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Irrigation and Waterways Directorate
Government of West Bengal

Annual Flood Report 2019

DIRECTOR

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MAY, 2020

ANNUAL FLOOD REPORT 2019

PREFACE

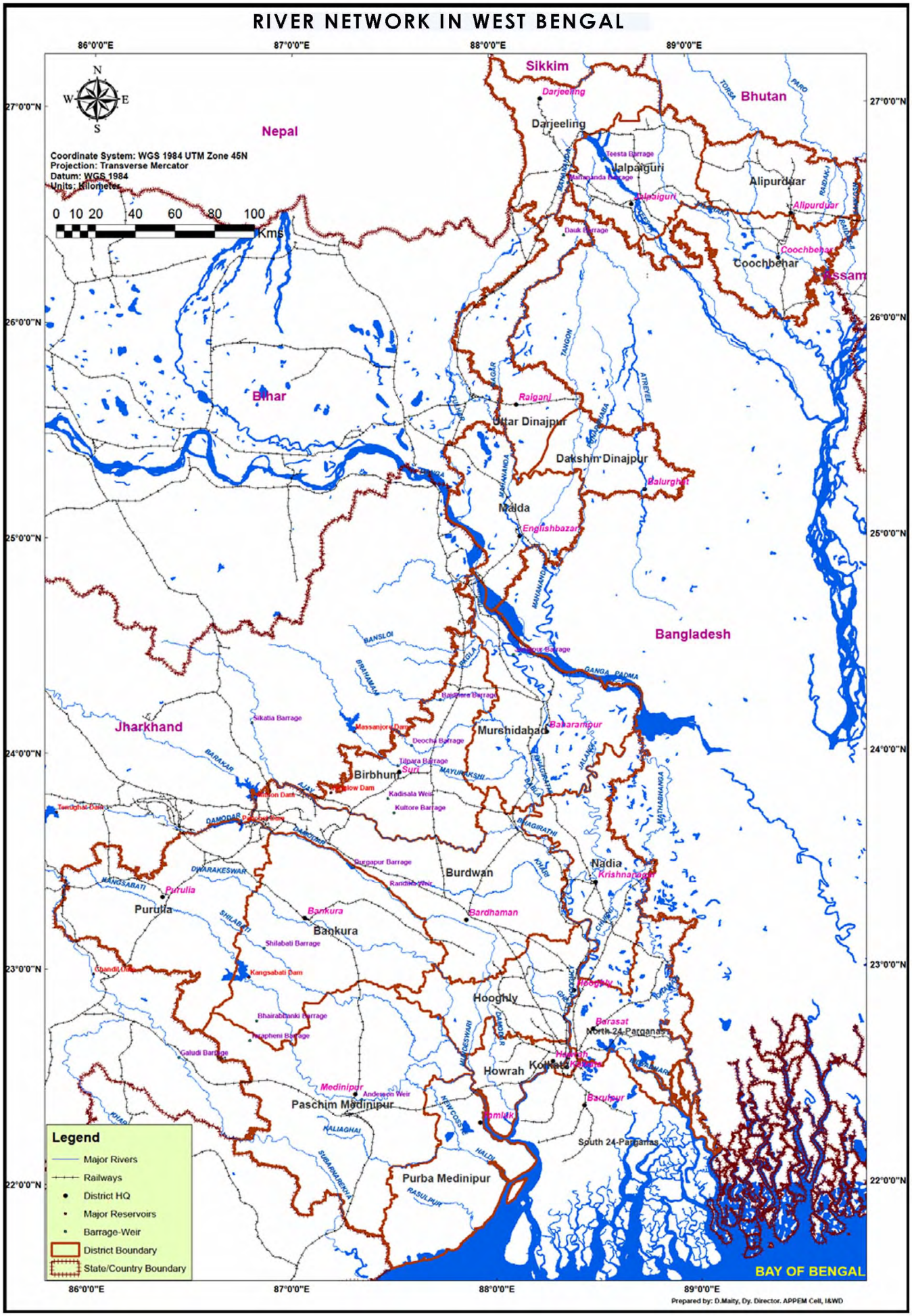
West Bengal being the lowermost riparian state of Ganga Basin and situated at the foothills of several Himalayan rivers of Brahmaputra Basin, the problem of flood management and drainage is quite acute here. Most of the rivers in the State originate from outside of the State boundary and thus they are either inter State or International category. The State has often witnessed destructive floods, even without any substantial rainfall within the geographical limits of its own. Along-with flood and water logging, various allied problems like bank erosion, embankment breach, drainage congestion, and cyclonic storm has often accentuated the flood disaster. The coastal areas along the Sundarban delta, which happens to be the largest delta of the world, often experience high tidal surges resulting in severe erosion and inundation to the country sides. In a nutshell, West Bengal having about 42.55% of its geographical area flood prone, happens to be one of the prime flood affected States in the country.

The flood and water related disaster and associated problems in West Bengal has been almost an annual feature. Many parts of the State are victims of onslaught offload of flood waters almost every year resulting severe loss to standing crops, cattle and properties. It has been noticed that the flood fury has increased during the last two decades.

To protect the country-side from flood ingress during peak monsoons and high tide, flood embankments are constructed along the vulnerable river banks. These embankments; constructed in various districts of the State in general and the deltaic Sundarbans in particular, are used as prime communication links, particularly during periods of natural calamity for safe passage of people and relief materials. It virtually serves as vital lifeline to the affected areas during adverse situation. Disruption of such communication links due to failure by way of subsidence and sudden breach during flood creates havoc, bringing the life of affected areas to a grinding halt as the areas become devoid of basic amenities of life.

Factors such as intensity and duration of rainfall, sedimentation of river bed, imprudent reservoir control, tidal lockage, obstruction and encroachment in natural waterways play vital role in the occurrence of flood. Basin-wise study of flood factors and evaluation of flood hazards are indispensable for chalking out future effective plans for flood control and management measures. Accordingly, Irrigation & Waterways Directorate, at the end of every flood season ritually brings out an Annual Flood Report incorporating the history of rainfall patterns of the monsoon season, district rainfall records, and major river gauge levels across the State, reservoir inflow-outflows and major flood events of the year.

This year overall rainfall of the State as well as for the adjacent catchments were normal but close to deficient range and the rainfall pattern was to some extent distributed. However, the State has experienced severe cyclones *'Fani' & 'Bulbul'* in May and November respectively. Some localized water logging and damages at some vulnerable spots of the flood embankments, river and sea protection works has occurred and restoration works were immediately undertaken to repair the damages.


RIVER NETWORK IN WEST BENGAL
Coordinate System: WGS 1984 UTM Zone 45N
Projection: Transverse Mercator
Datum: WGS 1984
Units: Kilometers
0 10 20 40 60 80 100
Kms
Sikkim
Nepal
Bhutan
Bihar
Jharkhand
Bangladesh
Darjeeling
Jalpaiguri
Alipurduar
Coochbehar
Uttar Dinajpur
Dakshin Dinajpur
Malda
Murshidabad
Birbhum
Burdwan
Nadia
Purulia
Bankura
Bardhaman
Hooghly
Howrah
Paschim Medinipur
Purba Medinipur
North 24-Parganas
South 24-Parganas
BAY OF BENGAL
Legend
Major Rivers
Railways
District HQ
Major Reservoirs
Barrage-Weir
District Boundary
State/Country Boundary
Prepared by: D.Maity, Dy. Director. APPEM Cell, I&WD

1. INTRODUCTION

Geographically, the State of West Bengal is capped by the Himalayan snow-peaks in the North and frothy sea of Bay of Bengal on the South. The terrain is a combination of land varying from hilly regions in the north and partly high plateau in the south-west to the Gangetic alluvial plains in the rest areas. The State is beset with extensive network of rivers, their tributaries, rivulets, jhoras, irrigation canals, wetlands, ponds, beels and low-lying pockets of water bodies. With the Tropic of Cancer passing across it, the State is situated in between 21°31' & 27°13'14" North Latitudes and 85°45'20" & 89°53' East Longitudes.

Salient features of West Bengal are given below in seriatim to give an outline of the flood situation of the State.

Salient Features:

Geographical area of State	:	88,752 sq. km.
Population (as per 2011 census)	:	9.13 crores
No. of Districts	:	23
Total no. of blocks	:	341
No. of flood susceptible districts	:	18
No. of Vulnerable blocks	:	198 (in Flood & Tidal inundation)
River basins (with CWC code)	:	Ganga (2A), Brahmaputra (2B), and Subarnarekha (6).
Catchment area	:	1,80,628 sq. km
Annual average rainfall	:	1,760 mm (Northern part: 2750 mm, Alluvial & Deltaic plain: 1650 mm, Western plateau: 1450 mm)
Total flood prone area	:	37,760 sq. km.
Area already protected	:	35, 380 sq. km.
Length of Embankment	:	10,584 km.
Length of Drainage Channel	:	8,250 km.
Length of erosion protection work other than embankments	:	2,978 km.
Length of sea wall	:	67 km.
Total no. of Outfall sluices	:	3,185
No. of Pumping stations	:	21
Surface water potential	:	136.9 BCM
Ground water potential	:	14.60 BCM

2. RIVER SYSTEMS AND FLOOD PROBLEMS

West Bengal, a part of Bengal Delta, has a long-recorded history of flood. At present **42.55%** of total area of the State is susceptible to flood. Reason is the landmass of the State was formed by the Ganga-Padma system of rivers through the delta building process of which flood being the main carrier of sediments, the bulk of fluvial deposit, in huge volumes. The highest affected area as recorded in 1978 is about 30,607 sq. km and in 2000, it is about 23,971 sq. km.

Most of the rivers in the State are either Inter-State or International in character. The flood problems of the State are of different nature at different regions which are describing below.

2.1. In North Bengal:

In North Bengal, rivers viz. **Teesta, Torsa, Jaldhaka, Raidak** and **Sankosh** after originating in the neighbouring countries of Bhutan and Tibet and the State of Sikkim, flow downwards through the districts of Darjeeling, Kalimpong, Jalpaiguri, Alipurduar and Coochbehar to meet the River Brahmaputra at different locations in Bangladesh, another neighbouring country. The combined catchment of all this system of rivers upto the international border is 37,545 sq. km.

The rivers of the districts of Uttar Dinajpur and Dakshin Dinajpur namely, **Tangon, Atreyee** and **Punarbhaba** after originating at Bangladesh pass through these districts and either directly or indirectly contribute catchment discharges into the river **Ganga-Padma** in Bangladesh after the Farakka Barrage. The combined catchment area of the river system up to the international border is 8,873 sq. km.

The southern part of district Malda through which the River **Ganga** flows receives its flood water from about 11 States and is battered by the run-off flow generated from these vast areas. Ultimately the river flows down the Farakka Barrage to Bangladesh. The western side of the Malda district receives floodwater mostly from neighbouring country of Nepal and State of Bihar through a network of rivers called **Mahananda** and **Fulahar**. Fulahar, after flowing straight south, joins with Ganga upstream of Farakka barrage while Mahananda turns towards south-east and after bifurcating Malda, outfalls into river Ganga-Padma at downstream of Farakka Barrage in Bangladesh. The combined catchment of Mahananda-Fulahar system is 19,342 sq. km.

Major contributing factors to flood in North Bengal regions are the run-off because of heavy local rainfall, discharge of upper basin areas and also outfall condition in the neighbouring countries. The Mahananda and most of the rivers of Uttar and Dakshin Dinajpur districts get stagnated when the Ganga upstream and downstream of Farakka Barrage rules high thereby not allowing drainage of flood discharge during that period.

2.2. In South Bengal:

There are certain distinctive features of drainage condition which give rise to flood situation in south Bengal. The flood in this zone becomes voluminous because of the shape of the catchment area, its steep slope starting from a high-level plateau area and sloping sharply down to a flat terrain near the outfall of limited capacity. This feature is again adversely affected by tidal conditions as is generally noticed in the month of September, the likely month of occurrence of flood.

Basin-wise there are quite a number of river systems on the right bank of the river Bhagirathi-Hooghly like **Pagla-Bansloi**, **Dwarka-Brahmani**, **Mayurakshi-Babla** and **Ajoy**. These rivers together drain out flood water from an area of 18,177 sq. km, spread

over the State of Jharkhand (the Chotanagpur Plateau) and the districts of Birbhum, western part of Murshidabad, West and East Burdwan, and finally outfall into river **Bhagirathi**. Carrying capacity of the river Bhagirathi is only 25% of the combined peak flood discharges generated from these basins because of simultaneous heavy rainfall, as it occurred during the flood of September 2000. In this vast tract of land there is one major reservoir, that is, *Massanjore Dam* over river **Mayurakshi** which interferes the flood discharge of only 11% of aforesaid combined catchments.

On the left bank of the Bhagirathi river system the **Bhairab-Jalangi-Sealmari** group of rivers originate from Ganga-Padma at Akherigunj in Murshidabad district and meet the Bhagirathi at Swarupgunj in Nadia District. This system of rivers between them drains a total area of 2,537 sq. km. of Murshidabad and Nadia districts. Generally, this area suffers from flood because of three reasons – (i) high intensity rainfall in the basin area itself (ii) inflow of flood water from Ganga-Padma at its high spate and (iii) drainage congestion at its outfall because of high stage of river Bhagirathi during high tide.

In the **Damodar-Barakar** river system, the rivers originate at Chotanagpur plateau of Jharkhand and flows down the plains of West Bengal to outfall into the **Rupnarayan-Hooghly** system through two channels namely **Mundeswari** and **Amta Channel**. The catchment area upto **Durgapur Barrage** is 18,026 sq. km. as against total catchment of 24,341 sq. km. In this catchment area there are only 4 (four) reservoirs having a storage capacity of 1.21 BCM. The original concept of flood storage was to have an area reserved for storing a volume of 3.58 BCM. Thus, with this limited flood storage capacity the storage dams at present can modify only the peak flood discharge. Any discharge above 70,000 cusecs downstream of Durgapur barrage may cause flood depending on the outfall condition of the Mundeswari at Harinkhola.

The **Shilabati-Darakeswar** and **Kangsabati-Kaliaghai** river systems which have combined catchment areas of 16,938 sq. km spread out in the districts of Purulia, Bankura, Jhargram, Paschim and Purba Medinipur outfall into river **Rupnarayan** and **Haldi** respectively which finally meet river Hooghly. The **Kangsabati-Kumari dam** at *Mukutmanipur*, Bankura intercepts flood discharge of only 22% of the aforesaid combined catchment area. In this basin spillway discharge from Kangsabati dam above 50,000 cusecs may cause flood at lower reaches downstream of **Mohanpur Anicut** near Midnapore Town depending on tidal condition of the outfall and rainfall in the uncontrolled catchment downstream of Kangsabati dam.

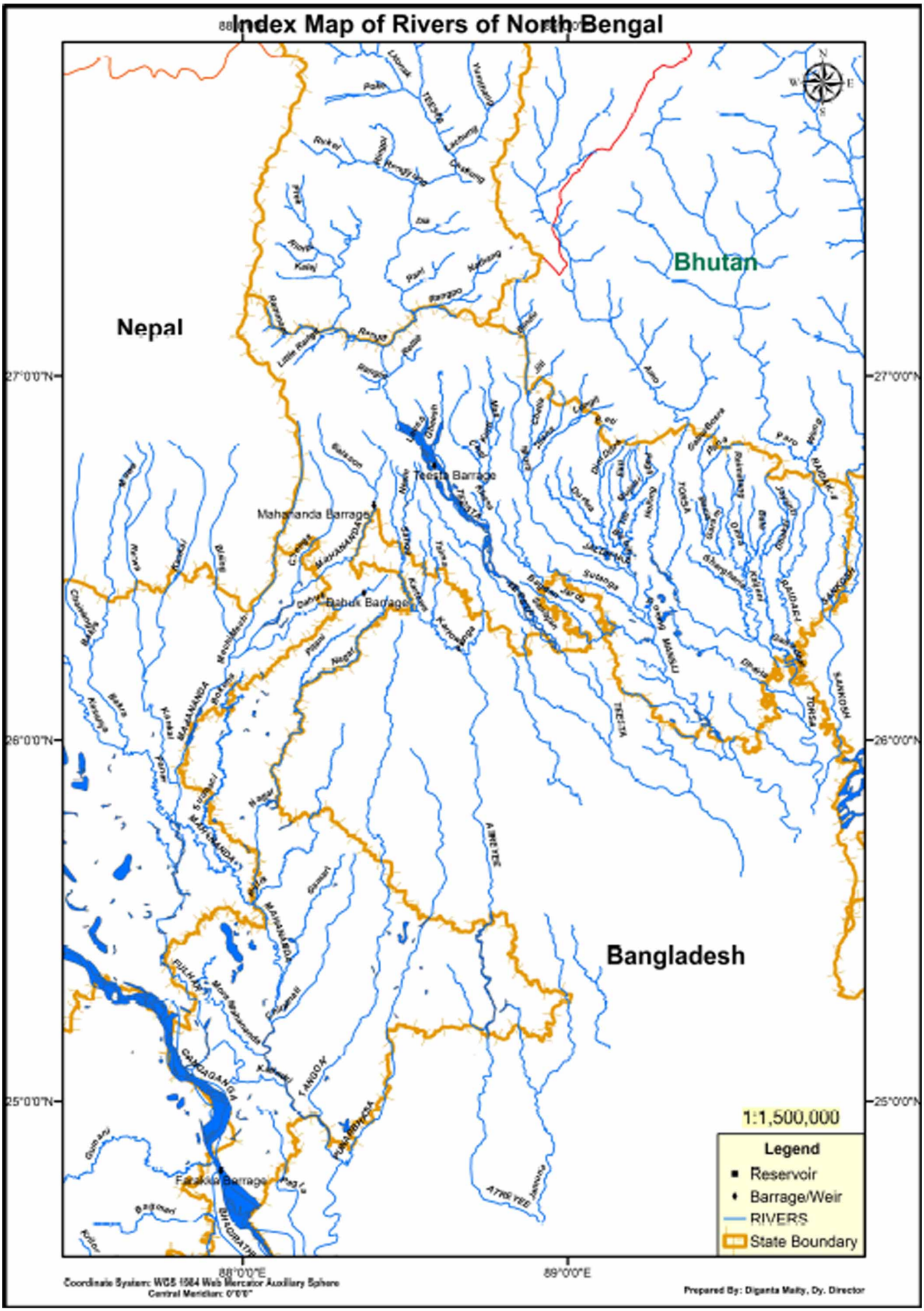
The **Mathabhanga-Churni-Ichamati** system of rivers originate at the Mathabhanga off-taking from Ganga-Padma downstream of Farakka Barrage in Bangladesh and on reaching West Bengal at Majdia in Nadia district, bifurcates in two branches (i) the Churni flowing on South-Westerly direction meeting the Bhagirathi at Ranaghat and (ii) the other branch namely, the Ichamati flowing on South-Easterly direction to meet Bay of Bengal through the creek of Raimangal. The main flood situation in this area arises because of inflow from Ganga-Padma (when it rules high), rainfall in the own catchment area and also tide lockage. In 2000 flood, a very unusual situation arose where the Bhagirathi transferred a large volume of its floodwater to this basin area by breaching its embankments at several places.

