,269	518	50,827	32,291	22,698	20,229	159,008	329,840
Rajanpur	45,540	7,499	40,123	30,639	18,063	38,951	120,652	301,467
Total	361,829	42,594	388,891	204,288	126,302	169,904	600,553	1,894,361

4. **C & W DEPARTMENT¹⁶:** The tentative cost of damage to the provincial roads due to the recent floods is **Rs.744 million** and the total length of roads affected is **365 kms**. C & W Department has also been asked to repair/rehabilitate the district roads length **492 kms** at a cost of **Rs.1381 million**. The only Department, we have to consult for making the cut on the roads in the times of flood is Irrigation & Power Department and Local Administration. Three bridges have been affected in the recent flood. Two of these are on Provincial Network and the third on NHA Road N70. The provincial roads affected due to the breach of LMB were 7 in Muzaffargarh while the roads affected in D.G. Khan, Rajanpur and Mianwali were due to the hill torrents.

¹⁵ E.X I.W.98/2

¹⁶ I.W. 8

Flood / Rain Affected Roads In Punjab¹⁷

Sr. No.	Description	No. of Road Affected	Length Affected- in kilometers	Tentative Cost* Rs in million
A	PROVINCIAL ROADS			
1	FLOOD AFFECTED	35	183	456
2	RAIN AFFECTED	47	182	288
SUB TOTAL:-		82	365	744
B	DISTRICT ROADS IDENTIFIED FOR EXECUTION BY C&W DEPARTMENT			
1	FLOOD AFFECTED	134	450	1,213
2.	RAIN AFFECTED	57	42	168
SUB TOTAL:-		191	492	1,381
GRANT TOTAL :-		273	857	2,125

*NOTE:- Cost does not include rehabilitation cost of structures & contingent charges.

- 5. LOCAL GOVERNMENT¹⁸:** Out of 36 Districts of Punjab, 8 Districts including 18 TMAs, 166 Union Councils and 1780 villages have been affected badly by the floods. As per assessment approximately Rs.1072.359 million are required for rehabilitation and restoration of the infrastructure and municipal services belonging to TMAs, details of which are as under:-

DETAIL OF DAMAGES

TMAs	Roads	Sewerage	Water Supply	Street Pavements	Others	Total
D.G. Khan	8.80	12.17	4.87	-		25.853
Taunsa	9.80	-	5.50	10.10	6.10	30.700
Tribal Area	13.70	30.65	04.13	-	-	48.450
Muzaffargarh	35.86	3.70	9.95	28.59	3.7	82.160
Kot Addu	-	234.5	15.00	-	-	249.50

¹⁷ EX I.W. 8/3

¹⁸ EX I.W. 94/1

Ali Pur	20.66	33.97	-	-	-	54.630
Jatoi	-	-	-	-	-	-
Rajanpur	06	17	0.8	67.38	9.30	100.48
Jampur	55.4	60.00	25.00	74.88	-	215.28
Rojhan	-	-	5.30	10.43	-	15.74
Layyah	-	-	-	-	-	-
Karor Lal Eisan	-	-	-	-	3.631	3.631
Chaubara	-	-	-	-	-	-
Mianwali	0.500	1.00	1.03			2.530
Essa Khel	45.5	10.7	-	18.8	8.9	83.900
Piplan	-	-	-	-	0.970	0.970
R.Y. Khan	33.88	-	-	33.8	-	67.765
Khanpur	4.00	4.00	-	23.5	1.00	32.50
Liaquatpur	28.28	-	-	28.25	-	56.57
Sadiqabad	-	-	-	-	-	-
Kallurkot	-	-	-	-	-	-
Darya Khan	-	-	-	-	-	-
Bhakkar	-	-	-	-	-	-
Mankera	-	-	-	-	-	-
Khushab	-	-	0.3	1.4	-	1.7
Noorpur Thal	-	-	-	-	-	-
Total	262.38	407.69	71.88	297.13	33.601	1072.359

- 6. AGRICULTURE DEPARTMENT:** According to Secretary Agriculture Mr. Arif Nadeem¹⁹, the major damage to the crops took place in District Muzaffargarh and Rajanpur. However, by and large Rabi cultivation which will start from 20th of October will not be affected at all. Due to the recent flood, which has brought water in plenty to this area, the agricultural productivity of the land stands enhanced by 6% to 7% for Rabi crops. There is no danger of food shortage in the Province as we have already stored around 6.162 million metric tones of wheat. The total financial loss in the seven districts is estimated around Rs.67.778 billion. The damages to cotton crops in Muzaffargarh and Rajanpur are Rs.27.639 billion whereas the loss caused to sugarcane in Muzaffargarh, Rajanpur and Rahim Yar Khan is Rs.6.294 billion. According to estimate, about 80% of the farmer affected are farmers with small landholdings i.e. less than 25 acres.
- 7. LIVESTOCK DEPARTMENT:** Additional Secretary, of the Department²⁰ (Khalid Awais Ranjha) submitted that “ The total animals affected²¹ due to the recent flood in the 9 districts namely Bhakkar, D.G. Khan, Muzaffargarh, Khushab, Mianwali, Layyah, Rajanpur, Rahim Yar Khan and Sargodha are 5,442,200 out of a total animal population of 16,949,940. The total figure of animal mortality in the districts is 4809 and animal mortality in Muzaffargarh is 2127. The estimate damages to our infrastructure i.e., Civil Veterinary Hospital, Civil Veterinary Dispensary and Artificial Insemination Centres is Rs.93.62 million. On the basis of above estimates flood loss due to animal mortality is Rs.190 million and loss to Poultry is Rs.2.43 million due to recent flood.
- 8. INDUSTRIES DEPARTMENT²²** The total damage incurred by the industry in the seven flood affected districts is Rs 404.685 million according to the document placed on the record by the Additional Secretary.

8.1. List of industries damaged in the Area under Inquiry are as follows²³:

Districts	Nos	Number of damaged industries
Muzaffargarh	162	27
Mianwali	19	02
Rajanpur	99	09
D.G.Khan	194	05
Bhakkar	14	Nil
Layyah	21	Nil
R.Y.Khan	291	Nil

¹⁹ IW-17

²⁰ I.W.18

²¹ mostly means “displaced”

²² Ex.IW-19/4

²³ Mark-120

9. HOUSING URBAN DEVELOPMENT AND PUBLIC HEALTH ENGINEERING

DEPARTMENT²⁴: In all 202 water supply schemes were damaged/affected in 9 Districts in Punjab due to recent floods. The total cost of rehabilitation of the affected water supply schemes is [Rs.101.264 Million](#), which is to be paid by UNICEF. The Department has also water schemes and drainage scheme in the active plains in these Districts.

10. HOME DEPARTMENT: The details of the affected peoples in the flood during the period 27.7.2010 to 13.08.2010 according to Rescue 1122 is [11156](#) while the data of dead persons received during flood is 36²⁵.

11. PAKISTAN FLOODS 2010 DAMAGE AND NEEDS ASSESSMENT REPORT SUBMITTED BY THE WORLD BANK/ADB has been placed on the record as Mark 106 in Appendix 81 for comparison.

²⁴ I.W. 15

²⁵ Ex.I.W.11/2