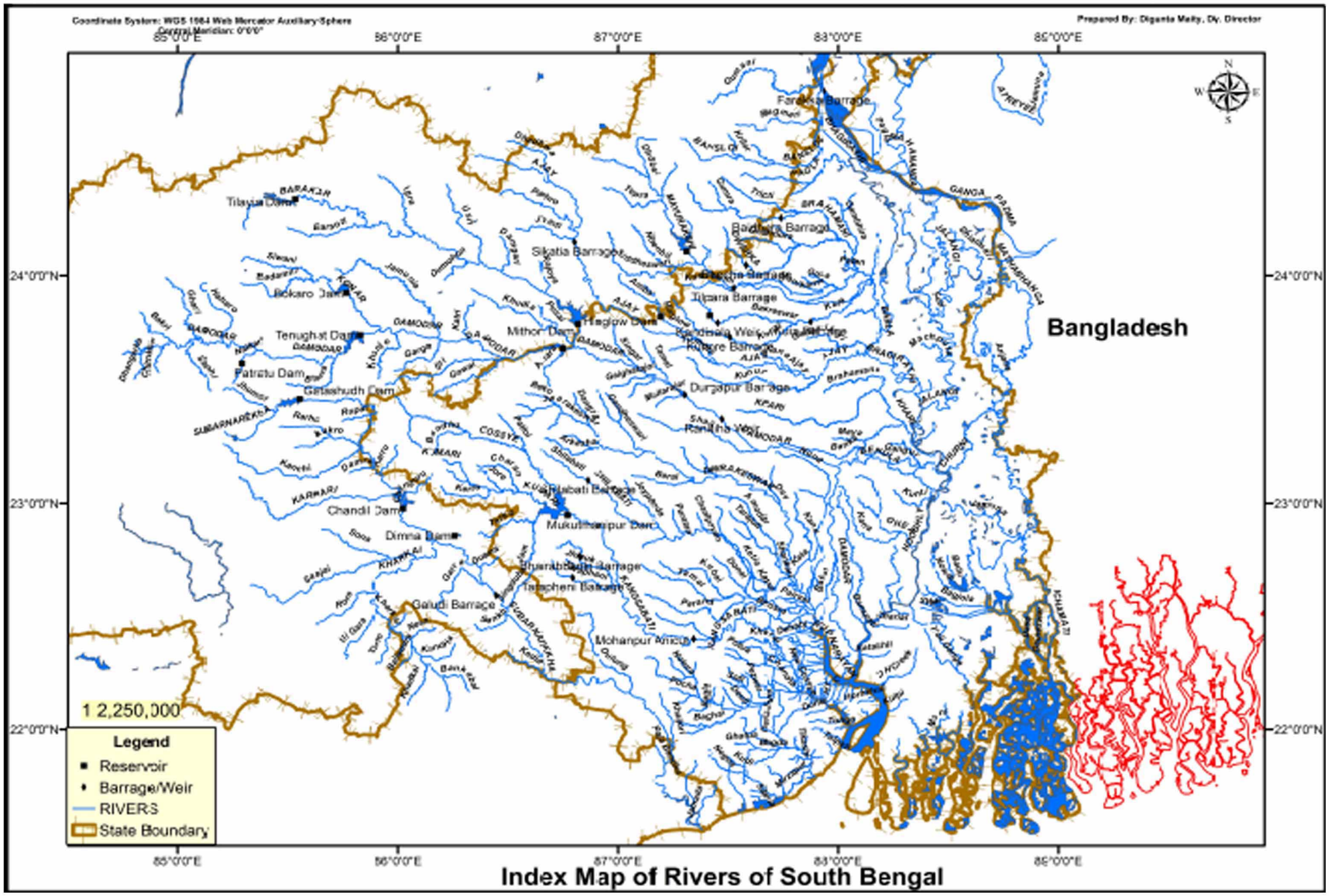
Index map of river system in North Bengal and South Bengal is presented below. The inventories of rivers, tributaries, branch channels within the sub basins have been presented in **Annexure I**.

2.3. Historical record of flood:

Historical record of flood available in West Bengal from 1960 till present year is given below:

Flood affected Area (in Sq. Km.)	*Years during which Flood occurred*	*Total Number of Years*
Below 500	1985, 1989, 1992, 1994, 1997, 2001, 2002, 2005, 2006, 2010, 2012, 2013, 2014, 2016, 2018 & 2019	16
Between 500 – 2,000	1962, 1963, 1964, 1965, 1966, 1972, 1975, 1996, 2003, 2004, 2007, 2009, 2011 & 2015	14
2,000 – 5,000	1960, 1961, 1967, 1969, 1970, 1974, 1976, 1980, 1981, 1982 & 2017	11
5,000 – 10,000	1973, 1977, 1993, 1995, 1998 & 2008	6
10,000 – 15,000	1968, 1979, 1983, 1990 & 1999	5
15,000 – 20,000	1971, 1986, 1987 & 1988	4
Above 20,000	1978, 1984, 1991 & 2000	4


Index Map of Rivers of North Bengal
Nepal
Bhutan
Bangladesh
Teesta Barrage
Mahananda Barrage
Rabuk Barrage
Farakka Barrage
27°0'0"N
26°0'0"N
25°0'0"N
88°0'0"E
89°0'0"E
1:1,500,000
Legend
Reservoir
Barrage/Weir
RIVERS
State Boundary
Coordinate System: WGS 1984 Web Mercator Auxiliary Sphere
Central Meridian: 0°0'0"
Prepared By: Diganta Maity, Dy. Director



Index Map of Rivers of South Bengal

3. DETAILS OF RIVER BASINS AND SUB-BASINS

The State can be demarcated into three distinct drainage basins namely Ganga (CWC basin code no. 2A), Brahmaputra (CWC basin code no. 2B) and Subarnarekha (CWC basin code no. 6) basins respectively. Ganga basin has been further divided into two parts namely Bhagirathi lower & others and Damodar. These three main river basins can be divided into sub-basins having individual catchment of their own. Index maps of different river sub-basins and basins are presented in **Annexure II.**

3.1. BRAHAMAPUTRA BASIN

The rainfall in the northern region of the State is generally high. The ground slope is steep, particularly in the Sub-Himalayan regions of the northern districts. Most of these northern districts belong to Brahmaputra basin. This system consists of a total area of 10,584 sq. km., nearly 12% of the geographical area of the State. This basin area is interspersed with a large number of drainage channels, which join the main drainage arteries of the regions like the rivers Teesta, Torsa, Raidak, Jaldhaka etc. All these rivers originate from the Himalayas in neighbouring countries Bhutan, Sikkim and Tibet, and flow across the Terai region and reach the plains of West Bengal and then flow to Bangladesh joining ultimately the Brahmaputra in Bangladesh. The catchment area distribution of this basin and sub-basins bounded within different neighbouring States and countries has been presented in the following table.

Distribution of Catchment Area of River Basins & Sub-Basins of West Bengal

CWC Basin Code	River Basin	Sub-Basins	CATCHMENT AREA (Sq. Km.)						TOTAL (Sq. Km)
			Assam	Sikkim	West Bengal	Bangla-desh	Bhutan	Tibet	
2B	**BRAHAMAPUTRA**								
	Brahmaputra Lower	Jaldhaka		76	3916	351	959		**5302**
		Raidak			246		4590	16	**4852**
		Sankosh	175		162		9734	75	**10146**
		Teesta		7000	3012	12		29	**10053**
		Torsa			3248		2363	1581	**7192**
		Sub-Total	**175**	**7076**	**10584**	**363**	**17646**	**1701**	**37545**

3.1.1. Sankosh Sub-basin

The river Sankosh with its origin in Bhutan is the eastern most river of Brahmaputra river basin. It serves as the boundary between the two states West Bengal and Assam. It joins with Raidak-II and finally falls into Brahmaputra in Bangladesh by name Gangadhar. The length of Sankosh in West Bengal is 24 km. The total catchment area of this river sub-basin is 10,146 sq.km.

3.1.2. Raidak Sub-basin

It originates in Mt. Akungphu at an altitude of 6,400 m. in Bhutan. The river Raidak then bifurcates into two channels namely Raidak-I and Raidak-II at Bhutanghat, close to Indo-Bangladesh border. Raidak-I joins the united stream of Torsa and Kaljani, while Raidak-II is joined by Sankosh and finally outfalls into Brahmaputra in Bangladesh by the name Gangadhar. The length of Raidak-II is around 50 km in West Bengal. The total catchment area of Raidak-II river sub-basin is 4,852 sq.km.

3.1.3. Torsa Sub-basin

The river Torsa originates in Chumbi Valley of southern Tibet at an altitude of 7,065 m. It flows through Tibet, Bhutan, West Bengal and Bangladesh. Below Hasimara Bridge on NH-31, it bifurcates into two channels namely Sil-Torsa and Char-Torsa. They reunite at PatlaKhowa forest. The river passes by the Coochbehar town and is joined by river Kaljani and Raidak-I. The combined flows outfalls into Brahmaputra near Nageswari at Rangpur in Bangladesh. The total length of this river is 222 km out of which 74 km is situated within West Bengal. The total catchment area of this river sub-basin is 7,192 sq.km.

3.1.4. Jaldhaka Sub-basin

The river Jaldhaka has its origin at Bitang Lake in Sikkim at an altitude of 4,400 m. It flows through Sikkim, Bhutan, West Bengal and Bangladesh. After the river is joined by a number of streams and tributaries; both in mountainous and sub-mountainous regions, it finally flows into river Dharala and the combined system, by the name Dharala ultimately outfalls into Brahmaputra in Bangladesh. The total length of this river is 192 km out of which 122 km is situated within West Bengal. The total catchment area of this river Sub-basin is 5,302 sq.km.

3.1.5. Teesta Sub-basin

Teesta, the mighty river of North Bengal originates in the glaciers of North Sikkim at an altitude of 6,400 m and is formed by the union of two streams viz. Lachen and Lachung at Chungthung in Sikkim. It enters West Bengal at Rangpo and upto Mechi, it forms the boundary between West Bengal and Sikkim. Two of its tributaries, Great-Rangeet and Rammam also serve as the natural boundary between the two States. The river finally outfalls into Brahmaputra in Rangpur district of Bangladesh. The total length of this river is 309 km. out of which 103 km. is situated within Sikkim and 121 km. in West Bengal. The total catchment area of this river Sub-basin is 10,053 sq. km. Under ***'Teesta Barrage Project',*** a barrage has been constructed at Gazoldoba under Jalpaiguri district.

3.2. GANGA BASIN

The two holy rivers - Bhagirathi and Alakananda originating from the glaciers of the Himalayas at an altitude of 7,000 m join at Devprayag and the combined stream is known as the Ganga. It emerges into the plains at Rishikesh in Uttarakhand. After flowing exclusively through Uttarakhand and Uttar Pradesh, it receives the flow of Yamuna, one of its major tributaries near Allahabad. The other major tributaries of Ganga are Ton, Gomti, Gharghara, Son, Gandak, Kosi and Fulahar. The Ganga forms the boundary between Uttar Pradesh and Bihar for a length of about 110 km and the river then enters Bihar and flows more or less through the middle of the state. After its confluence with the Kosi, the Ganga continues its eastward flows in Bihar for about 40 km.

At Bhagalpur of Bihar, the river begins to flow south-southeast and as it

enters West Bengal, the river swings round the Rajmahal hill range. It begins its attrition with the branching away of its first distributary, the Bhagirathi-Hooghly, which goes on to become the Hooghly River after meeting with Jalangi near Nabadwip and ultimately outfalls into the Bay of Bengal near Sagar Island. Just before the border with Bangladesh, the Farakka Barrage controls the flow of the Ganges, diverting some of the water into a feeder canal linked to the Hooghly for keeping it relatively silt-free.

The North-Central, South-Central, Western, Southwestern and Southern parts of West Bengal constitute the Ganga Basin. This basin is largely divided into two major sub-basins namely Bhagirathi lower and Damodar. The total length of the river Ganga from its point of origin to the point where it falls into sea is about 2,575 km. (measured along Bhagirathi and the Hooghly) of which 1,450 km. lies in Uttarakhand and Uttar Pradesh, 110 km along Uttar Pradesh and Bihar border, 445 km. in Bihar and 570 km. in West Bengal.

The Ganga system comprises a total area of 74,575 sq. km. within the state of West Bengal. The catchment area distribution of this basin and sub-basins bounded within different neighbouring states and countries has been presented in the following table.

Distribution of Catchment Area of River Basins & Sub-Basins of West Bengal

CWC Basin Code	*River Basin*	*Sub-Basins*	*CATCHMENT AREA (Sq. Km)*						*TOTAL (Sq. Km)*
			Bihar	*Jharkhand*	*Orissa*	*West Bengal*	*Bangladesh*	*Nepal*	
2A	*GANGA*								
	Bhagirathi and Others (Ganga Lower)	Atreyee				1627	2262		*3889*
		Fulahar	2940			325		2684	*5949*
		Mahananda	2739			6040	1319	3295	*13393*
		Punarbhaba				1125	1809		*2934*
		Tangon				1244	806		*2050*
		Ajay	386	3204		2503			*6093*
		Amta Channel Kana Damodar				1490			*1490*
		Bansloi		1794		119			*1913*
		Behula				549			*549*
		Bhagirathi-Hooghly		1292		4160			*5452*
		Bidyadhari				2014			*2014*
		Brahamani		985		154			*1139*
		Churni				975	1304		*2279*
		Dwarka		329		2649			*2978*
		Ganga-Padma				1673			*1673*
		Ghea				1167			*1167*
		Ichamati				2313	1063		*3376*
		Jalangi				2537			*2537*
		Khari				2268			*2268*
		Mayurakshi		2949		2529			*5478*
		Pagla		239		337			*576*
		Sundarban area				10209			*10209*
	Damodar	Damodar		17087		4325			*21412*
		Dwarakeswar				4292			*4292*
		Haldi				614			*614*
		Kaliaghai				1913			*1913*

Distribution of Catchment Area of River Basins & Sub-Basins of West Bengal									
CWC Basin Code	*River Basin*	*Sub-Basins*	*CATCHMENT AREA (Sq. Km)*						*TOTAL (Sq. Km)*
			Bihar	*Jharkhand*	*Orissa*	*West Bengal*	*Bangladesh*	*Nepal*	
		Kangsabati		321		6324			*6645*
		Mundeswari				1439			*1439*
		Pichabani			17	791			*808*
		Rasulpur				1556			*1556*
		Rupnarayan				1226			*1226*
		Shilabati				4088			*4088*
		Sub-Total	*6065*	*28200*	*17*	*74575*	*8563*	*5979*	*123399*

3.2.1. Mahananda-Fulhar Sub-basin

The river Mahananda originates from Ghoom near Darjeeling town in the district of Darjeeling. It is bounded on the north by the Himalayas, in the east by the ridges separating it from Teesta river system, the river Ganga on the South and the Kosi river system in the east. The river bifurcates into two channels at Barsoi in Bihar. Out of the two branches one flows through Bihar by the name Fulahar and the other flows through West Bengal as Mahananda. The river Mahananda carrying the flow of four tributaries namely, Nagar, Kalindri, Tangon and Punarbhaba, drains into the river Ganga from the Northwestern side at Godogarighat just downstream of the point where Ganga leaves the boundary of West Bengal. The combined catchment area of these two Sub-basins is 19,342 sq. km. Under ***'Teesta Barrage Project'*****,** a barrage has been constructed over **Mahananda** near Siliguri and another pick-up barrage has been constructed over river **Dauk** near Chopra of North Dinajpur district, which is a tributary of Mahananda.

3.2.2. Atreyee Sub-basin

Some rivers like Sahu, Neem, Talma, Chaoai, Panga originating from the high lands in districts of Jalpaiguri and meet together to form Kartowa which then enters into Bangladesh by the name Atreyee. The river Atreyee then bifurcates into two channels namely Dheepa and Atreyee. The Western Channel named Atreyee re-enters into West Bengal in South Dinajpur district covering a length of 40 km in the State. It again enters into Bangladesh and ultimately outfalls into river Jamuna after passing through Chalanbeel. The total catchment area of this river sub-basin is 3,889 sq.km at the point of leaving West Bengal boundary.

3.2.3. Punarbhaba Sub-basin

The river Dheepa after emerging out from Atreyee in Bangladesh, has taken a South - Western course to enter into South Dinajpur district assuming the name Punarbhaba. Covering a length of about 40 km. in the district, it touches the eastern boundary of Malda district and finally enters into Bangladesh. Further down, Punarbhaba meets the river Mahananda in Bangladesh. The catchment area of this sub-basin is 2,934 sq. km.

3.2.4. Nagar-Kulik, Gamari-Chiramati, Tangon Sub-basins

All these rivers flow through the districts Malda and North Dinajpur and outfall into the river Mahananda. In course of their flow, somewhere they form the boundary either between West Bengal and Bihar or between West Bengal and Bangladesh. Nagar, originating in Bangladesh flows along the boundary of West

Bengal and taking a Southeastern course, receives a spill channel of Mahananda and is joined by Kulick, which has also its origin in Bangladesh.

Gamari and Chiramati (or Srimati) are two small rivers that flow through North Dinajpur district before they are united. This combined streams finally outfalls into the river Mahananda. Tangon is a tributary of river Mahananda. It rises in Bangladesh. It flows through the district of North Dinajpur and Malda and meets Mahananda on the boundary of Malda and Bangladesh. The catchment area of Tangon is 2,050 sq. km.

3.2.5. Bhagirathi-Hooghly Sub-basin

Farakka Barrage diverts water from river Ganga into Bhagirathi through a channel known as **Feeder canal** near Tildanga town of Murshidabad district in order to ensure minimum flow in Bhagirathi especially during dry season. This canal flowing parallel to Ganga passes Dhulian and ends just above Jangipur where Bhagirathi takes its own course. Two right bank tributaries namely Pagla and Bansloi outfall into the Feeder canal before it turns into actual Bhagirathi. It has been renamed as river Hooghly as it passes on the eastern side of Hooghly district until it outfalls into the Bay of Bengal near Sagar island.

During its entire course from origin to outfall, Bhagirathi has formed boundaries between the districts of Purba Bardhaman & Nadia, Hooghly & North 24-Parganas, Howrah & Kolkata, Purba Medinipur & South 24-Parganas. River Ajay, Mayurakshi, Damodar (Amta Channel), Rupnarayan and Haldiare the major tributaries on its right bank while river Jalangi and Churni are the major tributaries on its left bank. Some other minor tributaries on its right bank are Khari, Behula, Ghea and Rasulpur. Moreover, there are so many small drainage channels and khals which directly outfall into this river from its both banks thus forming local catchment areas of 5,452 sq.km. The Tolly's Nullah or the Adi-Ganga, as it is sometimes called is a small but important tidal creek draining into the river Hooghly from the left near the city of Kolkata.

One important factor that affects the drainage potential of river Hooghly is the effect of tides. The tide runs rapidly on Hooghly and produces a remarkable example of the fluvial phenomenon known as a *'tidal bore'*. This consists of the head-wave of the advancing tide, hemmed in where the estuary narrows suddenly into the river, and often exceeds 2.1 m. in height. The difference from the lowest point of low water in the dry season to the highest point of high water in the rainy season is reported to be more than 6 m. It has been observed that the incident of flood devastation in the districts of Purba & Paschim Medinipur, Howrah and Hooghly occur mostly when high flood discharges from Jharkhand districts along-with those from Bankura, Birbhum, Paschim Bardhaman, Purba Bardhaman and Purulia districts of West Bengal synchronizes with high tides in river Hooghly specially during the month of August and September.

3.2.6. Jalangi-Bhairab Sub-basin

The river Jalangi originates from the right bank of the river Padma in Murshidabad district, 165 km. downstream of Farakka. Jalangi is dead for all purposes except during the periods of heavy rain, when it receives water from Padma. The river ends its journey by finally outfalling into the river Bhagirathi near Nabadwip town of Nadia district. The major tributary of Jalangi is river Bhairab that starts its journey from the river Ganga near Lalbag of Murshidabad district. It is now almost a dead channel but during rainy season, it receives water from Padma. Catchment area of Jalangi Sub-basin is 2,537 sq.km.

3.2.7. Mathabhanga-Churni Sub-basin

River Mathabhanga originates from the right bank of the Padma, at Munshiganjin Kushtia district of Bangladesh. It bifurcates near Majdia of Nadia in India, creating two channels. The western course, Churni runs a few km. through Nadia in a south-west direction to meet Bhagirathi and the other course Ichamati, after traversing a length of 20 km in India, enters into Bangladesh near Mubarakpur. The length of Churni is almost 56 km. Catchment area of Mathabhanga-Churni Sub-basin is 2,279 sq.km.

3.2.8. Ichamati- Bidyadhari Sub-basins

After entering into Bangladesh near Mubarakpur, river Ichamati flows for 35 km in Bangladesh and again re-enters into India at Duttaphulia of Nadia. It forms the international border between India and Bangladesh for 21 km. and finally outfalls into river Kalindi of Sundarban area. The length of Ichamati is 208 km. with the catchment area of 2,313 sq. km. within West Bengal and 1,063 sq. km. within Bangladesh. Bidyadhari originates near Haringhata in Nadia district and then flows through Deganga, Habra and Barasat areas of North 24 Parganas before joining the Raimangal River in the Sundarbans. It has been the major drainage system of North 24-Parganas and Kolkata having catchment area of 2,014 sq. km.

3.2.9. Pagla-Bansloi Sub-basins

These rivers originate from the Rajmahal hills in the Sahebganj district of Jharkhand. Flowing eastern across Birbhum district, they entered Murshidabad district as the tributaries of the river Bhagirathi. The combined catchment area of these sub-basins is 2,489 sq. km.

3.2.10. Brahamani-Dwarka Sub-basin

Dwaraka originating in Dumka district of Jharkhand, flows through Birbhum and Murshidabad districts where it joins with Mayurakshi to form Babla which finally outfalls into the river Bhagirathi. Brahamani is the main tributary of Dwarka. It also originates in Dumka district of Jharkhand and flows through Birbhum and Murshidabad districts to meet with Dwarka. There are Baidhara and Deocha barrages across the river Brahamani and Dwarka respectively under the ***'Mayurakshi Reservoir Project***'. The total catchment area of this sub-basin is 4,117 sq. km.

3.2.11. Mayurakshi-Babla Sub-basin

River Mayurakshi (or Mor), the major river in Birbhum district, has a long history of devastating floods. It has its source on Trikut hill, about 16 km from Deoghar in Jharkhand state. Several spill channels - the Manikarnika, Kana Mor etc. take off from the Mayurakshi in its lower reaches. All these rivers including river Dwarka flow into the lower pocket of Hijal beel in the district of Murshidabad. The combined flow when starts journey from the beel named as river Babla that finally drains into the river Bhagirathi. The ruling level of Bhagirathi considerably influences the drainage and flood level in the HijalBeel.

Massanjore dam and **Tilpara barrage** have been constructed across this river as a part of 'Mayurakshi Reservoir Project', which is the first major irrigation project in West Bengal after independence. Other important structures of this project situated in Birbhum are Kopai barrage on river Kopai and Kandisala weir over river Bakreswar. The combined flows of Kopai and Bakreswar are called river Kuia which outfalls into Mayurakhshi near Kandi of Murshidabad. Mayurakshi is about 250 km long out of which nearly 100 km passes through West Bengal. The total catchment

area of this sub-basin is 5,478 sq.km. River Siddheswari and Noonbeel are two major tributaries of Mayurakshi outfalling into itat 8 km downstream of Massanjore dam and largely contribute the high volume of uncontrolled flood discharge during monsoon.

3.2.12. Ajay Sub-basin

River Ajay originates on a small hill about 300 m high, southwest of Munger in Bihar. It then flows through Jharkhand and enters West Bengal at Simjuri, near Chittaranjan. It forms the border between Birbhum and old Burdwan districts and finally joins the Bhagirathi River near Katwa town of Purba Bardhaman. Total length of the Ajay is 288 km. out of which 152 km. lays in West Bengal. The important tributaries of Ajay are Pathro and Jayanti in Jharkhand, Hinglow in Birbhum and Kunur in Purba Bardhaman district of West Bengal.

There is a barrage across river Ajay constructed by Govt. of Jharkhand at Sikatia. The floods of this river are flashy and of short duration. There are some pockets in the Ajay-Kunur catchment, which suffer from frequent inundation. Large areas of Purba Bardhaman, Birbhum and Murshidabad districts experience inundation due to drainage congestion whenever flood of the Ajay coincides with those of the Mayurakshi and Dwarka. A dam has been constructed over the tributary Hinglow for the purpose of irrigation in some parts of Birbhum district. The total catchment area of this Sub-basin is 6,093 sq.km.

3.2.13. Khari-Behula-Ghea Sub-basins

Khari river a minor right bank tributary of river Bhagirathi originates from the swampy field of Kanksa-Panagarh region of Purba Bardhaman district and flows mainly eastward and later south-eastward to outfall into river Bhagirathi upstream of Kalna town. Its main tributary is Banka river, which acts as a spill channel of river Damodar, and after flowing almost parallel to Khari, it meets with Khari just before its outfall into Bhagirathi. The catchment area of this sub-basin is 2,268 sq. km.

Behula, also a spill channel of river Damodar originates near Palla village of Purba Bardhaman district and after flowing eastward it outfalls into river Bhagirathi upstream of Balagarh town of Hooghly district. Its main tributary is Gangur river. The catchment area of this sub-basin is 549 sq. km.

Ghea is another spill channel of river Damodar, originating in the Burdwan district and after flowing southward and south-eastward through Hooghly district it outfalls into Hooghly river near Champdani town. The main tributaries of this river are Kana and Kunti having a catchment area of 1,167 sq. km.

3.2.14. Damodar-Mundeswari Sub-basins

River Damodar originating from Palamau hills in Jharkhand and flowing through a length of 541 km between several districts of Jharkhand and West Bengal bifurcates into two channels at Beguahana of Purba Bardhaman district near Jamalpur. One channel carrying dominant flood discharge has been named as river Mundeswari that drains into Rupnarayan at Bakshi of Howrah district. The other channel after passing through Hooghly and Howrah districts as Amta channel carries its discharge and outfalls into the river Hooghly through an outfall sluice near Uluberia.

The river causes floods in its lower reaches in the districts of Purba Bardhaman, Hooghly and Howrah, mainly on the right bank of the river below Beguahana. Earlier known as the *'Sorrow of Bengal'* because of its ravaging floods in the plains of West Bengal, the Damodar and its tributaries have been somewhat tamed with the construction of four dams (Mithon, Panchet, Konar and Tilayia)

under the control of ***'Damodar Valley Corporation*** **(DVC)'**. There is another dam at Tenughat across Damodar under the direct control of Government of Jharkhand and in the lower catchment; there are one barrage at Durgapur and one weir at Randiha under the direct control of Irrigation & Waterways Department, Government of West Bengal.

River Barakar and Bokaro are two major tributaries of Damodar in Jharkhand which meet Damodar from its left bank whereas river Shali in Bankura district of West Bengal is other major tributary situated on its right bank. Harinkhola, Short-Cut channel, Kana Dwarakeswar, Hurhura khal are other important drainage arteries of this catchment which play important role in draining out flood discharge into river Rupnarayan, having tidal influence. The total catchment area of Damodar sub-basin in Jharkhand is 17,087 sq.km and in West Bengal is 4,325 sq. km. upto Beguahana point. The local catchment area of Mundeswari sub-basin is 1,439 sq.km and that of Amta Channel-Kana Damodar sub-basin is 1,490 sq.km.

3.2.15. Dwarakeswar Sub-basin

Darakeswar river (also known as Dhalkishore) is a major river in the western part of West Bengal. It originates from Tilboni hill of Chhotanagpur Plateau in Purulia district and enters Bankura district near Chatna. It mainly flows southeastward and after entering into Hooghly district it turns south near Arambag town. Its main tributary Gandheswari rising from Bankura district meets Darakeswar near Bankura town. After receiving contributions from other minor tributaries like Arkasha, Berai, and Shankari etc. Darakeswar finally joins with Shilabati at Bandar near Ghatal town of Paschim Medinipur district to form river Rupnarayan. There is proposal of *"Darakeswar-Gandheswari Reservoir Project"* within this sub-basin. Catchment area of this sub-basin is 4,292 sq. km.

3.2.16. Shilabati Sub-basin

Like Darakeswar, river Shilabati (also known as Shilai) emerging from hilly terrain of Chhota Nagpur Plateau in the Purulia district, traverses south-eastward through the districts of Bankura and Paschim Medinipur to meet with Darakeswar to form Rupnarayan River. River Joyponda, Ketia, Donai, Kubai and Parang are major tributaries of Shilabati. There is a small pickup barrage constructed across the river at Kadamdeuli in Bankura district as a part of 'Kangsabati Reservoir Project'. The catchment area of this sub-basin is 4,088 sq. km.

3.2.17. Kangsabati Sub-basin

The river Kangsabati (also variously known as the Kasai and Cossye) originating from Chhota Nagpur Plateau in the Purulia district and flowing south-eastward, joins with its main tributary Kumari river at Mukutmanipur of Bankura district where a reservoir popularly known as Mukutmanipur dam has been constructed under the ***'Kangsabati Reservoir Project'*** for the purpose of both irrigation and flood control. An Anicut structure built on this river near Midnapore town in 1872 was also added to the operations of the project. Further down, after entering into the district of Paschim Medinipur it joins with combined streams of Bhairab Banki and Tarafeni rivers. Both the rivers have barrages over them under the 'Kangsabati Reservoir Project'. After travelling further east in a tortuous course, it bifurcates into two rivers at Kapastikri of Paschim Medinipur.

Northern branch, known as Old Cossye after flowing through certain distance, further bifurcates into two courses at Daspur of Paschim Medinipur. One course, named as Palaspai khal flow further east to outfall into the Rupnarayan and the main course, known as Durbachati flows southeasterly along the border of both Medinipur districts to outfall into river Rupnarayan. Old Cossye is also

connected with river Shilabati through a small channel known as Kanki khal.

The southern course, known as New Cossye, flows further southeasterly direction to meet with river Kaliaghai at Dheubhanga of Purba Medinipur district and forms river Haldi that flows eastwardly into the river Hooghly at Haldia. Kherai and Bakshi khal is the main tributary of river New Cossye. The total length of Kangsabati is around 465 km. The catchment area of this sub-basin is 6,645 sq.km. Very often, lower portion of this sub-basin especially Ghatal area of Paschim Medinipur and Panskura area of Purba Medinipur districts suffer from inundation due to high flood discharge from its uncontrolled catchment downstream of the Mukutmanipur dam synchronizing with high tide in river Rupnarayan.

3.2.18. Kaliaghai Sub-basin

The river Kaliaghai trickles out from Dudhkundi of Jhargram district and flows south-easterly through Paschim and Purba Medinipur to meet the other arm of Kangsabati i.e. New Cossye to form Haldi. During the course of its journey, it is fed by the flow of its tributaries namely Kapaleswari, Baghai and Chandia. The length of this river is 121 km and catchment area is 1,913 sq. km. This river is mainly responsible for flood in Sabang area of Paschim Medinipur district.

3.2.19. Rupnarayan Sub-basin

River Rupnarayan is the major drainage artery of southwestern districts of South Bengal. Being the main tributary of Hooghly river, it receives tidal discharge of Bay of Bengal throughout the year and plays an important role in draining floodwater from vast catchment area. Irrespective of discharges from its major tributaries like Mundeswari, Darakeswar, Shilabati and Kangsabati, it also receives flood water from many local drainage channels like Kata khal of Hooghly, Bakshikhal of Howrah, Chandreswar khal of Paschim Medinipur, Denan-Dehaty-Soadighi-Gangakhali-Pratapkhali-Shankrara khals of Purba Medinipur which directly outfall into Rupnarayan from its both banks. The length of this river is 80 km having local catchment area of 1,226 sq.km.

3.2.20. Haldi Sub-basin

Two rivers New Cossye and Kaliaghai join at Dheubhanga of Purba Medinipur to form river Haldi which after traversing southeastward outfalls into river Hooghly near Haldia town. It divides the Purba Medinpur district into two parts, the Northern part can be categorized as drainage area of Tamluk and the southern part can be categorized as Rasulpur-Nandigram drainage area. Except upper catchment discharges from Kaliaghai-New Cossye sub-basins, river Haldi drains out water from parts of both the above-mentioned drainage areas. The lower portion of the river Haldi is affected by over bank spills and drainage problem during the monsoon as entire stretch of 42 km of the river falls under the tidal influence of river Hooghly. The local catchment area of this sub-basin is 614 sq.km.

3.2.21. Rasulpur Sub-basin

The river Rasulpur is formed by union of two drainage channels namely Bagda andSadarkhals. It is the main drainage channel in Contai sub-division of Purba Medinipur district. The river having length 19 km drains out floodwater of 1,556 sq. km. into the river Hooghly.

3.2.22. Pichabani-Negua Channel Sub-basin

River Pichabani and Negua Diversion channel systems are used to discharge rainwater out from Dubda basin of Purba Medinipur district. The two channelsoutfall into Bay of Bengal. Catchment area of this sub-basin is 808 sq.km.

3.2.23. Sundarban Drainage Sub-basin

Apart from the rivers described earlier within the Ganga basin, there is a group of rivers in Southern part of the State, which falls in the deltaic zone. These tidal rivers, estuaries and creeks are situated on the eastern side of Hooghly river popularly known as Sundarbans, which is nothing but an intricate network of number of deltaic islands of the district of South 24-Parganas. These rivers drain off whatsoever fresh discharge comes from countrysides, thus ultimately draining into Bay of Bengal. Some important rivers in Sundarban are Muriganga, Mridangabhanga, Saptamukhi, Raimangal, Matla, Bidya, Thakuran, Malancha, Kalindi, Gomar etc. The total land area of Sundarban sub-basin is 6,747 sq. km. whereas including all rivers and creeks, Sundarban has gross area of 10,209 sq. km.

3.3. SUBARNAREKHA BASIN

The river Subarnarekha (also called Swarnarekha) though it has small catchment within this state, has separate entity as it directly falls into the Bay of Bengal. Originating in the Chhotonagpur Range at an elevation of 609 m. near Ranchi, it traverses through three states *viz.* Jharkhand, West Bengal and Orissa. It drains out rainwater from a total area of 19,684 sq. km. out of which only 3,593 sq. km falls within Purulia, Paschim Medinipur and Jhargram districts of West Bengal.

One major dam at Chandil and one barrage at Galudi have been constructed across Subarnarekha in Jharkhand. The important tributaries on the right bank of this river are Kanchi and Karkari, which meet Subarnarekha above Chandil dam and another right bank main tributary named as Kharkai meets this river near Jamshedpur upstream of Galudi barrage. Dulung is the main tributary, which joins Subarnarekha from its left in the Jhargram district of West Bengal. The total length of this river is 395 km. out of which 83 km. falls within West Bengal.

Distribution of Catchment Area of River Basins & Sub-Basins of West Bengal

CWC Basin Code	*River Basin*	*Sub-Basins*	*CATCHMENT AREA (Sq. Km.)*			*TOTAL (Sq. Km)*
			Jharkhand	*Orissa*	*West Bengal*	
6	*SUBARNAREKHA*	Subarnarekha	13014	3077	3286	*19377*
		Kashpal			307	*307*
		Sub-Total	13014	3077	3593	*19684*

4. HYDRO-METEOROLOGICAL DATA COLLECTION & DISSEMINATION

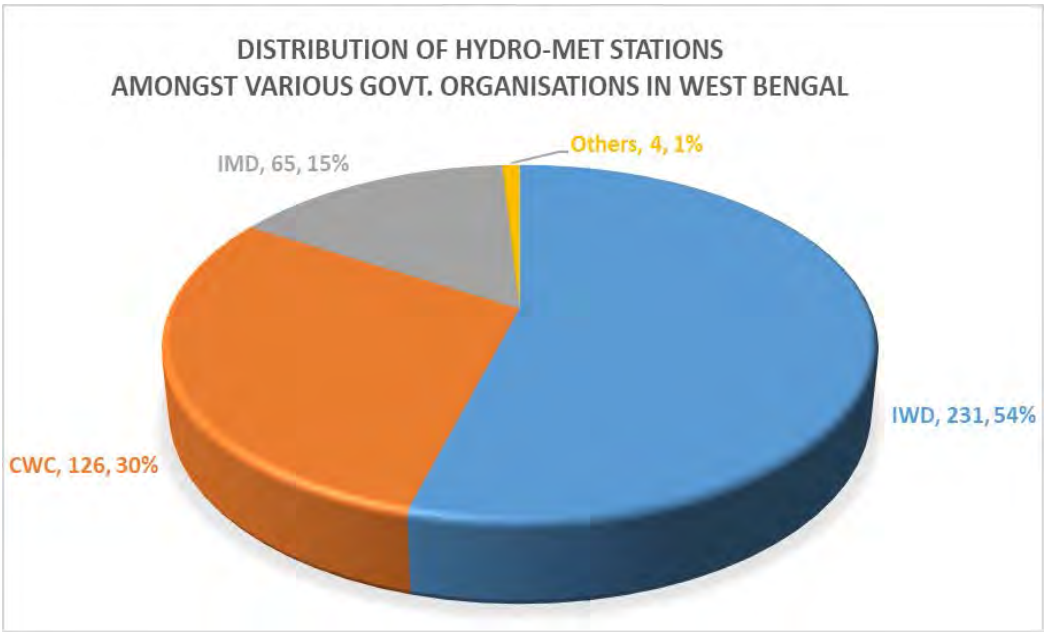
Irrigation and Waterways Department (IWD), Govt. of West Bengal is responsible for maintenance, collection, compilation and dissemination of hydrological and meteorological data for the purpose of monitoring of flood or flood-like situation for almost all river sub-basins of the State during monsoon. For this purpose, network of river gauges and rain gauges have been established at the important locations and during monsoon flood control rooms in each district are set up including the Central Flood Control Room (CFCR) at Jalasampad Bhavan, Salt Lake, Kolkata.

4.1. Rain and River Gauges

Apart from IWD, other organizations like Central Water Commission (CWC), India Meteorological Department (IMD), State Agricultural Department (AGRI), Kolkata Port Trust (KoPT), Damodar Valley Corporation (DVC) and Surface Water Investigation Directorate (SWID) under Water Resources Investigation & Development Department (WRIDD) have set up network of river gauges and rain gauges of their own at different locations for monitoring hydrological and meteorological data. These field data mainly include daily rainfall, water level of river and reservoir, river discharge and inflow-outflow from reservoir. In addition to that other information like inflow forecast, meteorological forecast and flood damage are also collected.

Existing Hydro-Met Monitoring Stations in the State

Type	IWD	CWC	IMD	Others
Rain Gauge Stations (ORG/ARG/AWS/FCS)	127	45	65	3
River Gauge Stations (G/G-D/Sediments/HOS)	104	81	-	1
Total	231	126	65	4
ORG = Ordinary Rain Gauges		ARG = Automatic Rain Gauges		
AWS= Automatic Weather Station		FCS = Full Climatic Station		
HOS = Hydrological Observation Station (Gauge, Discharge, Silt/Sediment, Water Quality)		HMS = Hydro-Meteorological Station (Rainfall, Temperature, Wind speed, Solar radiation, Humidity, & other Weather parameters)		



Besides Ordinary Rain & River gauges, IWD also maintains seven (7) Gauge-Discharge stations at different rivers and thirteen (13) Hydrological Observation Stations (HOS) at Dam & Barrage sites for measurement of Reservoir levels, Inflow, Outflow, Canal discharges & sediment/silt content if requires.

A comprehensive list of existing Hydro-Met stations within the State under the jurisdiction of Irrigation & Waterways Department, Central Water Commission and India Meteorological Department and the data recorded by Irrigation & Waterways Department, is given in the **Annexure III.**

Recently under National Hydrology Project (NHP), IWD is going to commission a '*Real Time Data Acquisition System (RTDAS)*' for efficient flood forecasting and modelling within the State. For this, fully automated radar and sensor type new hydro-met stations will be installed. Automated rain gauges (ARG), automated water level recorder (AWLR) as river gauges, automated weather stations (AWS), velocity radars, and automatic reservoir monitoring stations are being proposed under the RTDAS.

4.2. Role of Central Flood Control Room

The present flood monitoring and management system in the State comprises with the preparation of Daily Flood Report by Central Flood Control Room (CFCR) of IWD and transmission of the same to the State Disaster Management Department with the Head Quarter at Kolkata. This report is also shared with the Chief Secretary, Home Secretary of the State and other organization like Railway Authorities, Bengal Army Headquarters, CWC-Easten Zone Monitoring Office, Kolkata Port Trust (KoPT), Municipal Corporation of Kolkata (KMC), and all District Magistrates of the State.

This Daily Flood Report generally contains rainfall, river and gauge and discharge, river warning levels/signals, weather information, reservoir level/inflow/outflow data of different Stations within and outside the State. Sometimes the location and extent of major damages, the status of affected areas under inundation etc. are also included, as and when the situation such warrants. These data are collected from different district flood control rooms under IWD (details given in **Annexure XII**) along with other agencies like IMD, CWC and DVC by telephone, fax, e-mail or Whatsapp messages. Daily flood report is also uploaded in the departmental web site ***www.wbiwd.gov.in***.

During emergency, separate Flood Bulletin is issued and the same will be disseminated also to the District Disaster Management Cells and other authorities via e-mail, Fax, SMS or Whatsapp messages.

This year, CFCR was operational 24x7 during entire monsoon & flood season starting from 1st June, 2019 to 31st October 2019, collected raw data from all existing hydro-met stations & reservoir data of IWD's district control rooms, rainfall and weather forecast/warning from IMD websites, relevant data from CWC, DVC, Chandil Dam, Galudih & Sikatia barrage authorities, compiled all these in the standard proforma and finally prepared the Daily Flood Report for dissemination by 10.00 a.m.

Besides flood season, this year CFCR was in force round the clock during severe cyclonic storms as *'Fani'* & *'Bulbul'* right from its formation until it fades from the State. It continuously monitored the position & stages, gathered weather information from IMD New Delhi & Kolkata offices, collected damage reports from IWD field offices and published the Special Bulletin twice daily.

5. RAINFALL

Climatological variations are observed in West Bengal due to its physical and geographical position. The annual average rainfall in the State is 1750 mm, of which more than 75% occurs during the monsoon period while the hilly regions at the foothills of Himalaya receive the heaviest rainfall ranging from 2500 mm to 4000 mm. The southern districts in the plains receive average of 1125 mm to 1875 mm. Main rainfall season in this state is the South-West monsoon season during which the entire land (excepting the extreme north, the extreme north-east and extreme south) gets 75% of the annual rainfall. The gangetic plains of West Bengal get 78% of its annual rainfall during the monsoon period distributed normally from 1st day of June to the end of September. But during last few years, some parts of West Bengal have experienced premature heavy rainfall in the last week of May causing flood. However, the late withdrawal of monsoon even after second week of October has also been observed during these years.

5.1. Normal Rainfall Pattern

The river Ganga divides the State into two parts, which are by and large homogeneous from the meteorological point of view. The northern half is designated as 'Sub-Himalayan West Bengal' and the southern half as 'Gangetic West Bengal'. Sub-Himalayan West Bengal is more susceptible to heavy rains both in respect of amount as well as in frequency of occurrence.

Very heavy rain is more frequent in first two months (June and July) than in subsequent, in the Sub-Himalayan West Bengal. In Gangetic West Bengal, the frequency is maximum in August followed by June, July and September in that order. On the basis of rainfall distribution, the State can be divided into two broad zones -(i) The Himalayan and Sub-Himalayan Region (ii) The Gangetic Plains

i) Himalayan and Sub-Himalayan Region

The Himalayan and Sub-Himalayan Region comprises the districts of Darjeeling, Kalimpong Jalpaiguri, Coochbehar and Northern part of Islampur Sub-Division of Uttar Dinajpur district of high intensity of average annual rainfall from 2000 mm to over 4000 mm, about 80% of which is found to occur during monsoon season. On an average, Darjeeling, Coochbehar and Jalpaiguri get 114, 112 and 110 rainy days respectively in a year.

The monsoon generally follows a northern track to ultimately break up against Eastern Himalaya causing very heavy rainfall and thereafter, trough of low pressure under break monsoon conditions. It then shifts northward to the Himalayan foothills. It has been found that a precipitation between 200 to 300 mm in two hours is not unusual here.

ii) Gangetic Plains

The gangetic plains which constitute the major portion of the State, can be further sub-divided into the following three sectors on the basis of average rainfall.

Sector-I: Bankura, Burdwan, Hooghly, Nadia and Purulia districts which receive an average annual rainfall - between 1140 mm and 1400 mm.

Sector-II: Birbhum, Midnapore, Murshidabad and North 24-Parganas having an average annual rainfall between 1400 mm and 1650 mm.

Sector-III: Kolkata, Howrah and South 24-Parganas having an average annual rainfall - between 1650 mm and 1900 mm.

Such regional variations in the precipitation pattern may causes flood condition time to time.

5.2. Intensity & Spatial Distribution of Rainfall

The India Meteorological Department (IMD) categorizes the intensity and distribution of daily rainfall in the following manner:

Intensity of Rainfall

Descriptive term used	Rainfall amount (in mm)	Descriptive term used	Rainfall amount (in mm)
No Rain	0	Rather Heavy Rain	35.6 - 64.4
Very Light Rain	0.1 - 2.4	**Heavy Rain**	**64.5 - 124.4**
Light Rain	2.5 - 7.5	**Very Heavy Rain**	**124.5 - 244.4**
Moderate Rain	7.6 - 35.5	**Extremely Heavy Rain**	**> 244.5**
Exceptionally Heavy Rain	When the amount is a value near about the highest recorded rainfall at or near the station for the month or season. However, this term will be used only when the actual rainfall amount exceeds 120 mm.		

Spatial Distribution of Rainfall

Distribution	No. of Places	Description
Isolated	One or two places	< 25% of stations get rainfall
Scattered	At a few Places	(26–50) % of stations get rainfall
Fairly Widespread	At many places	(51–75) % of stations get rainfall
Wide spread	At most places	(76–100) % of stations get rainfall
Dry	–	No station reported rainfall

Weekly/Seasonal Rainfall Distribution on Regional Scale

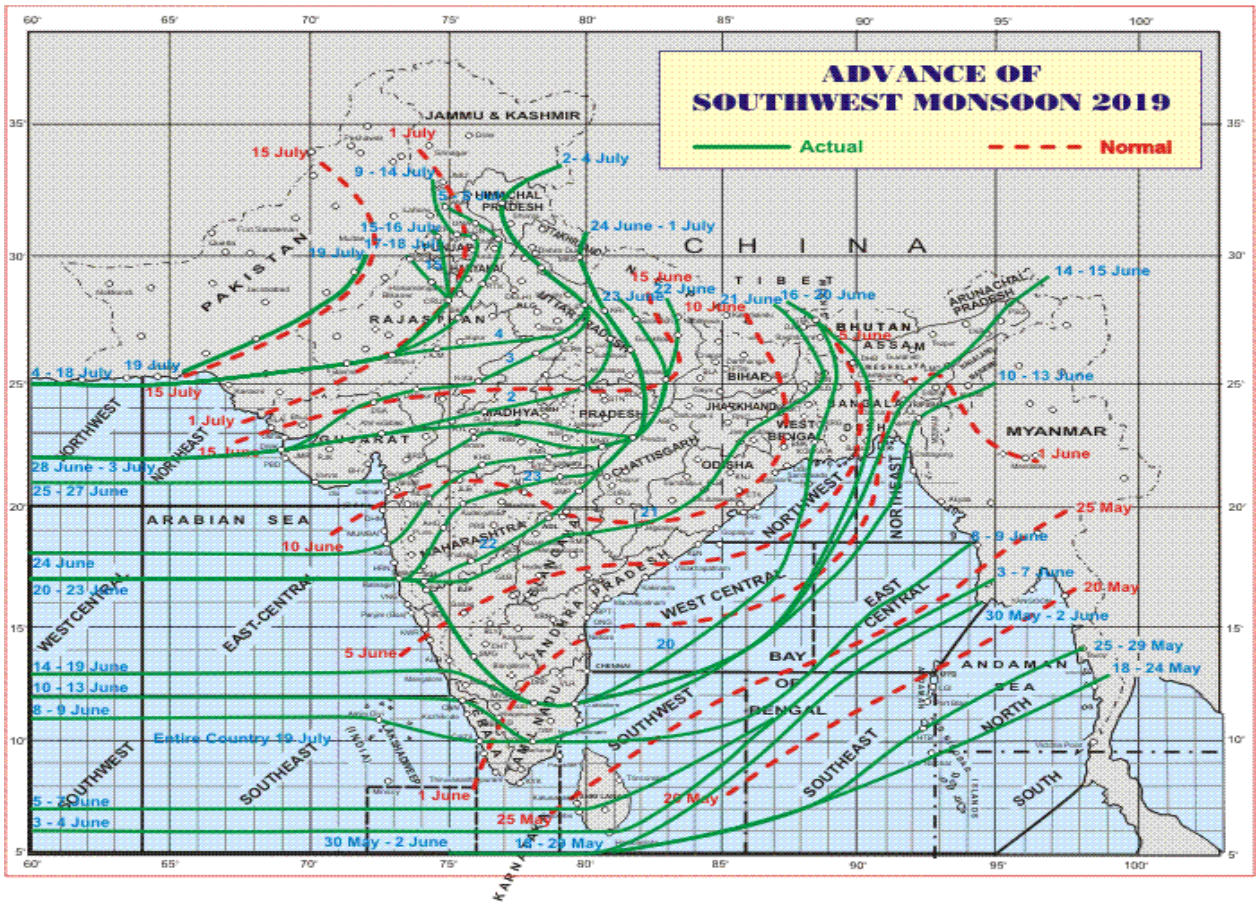
Large Excess	Percentage departure of realized rainfall from normal rainfall is + 60% or more.
Excess	Percentage departure of realized rainfall from normal rainfall is between + 20% to + 59%.
Normal	Percentage departure of realized rainfall from normal rainfall is between - 19 % to + 19 %.
Deficient	Percentage departure of realized rainfall from normal rainfall is between - 20 % to - 59 %.
Scanty	Percentage departure of realized rainfall from normal rainfall is between - 60 % to - 99 %.
No Rain	Percentage departure of realized rainfall from normal rainfall is - 100 %.

Rainfall Distribution on All India Scale

Normal	Percentage departure of realized rainfall from normal rainfall is within ± 10 % of the Long Period Average.
Below Normal	Percentage departure of realized rainfall from normal rainfall is < 10 % of the Long Period Average.
Above Normal	Percentage departure of realized rainfall from normal rainfall is > 10 % of the Long Period Average.
All India Drought Year	When the rainfall deficiency is more than 10%, and when 20 to 40% of the country is under drought conditions, then the year is termed as All India Drought Year
All India Severe Drought Year	When the rainfall deficiency is more than 10% and when the spatial coverage of drought is more than 40%, it is called as All India Severe Drought Year.

5.3. Monsoon 2019

As per IMD-Kolkata, this year South West Monsoon had onset over Kerala on 8th June and had arrived some part of North Bengal & Sikkim on 16th June. It covered many parts of South Bengal within 21st June.



The Sectoral variations of monthly average rainfall in West Bengal during monsoon months 2019 is given below, which is derived from IMD's district-wise monthly rainfall (presented in **Annexure IV-A).**

Variation of Monthly Average Rainfall (mm) of Sub-Himalayan West Bengal during Monsoon 2019

Month	June			July			August			September		
North Bengal Sector	Actual	Normal	% Dep	Actual	Normal	% Dep	Actual	Normal	% Dep	Actual	Normal	% Dep
	292.7	462.6	-36.7%	737.0	627.8	17.4%	243.9	470.6	-48.2%	455.6	384.6	18.5%

Variation of Monthly Average Rainfall (mm) of Gangetic Plains of West Bengal during Monsoon 2019

Month	June			July			August			September		
South Bengal	Actual	Normal	% Dep	Actual	Normal	% Dep	Actual	Normal	% Dep	Actual	Normal	% Dep
Sector-I	97.7	232.3	-58.0%	200.4	296.6	-32.4%	276.5	275.3	0.5%	233.3	235.1	-0.8%
Sector-II	105.6	257.7	-59.0%	213.8	330.7	-35.4%	307.6	318.4	-3.4%	311.8	292.9	6.4%
Sector-III	106.5	281.9	-62.2%	179.2	388.5	-53.9%	505.8	353.4	43.1%	351.0	318.5	10.2%

*Dep = Departure **Source: IMD, Kolkata

The graphical representation of district-wise monthly rainfall 2019 vis-à-vis normal rainfall are given in **Annexure IV-B.** The cumulative monthly rainfall of various Rain gauge stations for different River Sub-Basins, as observed at I&WD's Central Flood Control Room during entire flood season *i.e.* from 1st June to 31st October, is given in **Annexure - VI.**

The progress of monsoon 2019 week by week as per IMD for West Bengal is as follows.

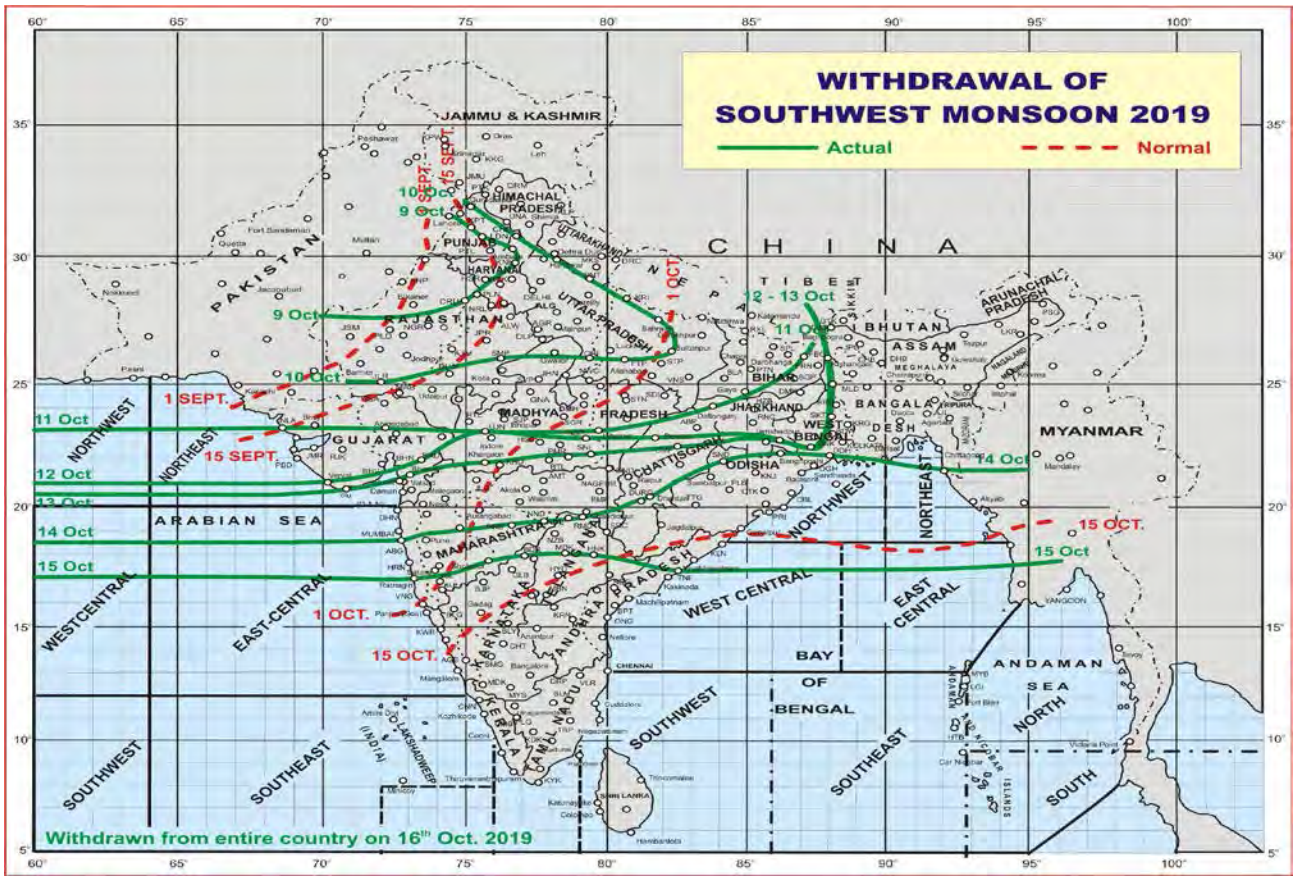
S.NO	MET.SUBDIVISION	WEEK ENDINGS																
		5-Jun	12-Jun	19-Jun	26-Jun	3-Jul	10-Jul	17-Jul	24-Jul	31-Jul	7-Aug	14-Aug	21-Aug	28-Aug	4-Sep	11-Sep	18-Sep	25-Sep	30-Sep
5	S.H.W.B. & SIKKIM																		
6	GANGATIC W.B.																		

In North Bengal (Himalayan and Sub-Himalayan region), the average monsoon rainfall deviation was -11.1% from its normal average while that of South Bengal (Gangetic Plains) is -20.1%. Details are given in **Annexure V**.

Average Monsoon Rainfall [01.06.18-30.09.18] (mm)			
Zone	*Actual*	*Normal*	*% Dep*
North Bengal	1729.2	1945.5	-11.1%
South Bengal	935.4	1170.9	-20.1%

For the State as a whole, the monsoon rainfall as per IMD, from 1st June to 30th September 2019 was near to **normal** with some shortfall, the percentage departure i.e. deviation from its normal value is **-16.2%**. The annual rainfall deficiency is somehow adjusted with post monsoon and winter rainfall. Thus, annual average rainfall for the state is achieved at normal with a minimum shortfall departure of **-7.4%** only. Season-wise Average Rainfall Statistics of West Bengal for the Year 2019 as per data provided by IMD, Kolkata is presented in **Annexure V.**

As per IMD, Kolkata, SW monsoon had started withdrawing from some parts of West Bengal on 12th October 2019 and from most parts of West Bengal on 14th October 2019.

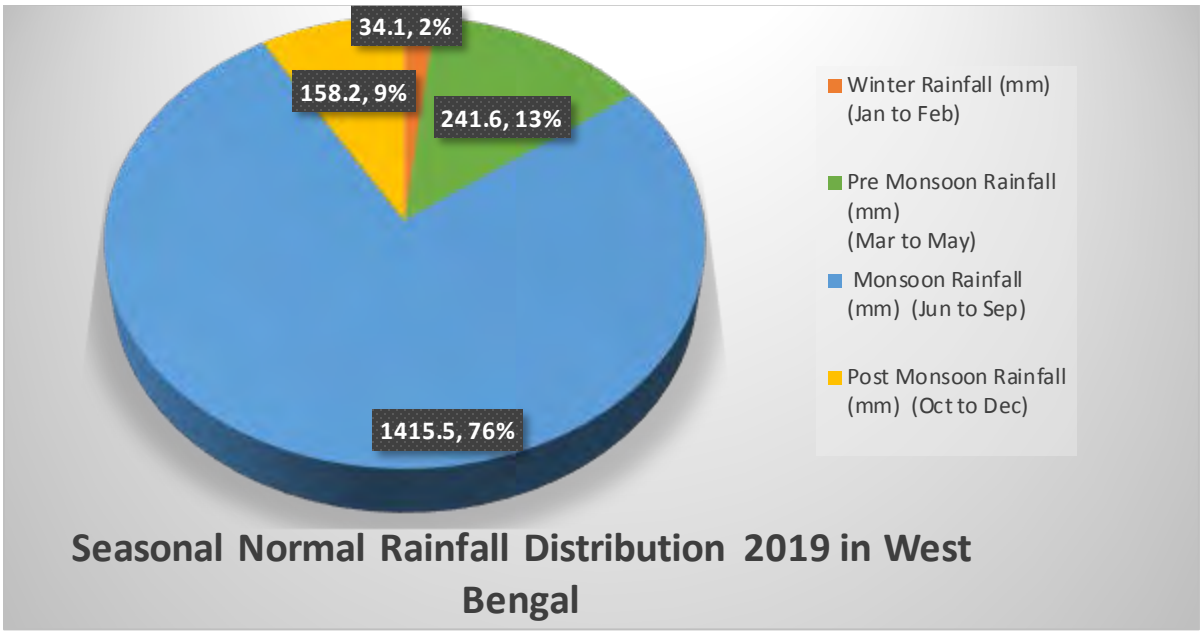


5.4. Annual Rainfall 2019

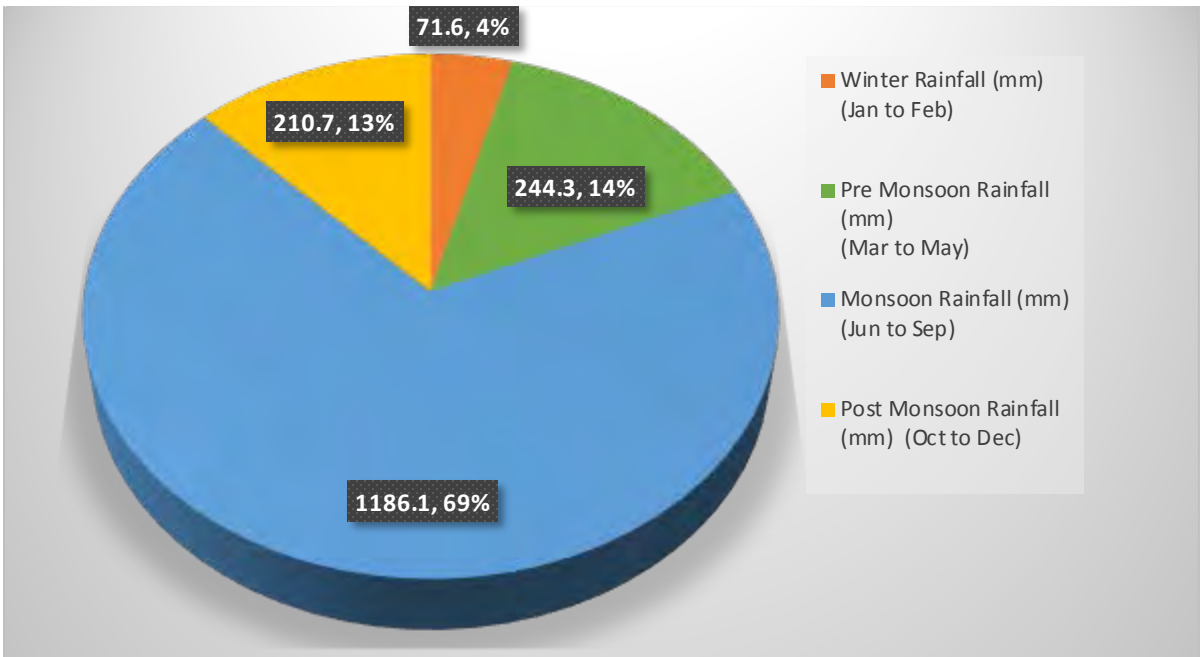
As defined by IMD, meteorological seasons comprising of four seasons.

A) Winter (1st January to 28th February)
B) The Pre-monsoon (1st March to 31st May),
C) Monsoon (1st June to 30th September) and
D) Post-monsoon (1st October to 31st December)

The seasonal distribution of rainfall in West Bengal is graphically presented below:

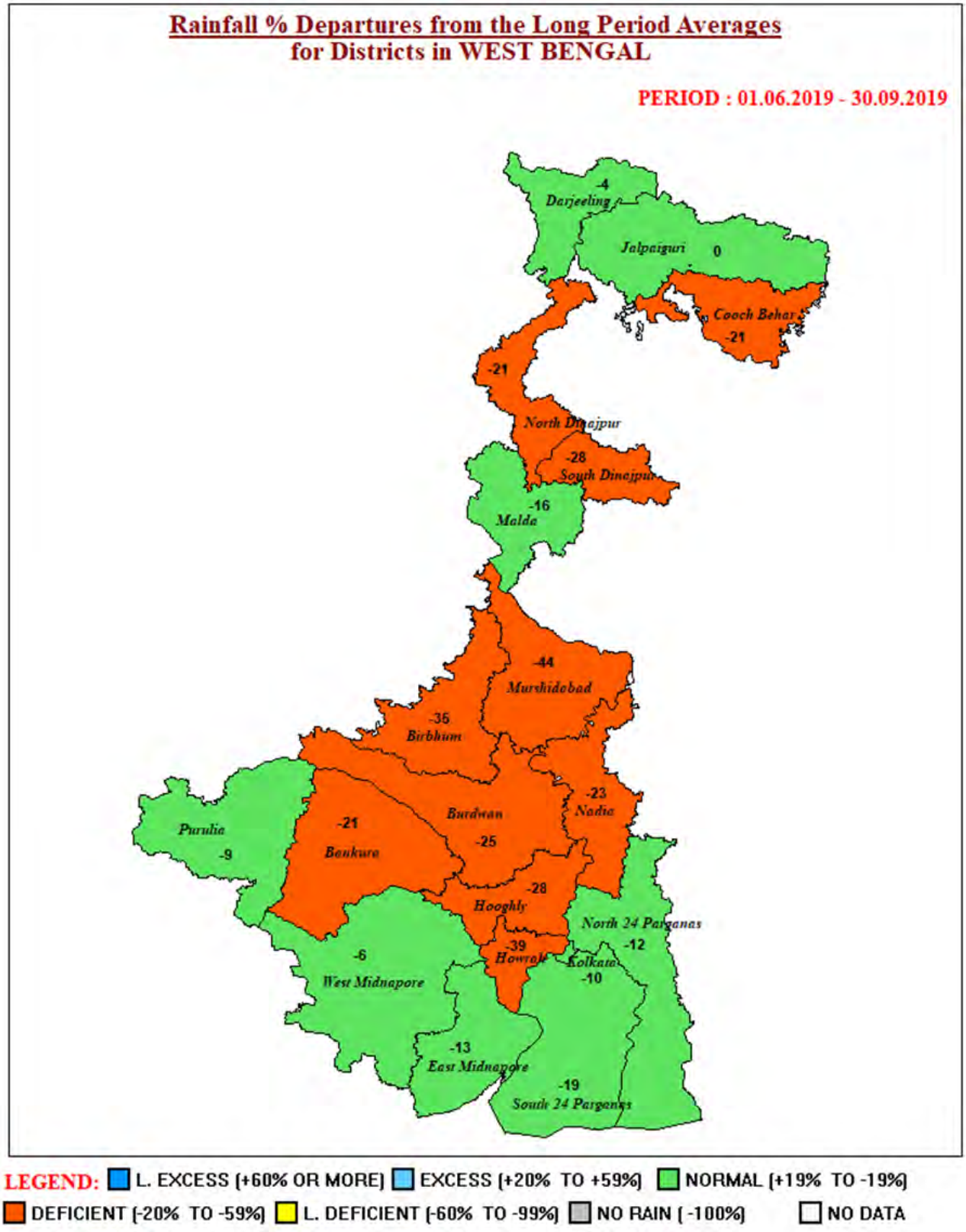


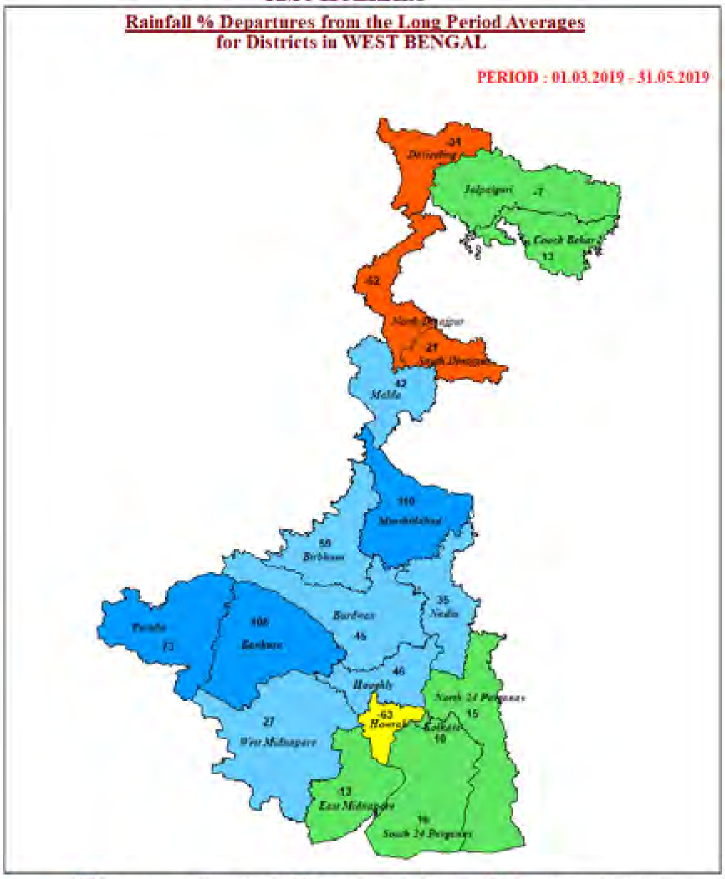
Seasonal Normal Rainfall Distribution 2019 in West Bengal



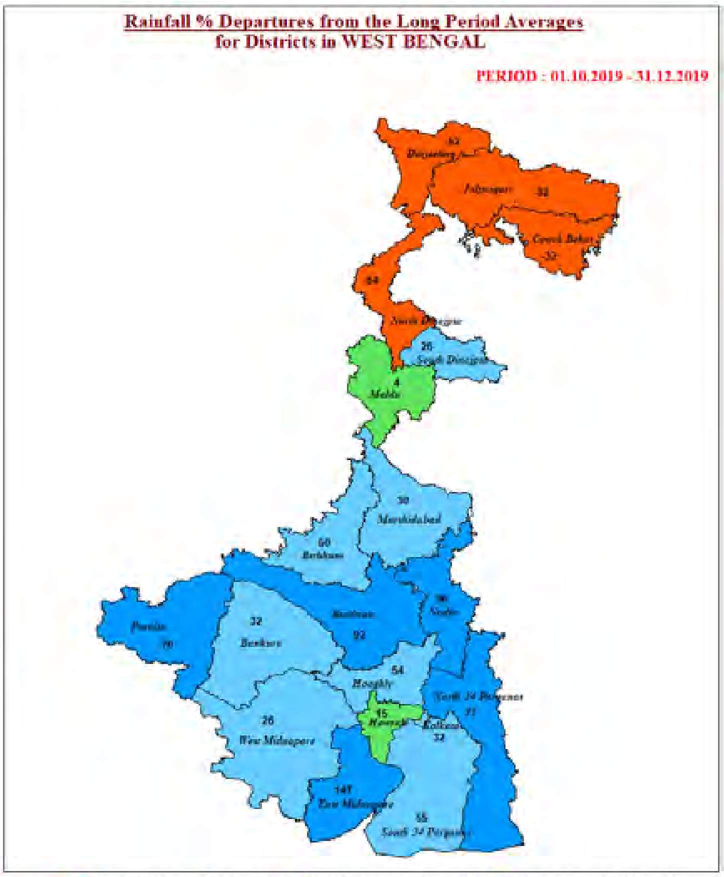
Seasonal Actual Rainfall Distribution 2019 in West Bengal

IMD, RMC, Kolkata has prepared a percentage rainfall departure map from long period average for the districts in West Bengal for monsoon, pre-monsoon, and post monsoon period which are presented below in seriatim:





LEGEND: L. EXCESS [+60% OR MORE] EXCESS [+20% TO +59%] NORMAL [+19% TO -19%]
DEFICIENT [-20% TO -59%] L. DEFICIENT [-60% TO -99%] NO RAIN [-100%] NO DATA



LEGEND: L. EXCESS [+60% OR MORE] EXCESS [+20% TO +59%] NORMAL [+19% TO -19%]
DEFICIENT [-20% TO -59%] L. DEFICIENT [-60% TO -99%] NO RAIN [-100%] NO DATA

6.FLOOD SEASON 2019

As per Govt. of India's Water Resources Information System (India-WRIS) and Central Water Commission (CWC), monsoon period comprises of five months from June to October. Consequently, flood season also comprises from June to October. The distribution of monthly average rainfall in the State for this season shows overall normal rainfall with average deficit of rainfall of 13.2% that varies from maximum deficit of 49.1% in June 2019 to maximum surplus of 19.2% in October 2019.

Distribution of Monthly Average Rainfall in West Bengal during Flood Season 2019

Month	*Actual Rainfall (mm)*	*Normal Rainfall (mm)*	*% Departure*	*Remarks*
Jun-19	162.70	319.50	-49.10%	Deficient rainfall
Jul-19	370.00	424.70	-12.90%	Normal rainfall
Aug-19	310.60	360.60	-13.90%	Normal rainfall
Sep-19	342.70	310.70	10.30%	Normal rainfall
Oct-19	157.40	132.00	19.20%	Normal rainfall

* Data source: IMD-Kolkata

Month-wise statistical analysis of River Gauges i.e. Maximum peak values, Minimum river gauges, average river stages, number of days river level crossed primary danger level (PDL), danger level (DL) and extreme danger level (EDL) and during Flood Season, 2019 is presented in **Annexure VII.**

6.1. Flood Spells in North Bengal

6.1.1. In June 2019: On the onset of monsoon, one day heavy to very heavy rainfall on 15th June had occurred in Jalpaiguri District but as the North Bengal rivers were thirsty at very beginning it was well attenuated. After ten days there was a three days spell of heavy to extremely heavy rainfall had occurred in Brahmaputra Basin with **405.4 mm** rainfall in past 24 hrs. at **Alipurduar** recorded at 8:30 AM on **26.6.19**, the maximum daily rainfall value of entire flood season. The Rainfall spell is show in the following table:

Sl. No.	*River Sub Basin*	*District*	**Normal Annual Rainfal (mm)**	*Rain Gauge Station*	*Rainfall in past 24-hrs. (mm)*			*Total Rainfall in 3-days (mm)*	*% of Normal Annual*
					25.6.19	*26.6.19*	*27.6.19*		
1	*Teesta*	East Sikkim	2739.00	*Gangtok*	0.50	117.80	27.00	145.30	5.30%
2		Jalpaiguri	3463.30	*Malbazar*	56.90	148.50	27.20	232.60	6.72%
3	*Jaldhaka*			*Banarhat*	30.40	222.00	34.00	286.40	8.27%
4	*Torsa*			*Hasimara*	167.00	**251.80**	108.00	526.80	15.21%
5	*Sankosh*	Alipurduar	3463.30	*Barabisha*	19.80	**269.60**	55.20	344.60	9.95%
6	*Torsa*			*Alipurduar*	12.00	**405.40**	44.00	461.40	13.32%
7		Coochbehar	3443.70	*Coochbehar*	29.70	76.80	10.60	117.10	3.40%
8				*Tufanganj*	0.00	170.40	20.20	190.60	5.53%

As a consequence, the rivers in the basin spate and flows at alarming levels. The peak flood levels in different river gauge stations is presented below.

Sl	*River*	*Gauge Station*	*District*	*Maximum Water Level / Flood Peak*		
				(mGTS)	*On*	*Remarks*
1	*Raidak-I*	*Tufanganj*	Coochbehar	35.01	27-06-2019	0.29 m. below DL
2	*Torsa*	*Coochbehar*		41.42	27-06-2019	0.04 m. below PDL
3		*Hasimara*	Alipurduar	116.40	25-06-2019	0.10 m. above DL
4	*Kaljani*	*Alipurduar*		45.40	26-06-2019	0.30 m. above DL
5	*Diana*	*Chengmari*	Jalpaiguri	201.00	25-06-2019	*0.20 m. below EDL*
6	*Jaldhaka*	*NH-31 Crossing*		79.94	26-06-2019	0.16 m. below DL

6.1.2. In July 2019: Rainfall in North Bengal districts (except North Dinajpur) in July 2019 were above normal **(Annexure IV - A & B).** An 8 - 10 days lengthy rainfall spell in from 2nd week of July observed in entire North Bengal, mostly on lower Brahmaputra basin and middle Ganga basin. The rainfall statistics during 7th to 16th July at some of the important rain gauge stations in North Bengal is shown in the following table.

Sl. No.	River Sub Basin	District	Normal Annual Rainfall (mm)	Rain Gauge Station	Rainfall In 9-Days (mm)	% Of Normal Annual	One Day Max. Rainfall	
							(mm)	On
1	Teesta	Darjeeling	3118.50	Darjeeling	532.70	17.08%	138.60	08.7.19
2	Mahananda			Siliguri	738.80	23.69%	147.40	12.7.19
3	Torsa	Jalpaiguri	3463.30	Hasimara	692.60	20.00%	218.00	14.7.19
4	Teesta			Malbazar	584.40	16.87%	142.20	11.7.19
5				Jalpaiguri	709.40	20.48%	204.00	14.7.19
6	Jaldhaka			Banarhat	631.30	18.23%	137.00	11.7.19
7				Mainaguri	689.00	19.89%	194.00	14.7.19
8	Sankosh	Alipurduar	3463.30	Barabisha	628.10	18.14%	147.00	10.7.19
9	Torsa			Alipurduar	766.20	22.12%	154.80	14.7.19
10	Jaldhaka	Coochbehar	3443.70	Mathabhanga	540.40	15.69%	121.60	13.7.19
11	Torsa			Coochbehar	639.30	18.56%	197.40	13.7.19
12				Tufanganj	597.20	17.34%	125.40	14.7.19
13	Mahananda-fulhar	Uttar Dinajpur	1727.60	Islampur	272.60	15.78%	58.20	14.7.19
14				Raiganj	263.10	15.23%	57.40	15.7.19
15	Atreyee	Dakshin Dinajpur	1584.90	Balurghat	463.90	29.27%	123.00	09.7.19
16	Punarbhaba			Gangarampur	195.40	12.33%	74.50	08.7.19

Another 4 days heavy spell of rainfall from 21st / 22nd July to 24th / 25th July has worsen situation. The rainfall statistics tabulated below.

Sl. No.	River Sub Basin	District	Normal Annual Rainfall (mm)	Rain Gauge Station	Rainfall in 4 days. (mm)	% of Normal Annual	One Day Max. Rainfall	
							(mm)	On
1	Teesta	Jalpaiguri	3463.30	Malbazar	384.30	11.10%	267.10	24.7.19
2				Jalpaiguri	321.80	9.29%	173.00	22.7.19
3	Jaldhaka			Banarhat	555.30	16.03%	238.00	24.7.19
4				Mainaguri	301.00	8.69%	169.00	22.7.19
5	Torsa			Hasimara	385.60	11.13%	130.20	23.7.19
6	Torsa	Alipurduar	3463.30	Alipurduar	637.60	18.41%	270.20	22.7.19
7	Sankosh			Barabisha	826.40	23.86%	397.60	24.7.19
8	Jaldhaka	Coochbehar	3443.70	Mathabhanga	316.00	9.18%	124.00	24.7.19
9	Torsa			Coochbehar	390.90	11.35%	177.10	22.7.19
10				Tufanganj	338.40	9.83%	170.80	23.7.19
11	Mahananda	Darjeeling	3118.50	Siliguri	305.60	9.80%	233.00	24.7.19
12	Atreyee	Dakshin Dinajpur	1584.90	Balurghat	224.20	14.15%	132.80	23.7.19
13	Punarbhaba			Gangarampur	98.55	6.22%	77.55	24.7.19

As a result, rivers of North Bengal experienced two peak inflow hydrographs during July 2019 and River Fulahar in particular, continuously flowed at alarming level during entire month due to prolonged rainfall and its accumulation at its upper catchment situated outside of the State. The peak flood levels in different river gauge stations have been presented in the table below.

Sl. No.	River	Gauge Station	District	Maximum Water Level / Flood Peak		
				(mGTS)	On	Remarks
1	Raidak-I	Tufanganj	Coochbehar	36.12	24.7.19	0.22 m. above EDL
2	Torsa	Hasimara	Alipurduar	116.05	24.7.19	0.25 m. below DL
3		Coochbehar	Coochbehar	41.74	13.7.19	0.33 m. below DL
4	Kaljani	Alipurduar	Alipurduar	45.25	14.7.19 & 24.7.19	0.15 m. above DL
5	Diana	Chengmari	Jalpaiguri	200.60	24.7.19	0.10 m. above DL
6	Jaldhaka	NH-31 Crossing	Jalpaiguri	80.08	12.7.19	0.02 m. below DL
7	Mansai	Mathabhanga	Coochbehar	47.66	24.7.19	0.04 m. below DL
8	Teesta	Teesta Bazar	Darjeeling	210.80	11.7.19	0.20 m. below DL
9		Domohani	Jalpaiguri	85.94	12.7.19	0.01 m. below DL
10		Mekhliganj	Coochbehar	65.59	13.7.19	0.36 m. below DL
11	Mahananda	Hill Cart Road	Darjeeling	115.50	12.7.19	0.48 m. below DL
13		Englishbazar	Malda	20.56	24.7.19	0.44 m. below DL
14	Fulhar	Teljana	Malda	28.56	18.7.19	0.21 m. above EDL
15	Atreyee	Balurghat	South Dinajpur	23.14	17.7.19	0.01 m. below DL
16	Punarbhaba	Gangarampur	South Dinajpur	26.32	16.7.19	0.5 m. above DL

Due to high river stages, warning signals were frequently imposed for unprotected & protected areas of North Bengal. List of such signals is presented in **Annexure X.**

6.1.3. In August: Rainfall of August 2019 in North Bengal was deficient i.e. below normal **(Annexure IV - A & B).** Hence river stages were also not troublesome.

6.1.4. In September: On the contrary, rainfall in North Bengal districts in September 2019 were above normal **(Annexure IV- A & B).** Almost uniformly distributed rain had occurred during the month with some concentration observed near 15th to 17th September & 23rd to 25th September. One-day peak rainfall in this month at different rain gauge locations are presented below.

Sl. No.	River Sub Basin	District	Normal Annual Rainfall (mm)	Rain Gauge Station	One Day Max. Rainfall	
					(mm)	On
1	Teesta	East Sikkim	2739.00	Gangtok	82.00	13.9.19
2		Darjeeling	3118.50	Darjeeling	78.40	13.9.19
3		Jalpaiguri	3463.30	Malbazar	96.00	16.9.19
4				Jalpaiguri	163.40	23.9.19
5	Jaldhaka			Banarhat	87.30	22.9.19
6				Mainaguri	112.00	25.9.19
7		Coochbehar	3443.70	Mathabhanga	94.60	9.9.19
8	Sankosh	Alipurduar	3463.30	Barabisha	134.40	15.9.19
9	Torsa	Jalpaiguri		Hasimara	143.00	17.9.19
10		Alipurduar		Alipurduar	182.20	25.9.19
11		Coochbehar	3443.70	Coochbehar	74.70	29.9.19
12				Tufanganj	124.80	24.9.19
13	Mahananda-Fulhar	Darjeeling	3118.50	Siliguri	121.00	25.9.19
14		Uttar Dinajpur	1727.60	Islampur	56.30	30.9.19
15				Raiganj	105.40	23.9.19
16		Malda	1419.40	English Bazar	99.80	30.9.19
17	Atreyee	Dakshin Dinajpur	1584.90	Balurghat	59.40	13.9.19
18	Punarbhaba			Gangarampur	68.50	17.9.19

Due to such evenly distributed rain, river stages in North Bengal was not on high spate except River Jaldhaka at NH-31 Crossing where gauge had crossed PDL during heavy precipitation, River Fulhar at Teljana where gauge had crossed DL during heavy precipitation and River Ganda at Manikchakghat, Malda where gauge had crossed EDL during heavy precipitation as well as upper catchment discharge. Following table shows the peak flood conditions.

Sl. No.	*River*	*Gauge Station*	*District*	**Maximum Water Level / Flood Peak**		
				(mGTS)	**On**	**Remarks**
1	Jaldhaka	NH-31 Crossing	Jalpaiguri	79.80	24-09-2019	0.30 m. below DL
2	Fulhar	Teljana	Malda	27.75	30-09-2019	0.32 m. above DL
3	Ganda	Manikchakghat		25.93	30-09-2019	*0.63 m. above EDL*

6.1.5. In October: Rainfall of October 2019 in North Bengal was almost deficient i.e. below normal except in the Malda district (Annexure IV - A & B). Hence river stages were normal except Rivers Mahananda-Fulahar & Ganga-Padma in Malda district. Due to continuous upland discharge, their high spate was predominant during the 1st week of October 2019. The River Gauges of Malda district in the first 10-days are presented below to describe the situation.

Date	*River Mahananda at Englishbazar*		*River Fulahar at Teljana*		*River Ganga-Padma at Manikchakghat*	
	WL (mGTS)	*Crossed DL by (m)*	*WL (mGTS)*	*Crossed DL by (m)*	*WL (mGTS)*	*Crossed EDL by (m)*
1.10.19	21.25	0.25	28.23	0.80	25.98	*0.68*
2.10.19	21.45	0.45	*28.27*	0.84	*25.99*	*0.69*
3.10.19	21.57	0.57	28.24	0.81	*25.99*	*0.69*
4.10.19	*21.63*	0.63	28.08	0.65	25.94	*0.64*
5.10.19	21.61	0.61	27.91	0.48	25.86	*0.56*
6.10.19	21.62	0.62	27.74	0.31	25.78	*0.48*
7.10.19	21.54	0.54	27.61	0.18	25.65	*0.35*
8.10.19	21.47	0.47	27.45	0.02	25.48	*0.18*
9.10.19	20.70	Below DL	26.35	Below DL	25.35	*0.05*
10.10.19	21.07	0.07	27.10	Below DL	24.92	Below EDL

Flood frequency curves (Gauge Level vs. Time) of different rivers in entire North Bengal have been presented in **Annexure VIII-A**.

6.2. Flood Spells in South Bengal

6.2.1. In June & July: Rainfall of early part of Monsoon in South Bengal was deficient i.e. below normal **(Annexure IV - A & B).** Hence river stages were either below gauge or lacking excess flesh.

6.2.2. In August: Overall rain in August was normal. Apart from some intermittent heavy rain at the beginning, two days heavy to very heavy rain had occurred in 17th & 18th August 2019 in lower gangetic plains. The rainfall pattern is presented below.

Sl. No.	River Sub Basin	District	Normal Annual Rainfall (mm)	Gauge Station	Rainfall (mm)		2 days Total (mm)	% of Normal
					17.8.19	18.8.19		
1	Amta Channel	Howrah	1600.00	Amta	62.00	75.00	137.00	8.60%
2	Kangsabati	Purba Medinipur	1669.60	Panskura	215.00	116.00	331.00	19.80%
3	Rupnarayan			Tamluk	157.50	106.00	263.50	15.80%
4	Kaliaghai			Amgachia	47.00	71.00	118.00	7.10%
5	Haldi			Itamogra	212.10	160.20	372.30	22.30%
6	Rasulpur			Contai	97.80	55.40	153.20	9.20%
7	Subarnarekha			Digha	8.00	143.50	151.50	9.10%
8	Kaliaghai	Paschim Medinipur	1535.50	Sabang	133.34	74.80	208.14	13.60%
9	Chandia			Barisha	210.00	60.00	270.00	17.60%
10	Kangsabati	Jhargram	1535.50	Jhargram	15.30	86.70	102.00	6.60%
11	Hooghly	Kolkata	1709.20	Alipore	137.60	61.50	199.10	11.60%
12	Bidyadhari	North 24-Parganas	1560.30	Dumdum	90.30	51.30	141.60	9.10%
13	Bidyadhari	South 24-Parganas	2088.00	Chowbaga	77.00	67.00	144.00	6.90%

Due to this spell of very heavy precipitation, rivers in this region flowing full and some low banked rivers like Kaliaghai, Kapaleswari, Chandia started flowing above DL. The high stages are presented below.

Sl. No.	River	Gauge Station	District	Maximum Water Level / Flood Peak		
				(mGTS)	On	Remarks
1	Chandia	Barisha	Paschim Medinipur	5.75	20.8.19	0.75 m. above EDL
2	Kapaleswari	Narayanbarh		6.21	20.8.19	0.27 m. above EDL
3	Kaliaghai	Bakhrabad		10.05	19.8.19	1.20 m. above EDL
4		Dehati		6.15	20.8.19	0.20 m. above PDL
5		Amgachia		6.30	21.8.19	0.51 m. above DL
6		Kalimandop		5.00	21.8.19	At DL

6.2.2. In September: Again, overall rain in September was nomal & evenly distributed for South Bengal, except the day of 25th when heavy to very heavy rainfall had occurred in the following manner.

Sl. No.	River Sub Basin	District	Normal Annual Rainfall (mm)	Gauge Station	Rainfall on 25.9.19 (mm)	% of Normal
1	Mayurakshi	Murshidabad	1391.10	Kandi	71.00	5.10%
2	Ajay-Hinglow	Birbhum	1612.40	Hinglow	70.00	4.30%
3	Amta Channel (Damodar)	Hooghly	1418.70	Champadanga	72.75	5.10%
4		Howrah	1600.00	Domjur	76.00	4.80%
5	Kangsabati	Purba Medinipur	1669.60	Panskura	158.00	9.50%
6	Rupnarayan			Tamluk	114.50	6.90%
7	Kaliaghai			Amgachia	115.00	6.90%
8	Haldi			Itamogra	170.20	10.20%
9	Rasulpur			Contai	110.20	6.60%
10	Subarnarekha			Digha	116.00	6.90%
11	Chandia	Paschim Medinipur	1535.50	Barisha	110.00	7.20%
12	Kaliaghai			Sabang	138.97	9.10%
13	Shilabati			Ghatal	74.80	4.90%
14	Kangsabati			Midnapore	110.60	7.20%
15	Kangsabati	Jhargram	1535.50	Jhargram	72.25	4.70%
16	Hooghly	Kolkata	1709.20	Alipore	80.50	4.70%
17	Bidyadhari	South 24-Parganas	2088.00	Chowbaga	78.00	3.70%

At the end of September, some heavy rainfall occurred in the upper catchment of Brahamani-Dwarka, Mayurakshi-Babla, Ajay-Hinglow and Damodar. Effect of such heavy rainfall had also observed on the high river stages at the month ending period and continued for the next month. Following table would depict the scenario.

Sl. No.	River	Gauge Station	District	Maximum Water Level / Flood Peak		
				(mGTS)	On	Remarks
1	Chandia	Barisha	Paschim Medinipur	5.25	30.9.19	0.25 m. above EDL
2	Kapaleswari	Narayanbarh		6.12	30.9.19	0.18 m. above EDL
3	Kaliaghai	Bakhrabad		9.35	29.9.19	0.50 m. above EDL
4		Dehati		6.15	29.9.19	At PDL
5		Amgachia		6.32	30.9.19	0.53 m. above DL
6		Kalimandop		4.73	30.9.19	0.27 m. below DL

6.2.3 In October: Rainfall of early October and end of Monsoon in South Bengal was above normal **(Annexure IV - A & B).** Apart from intermittent point rainfall, localized heavy rainfall continued even after withdrawal of monsoon due to buildup of low-pressure depression. Due to such climatology, water level of few South Bengal rivers found above DL particularly at the beginning of October because of self-saturation as well as upper catchment releases. High river stages are presented below.

Sl. No.	River	Gauge Station	District	Maximum Water Level / Flood Peak		
				(mGTS)	On	Remarks
1	Dwarka	Sankoghat	Murshidabad	21.53	02.10.19	0.23 m above EDL
2		Ranagram		17.24	04.10.19	0.12 m. below DL
3	Bhagirathi-Hooghly	Swarupganj	Nadia	8.73	03.10.19	0.29 m. above DL
4	Amta Channel	Champadanga	Hooghly	14.25	01.10.19	0.75 m. above EDL
5		Amta	Howrah	6.09	03.10.19	0.45 m. above DL
6	Hurhura	Muchighata		6.88	01.10.19	0.11 m. above EDL
7	Chandia	Barisha	Paschim Medinipur	5.30	01.10.19	0.30 m. above EDL
8	Kapaleswari	Narayanbarh		6.07	01.10.19	0.13 m. above EDL
9	Kaliaghai	Amgachia		6.25	01.10.19	0.46 m. above DL
10		Kalimandop		4.77	01.10.19	0.23 m. below DL

Flood frequency curves of different rivers in South Bengal have been presented in **Annexure VIII-B**.

6.3. Reservoir and Barrage Data

The instantaneous Inflow-Outflow and Reservoir level of large dams and important barrages either under the control of Irrigation & Waterways Department or those have direct impact on the flood situation of West Bengal have been measured during the flood season. Monthly Statistics of data of those Dam-Barrage Operations i.e. maximum, minimum & average reservoir level, inflow & outflow data was analyzed and presented in **Annexure IX-A**. The inflow-outflow data along-with reservoir levels of those important Dams and Barrages during 1st June to 31st October, 2019 have been graphically presented in Annexure **IX-B**.

6.4. Warning / Signal System

North Bengal Central Flood Control Room, Jalpaiguri imposes warning / signal system for protected and unprotected river banks of North Bengal during peak flood period. The details of signal imposed and later withdrawn; on receding of river levels in

given in the following table.

Flood Warning Levels of North Bengal Rivers

Gauge obtained from	Signal Imposed By	Name of River	Name of Gauge Station	Unprotected Area		Protected Area	
				Yellow	Red	Yellow	Red
Irrigation & Waterways Department, Government of West Bengal	JPG	Teesta	Teesta Bazar	211.00	213.00		
			Coronation Bridge	149.40	151.80	150.00	153.60
			Domohoni	85.65	85.95	85.95	86.30
	CBR		Mekhliganj	65.45	65.95		
	JPG	Jaldhaka	N.H-31C (Nagrakata)	160.70	161.30	161.00	161.80
			N.H-31 Crossing	80.00	80.50	80.10	80.90
	CBR	Mansai	Mathabhanga	47.70	48.70	48.40	48.90
	APD	Torsa	N.H-31C (Hasimara)	116.30	116.90	116.30	117.50
	CBR		C.B.R (Kashab Ashram)	42.07	42.68		
	APD	Kaljani	P.W.D (Alipurduar)	45.10	45.70		
		Raidak-I	N.H-31C (Chapan)	46.70	47.60	47.00	47.90
		Raidak-II	N.H-31C (Telepara)	48.10	49.00	48.40	49.30
		Daina	Chengmari	200.50	201.40		
		Sankosh	N.H-31C (LRP)	48.20	49.10	48.50	49.40
	CBR	Mujnai	Bhutnir Ghat	61.70	62.30		
		Raidak-I	Tufanganj	34.22	35.30		
	SLG	Mahananda	Siliguri	115.97	116.59		

Abbreviations: - JGP: Jalpaiguri, CBR: Coochbehar, APD: Alipurduar, SLG: Siliguri

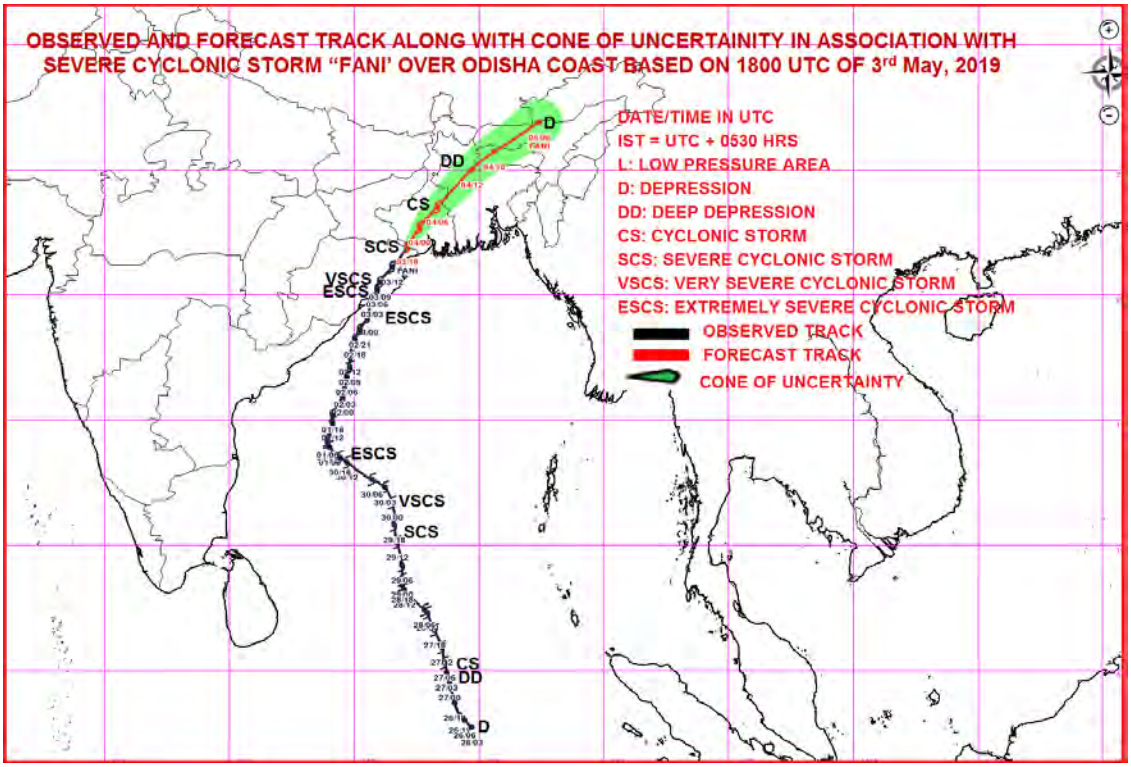
The warning signals imposed for different rivers in North Bengal for this flood season is tabulated in **Annexure-X.**

6.5. Flood Damage Data

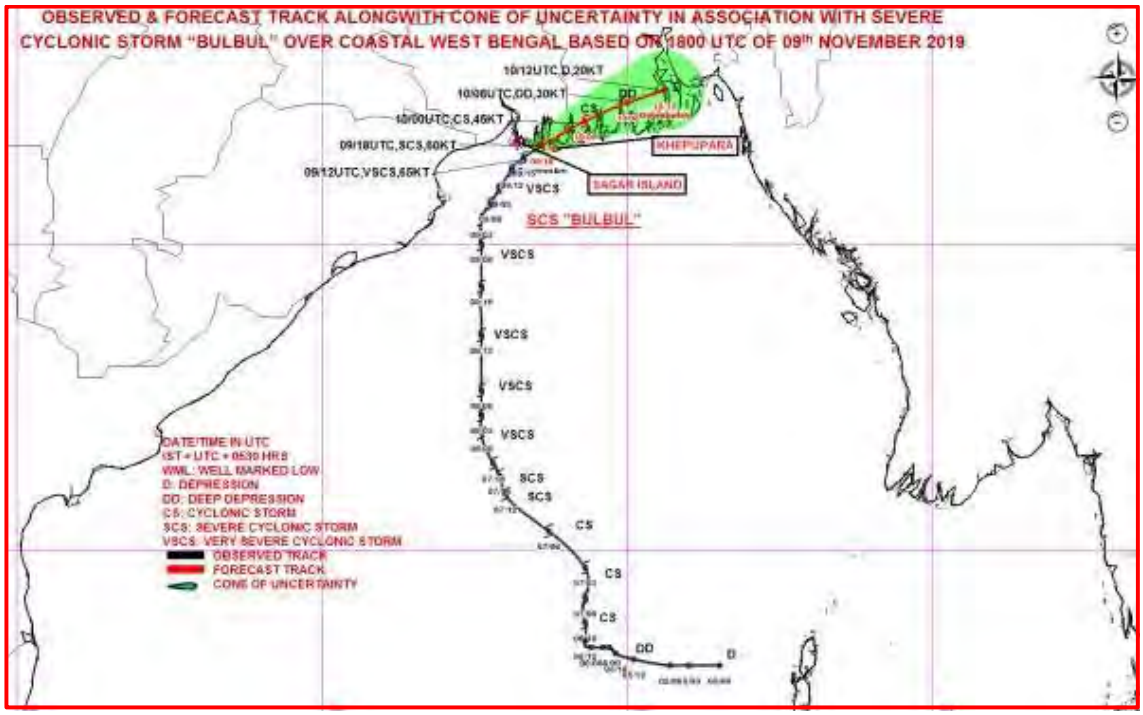
Extent and expenditure involved for restoration of flood damages occurred in different districts of North Bengal and South Bengal have been presented in **Annexure-XI.**

6.6. Cyclonic Storms in 2019

6.6.1. Fani: Severe cyclonic storm *'Fani'* formed over Bay of Bengal, slashed into coastal areas of Odisha had moved further North-Northeastward and entered into Gangetic West Bengal at around 00:30 hrs. of **4th May, 2019** and laid centered at 01:30 hrs. about 40 KM west of Kolkata. It moved further in the same direction and weaken gradually and laid centered as cyclonic storm at about 60 KM north of Kolkata at 05:30 hrs. Finally, it converted into deep depression & moved into Bangladesh on 4th May 08:30 hrs. Due to its effect, some amount of heavy to very heavy rainfall with gusty wind observed in Purba & Paschim Medinipur, Jhargram, Bankura, Birbhum, West Burdwan, Hooghly Kolkata and North 24-paragana. Apart from few minor damages of flood embankment of three coastal districts, presented in **Annexure XI-A**, no adverse situation did occur in the State.



6.6.2. Bulbul: Very severe cyclonic storm *'Bulbul'* formed over Bay of Bengal, struck into the coastal Sundarban of West Bengal at around 20:30 hrs. of **9th November 2019,** landfall took almost three hrs. to complete. Gradually converted into severe to cyclonic storm & moved into Bangladesh in early morning of 10th November and converted into deep depression. It caused gusty wind, storm surge, heavy to very heavy rainfall in the area. Very heavy rainfall occurred in most of the places of South 24-parganas, heavy rainfall occurred in Kolkata, Howrah and East Midnapore districts. Major damages had been observed in three coastal districts of West Bengal causing breach, subsidence, and over toping of coastal embankments. The comprehensive damage report is presented in **Annexure XI-B** for taking departmental restoration action, which has already been started.



7. Conclusion

Our State is a huge recipient of run-off generated from outside of the State. It has typical basin characteristics. In the northern Sub-Himalayan region, the rainfall is high and the terrain slope is steep. The rivers in the Terai region are wide, shallow and mostly braided. Due to continuous denudation of forest cover and mining activity in the hills, the silt loads are continuously deposited in the river beds, reducing the carrying capacity of rivers. It causes overflow during high discharges, often creating flood situations. In the central and southern region, heavy rainfall and surface run-off descending from the upper catchments, often outside the State geographical boundary, causes flood inundation and drainage congestion due to flat topography of the region.

Main structural measures of flood control in West Bengal are river embankments measuring about 10,500 km., spread over different river systems, constructed over the years. There are major dams across river Kangsabati, Mayurakshi and Damodar river systems. In the Damodar system, moderation of the dams during the peak flood is possible to some extent.

In North Bengal, an elaborate flood warning system maintained by the department warns the common people about the trend of rise of water level in rivers and thus alarms them to take necessary precautionary measures well beforehand. In Central and South Bengal, the water level of different rivers together with their danger and extreme danger levels and the releases from different dams and barrages are intimated to different authorities time to time during entire flood season.

Besides this, our department continuously maintains close liaison with the Regional Meteorological Centre (RMC), Kolkata and keeps continuous track of India Meteorological Department (IMD) website in order to collect dynamic information on weather condition during entire monsoon period. In critical situations, the department adopts appropriate measures commensurate with the circumstances. Central Water Commission (CWC) always extend their co-operation by providing different hydro-meteorological data under their jurisdiction.

In every monsoon and during cyclonic storm emergencies beyond the normal flood season, Central Flood Control Room (CFCR) becomes operational at Jalasampad Bhawan, Salt Lake, Kolkata to keep close vigil of the situation. It functions round the clock and is always on high alert, with two toll-free landline numbers, one at the headquarter and the other at North Bengal Flood Control Room, Club Road, Jalpaiguri for communication of information by common people. It collects daily hydro-meteorological and climatological data from all possible sources, prepares Daily Flood Reports and disseminates to all concerned. Daily reports during entire monsoon period is also available in public domain in the departmental website ***www.wbiwd.gov.in.***

Besides monsoon, this year CFCR was also in force during Cyclonic storms '*Fani*' and '*Bulbul*' that has struck during May and November 2019. CFCR had continuously monitored and kept track the development and advancement of the storm, collected data of associated rainfall, wind speed, storm surge and damages of departmental infrastructure and published special bulletins twice daily in exigencies.

In the previous year, overall rainfall has been below normal in entire West Bengal, as such no adverse/flood situation occurred but some extent of localized damages were observed during peak monsoon. Apart from that, few damages in river & sea embankments of coastal districts has occurred due to severe cyclones 'Fani' and 'Bulbul', the later creating more damage. In this regard, the department took appropriate action at the right time for complete restoration of those damages.

27/5/2020.

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Annexure I: Details of River Network

Sl. No.	RIVER	Tributaries		Location	
		Primary	Secondary	STATE	District
BASIN 2A: BRAHAMAPUTRA		SUB-BASIN: LOWER BRAHAMAPUTRA			
1	Sankosh			Assam	Kokrajhar
				West Bengal	Coochbehar
		Chhoto Sankosh		Assam	Kokrajhar
				West Bengal	Alipurduar
		Raidak-II		West Bengal	Alipurduar, Coochbehar
2	Torsa			West Bengal	Alipurduar, Coochbehar
		Raidak-I	Dhakshi	West Bengal	Alipurduar, Coochbehar
		Gadadhar	Jayanti	West Bengal	Alipurduar
		Kaljani	Bala	West Bengal	Alipurduar
			Nonai	West Bengal	Alipurduar
			Dima	West Bengal	Alipurduar
			Pana	West Bengal	Alipurduar
			Garam	West Bengal	Alipurduar
			Bania	West Bengal	Alipurduar
			Ghargharia	West Bengal	Alipurduar, Coochbehar
		Holong		West Bengal	Alipurduar, Coochbehar
		Dharala		West Bengal	Coochbehar
3	Jaldhaka			West Bengal	Kalimpong, Jalpaiguri, Coochbehar
		Mujnai	Titi	West Bengal	Alipurduar
			Pagli	West Bengal	Alipurduar
			Ekti	West Bengal	Alipurduar
			Shukti	West Bengal	Alipurduar
		Jurapani	Dudua	West Bengal	Jalpaiguri, Alipurduar
			Gilandi	West Bengal	Jalpaiguri
		Diana	Longit	West Bengal	Jalpaiguri
		Khuji Diana	Chetia	West Bengal	Jalpaiguri
		Jiti		West Bengal	Jalpaiguri
		Murti		West Bengal	Jalpaiguri
		Sutanga		West Bengal	Coochbehar
		Jarda	Bagdan	West Bengal	Jalpaiguri, Coochbehar
		Dolong		West Bengal	Coochbehar
4	Teesta			Sikkim	North Sikkim, South Sikkim
				West Bengal	Darjeeling, Jalpaiguri, Coochbehar
		Lachung	Yumthang	Sikkim	North Sikkim
		Lasha		Sikkim	North Sikkim
		Lohnak	Poke, Gome	Sikkim	North Sikkim
		Rangyung	Ringpi, Rukel	Sikkim	North Sikkim
		Chakung		Sikkim	North Sikkim
		Dick		Sikkim	North Sikkim
		Rangit	Rimbi	Sikkim	West Sikkim
			Kalej	Sikkim	West Sikkim
			Rammam	Sikkim	West Sikkim
			Little Rangit	West Bengal	Darjeeling
		Rani		Sikkim	East Sikkim
		Rangpo	Nathang	Sikkim	East Sikkim
		Relli		West Bengal	Kalimpong
		Rangio		West Bengal	Darjeeling
		Leesh		West Bengal	Kalimpong, Jalpaiguri
		Gheesh		West Bengal	Kalimpong, Jalpaiguri
		Dharala		West Bengal	Kalimpong, Jalpaiguri
			Neora, Mal	West Bengal	Kalimpong, Jalpaiguri

Sl. No.	RIVER	Tributaries		Location	
		Primary	Secondary	STATE	District
			Chel	West Bengal	Darjeeling, Jalpaiguri
		Karla		West Bengal	Jalpaiguri

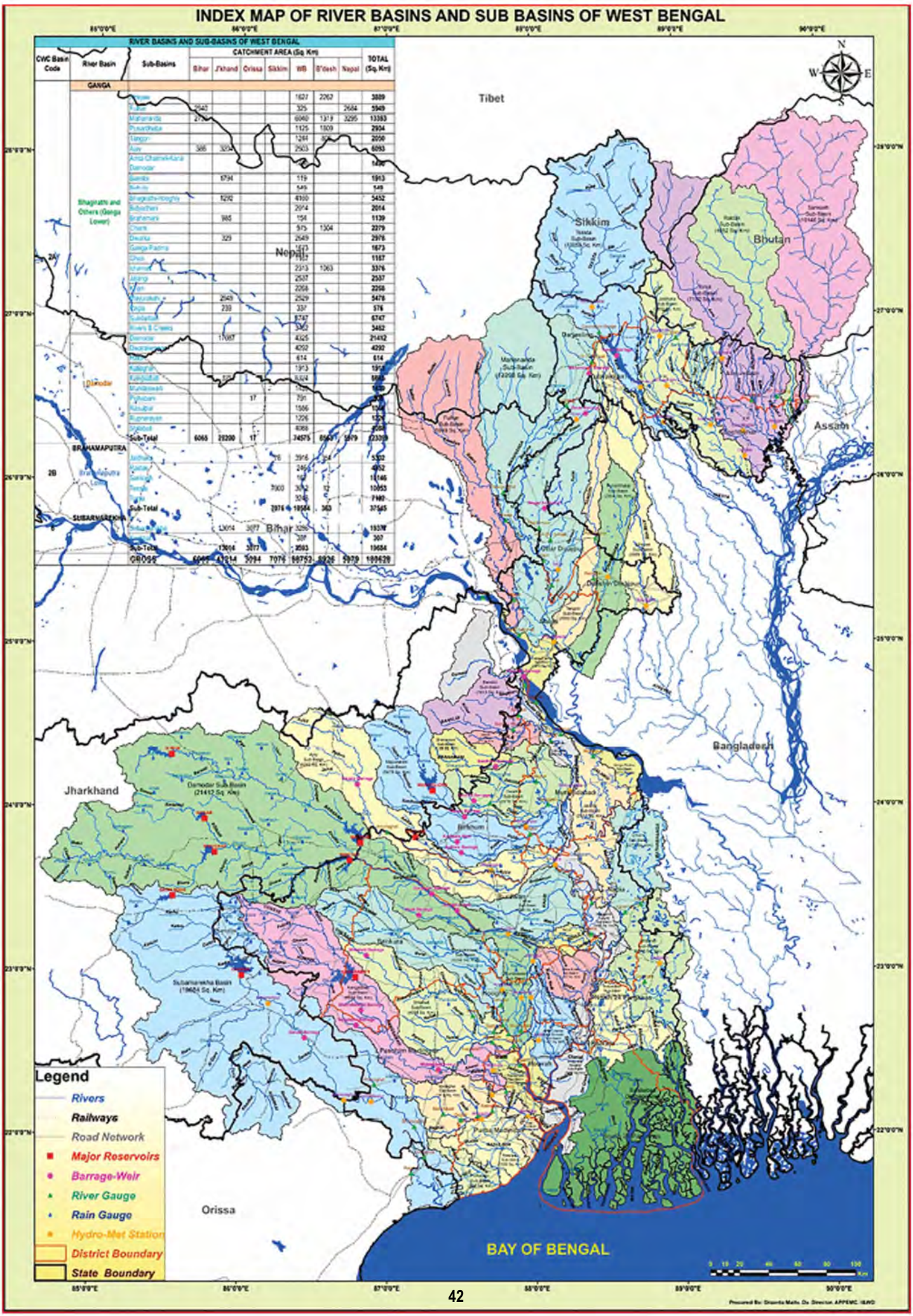
BASIN 2B: GANGA		SUB-BASIN: BHAGIRATHI LOWER & OTHERS			
1	Mahananda			West Bengal	Darjeeling, Uttar Dinajpur, Malda
				Bihar	Kishanganj, Purnia
		Balason	Rohini	West Bengal	Darjeeling
		Lachka		West Bengal	Darjeeling
		Taipu	Manjha	West Bengal	Darjeeling
		Mechi	Biring	Bihar	Kishanganj
		Kankai	Ratwa	Bihar	Kishanganj, Purnia
		Panar		Bihar	Araria, Purnia, Katihar
			Bakra	Bihar	Araria, Purnia
			Kesaliya	Bihar	Araria, Purnia
		Dauk		West Bengal	Uttar Dinajpur
		Pitani	Bakuna	West Bengal	Uttar Dinajpur
		Nagar	Sudhani	West Bengal	Uttar Dinajpur
			Kulik	West Bengal	Uttar Dinajpur
		Chiramati		West Bengal	Uttar Dinajpur
		Sui		West Bengal	Uttar Dinajpur
		Tangon		West Bengal	Uttar & Dakshin Dinajpur, Malda
		Mora Mahananda		West Bengal	Malda
		Kalindri		West Bengal	Malda
2	Fulhar			Bihar	Katihar
				West Bengal	Malda
3	Punarbhaba			West Bengal	Dakshin Dinajpur, Malda
4	Atreyee			West Bengal	Dakshin Dinajpur
		Kartowa	Neem	West Bengal	Jalpaiguri
			Sahoo	West Bengal	Jalpaiguri
			Chauli	West Bengal	Jalpaiguri
			Talma	West Bengal	Jalpaiguri
		Panga		West Bengal	Jalpaiguri
		Jamuna		West Bengal	Dakshin Dinajpur
		Brahmani		West Bengal	Dakshin Dinajpur
5	Ganga-Padma	Pagla		West Bengal	Malda
		Gumani		West Bengal	Murshidabad
				Jharkhand	Godda, Sahebganj
6	Bansloi			Jharkhand	Sahebganj, Pakur
				West Bengal	Birbhum, Murshidabad
		Bagmari		Jharkhand	Pakur
				West Bengal	Murshidabad
		Krilor		West Bengal	Murshidabad
7	Pagla			Jharkhand	Pakur
				West Bengal	Birbhum, Murshidabad
		Buri		West Bengal	Birbhum
8	Dwarka	Brahamani		Jharkhand	Dumka
				West Bengal	Birbhum, Murshidabad
			Gumra	Jharkhand	Dumka
			Tripti	Jharkhand	Dumka
				West Bengal	Birbhum
		Gambhira	Gamri	West Bengal	Birbhum, Murshidabad
		Chailan		Jharkhand	Dumka
				West Bengal	Birbhum

Sl. No.	RIVER	Tributaries		Location	
		Primary	Secondary	STATE	District
		Ghormora		West Bengal	Birbhum
		Kajuli		West Bengal	Birbhum
		Daoka	Manikarnika	West Bengal	Birbhum, Murshidabad
		Banka		West Bengal	Murshidabad
9	Mayurakshi			Jharkhand	Deoghar, Dumka
				West Bengal	Birbhum, Murshidabad
		Dhabai		Jharkhand	Dumka
		Bhurbhuri		Jharkhand	Dumka
		Tepra		Jharkhand	Dumka
		Siddeswari		Jharkhand	Jamtara, Deoghar, Dumka
			Noonbeel	Jharkhand	Deoghar
		Kushkarini		Jharkhand	Jamtara
				West Bengal	Birbhum
		Kuia	Bakreswar	West Bengal	Birbhum, Murshidabad
				Jharkhand	Jamtara
			Kopai	West Bengal	Birbhum
10	Babla	Mayurakshi		West Bengal	Murshidabad
		Dwarka		West Bengal	Murshidabad
11	Ajay			Bihar	Munger
				Jharkhand	Deoghar, Jamtara
				West Bengal	Birbhum, East & West Burdwan
		Dudhwa		Bihar	Munger
				Jharkhand	Deoghar
		Pathro & Jayanti		Jharkhand	Giridih, Deoghar
		Hinglow	Amba	Jharkhand	Jamtara
				West Bengal	Birbhum
		Tumoni		West Bengal	West Burdwan
		Kunur		West Bengal	East & West Burdwan
		Kana Ajay		West Bengal	Birbhum
12	Jalangi			West Bengal	Murshidabad, Nadia
		Bhairab		West Bengal	Murshidabad
		Sialamari		West Bengal	Murshidabad
		Suti	Chhoto Bhairab	West Bengal	Murshidabad
			Bhandardaha	West Bengal	Murshidabad
13	Churni	Anjana		West Bengal	Nadia
14	Ichhamati	Jamuna		West Bengal	Nadia, North 24-Parganas
15	Bidyadhari	Nowai		West Bengal	North 24-Parganas
16	Khari	Brahmani		West Bengal	East Burdwan
		Banka		West Bengal	East Burdwan
17	Behula	Gangur		West Bengal	East Burdwan, Hooghly
18	Kunti			West Bengal	Hooghly
19	Ghea	Kedarmati		West Bengal	East Burdwan, Hooghly
		Kana		West Bengal	East Burdwan, Hooghly
20	Saraswati			West Bengal	Hooghly, Howrah
21	Kana Damodar			West Bengal	East Burdwan, Hooghly, Howrah
22	Amta Channel			West Bengal	East Burdwan, Hooghly, Howrah
23	Kalindri			West Bengal	South 24-Parganas
24	Rai Mangal			West Bengal	South 24-Parganas
25	Bidya			West Bengal	South 24-Parganas
26	Matla			West Bengal	South 24-Parganas
27	Gosaba			West Bengal	South 24-Parganas
28	Thakuran			West Bengal	South 24-Parganas
29	Saptamukhi			West Bengal	South 24-Parganas

Sl. No.	RIVER	Tributaries		Location	
		Primary	Secondary	STATE	District
30	Muri Ganga			West Bengal	South 24-Parganas
31	Adi Ganga / Tolly's Nullah			West Bengal	Kolkata, South 24-Parganas
32	Bhagirathi-Hooghly			West Bengal	Birbhum, Murshidabad, Nadia, East Burdwan, Hooghly, Howrah, South & North 24 Parganas, Purba Medinipur
BASIN 2B: GANGA		SUB-BASIN: DAMODAR			
1	Damodar			Jharkhand	Latehar, Chatra, Hazaribag, Ramgarh, Bokaro Dhanbad
				West Bengal	East & West Burdwan, Purulia, Bankura, Hooghly, Howrah
		Barakar		Jharkhand	Hazaribag, Giridih, Kodarma, Dhanbad
				West Bengal	Paschim Bardhaman
			Igra	Jharkhand	Giridih
			Ushri	Jharkhand	Giridih
			Dumohon	Jharkhand	Giridih
			Barsoti	Jharkhand	Hazaribag
		Barki		Jharkhand	Latehar, Chatra, Hazaribag
		Haharo		Jharkhand	Hazaribag
		Ghari		Jharkhand	Hazaribag
		Bokaro		Jharkhand	Hazaribag, Bokaro
		Konar		Jharkhand	Hazaribag, Bokaro
			Siwani	Jharkhand	Hazaribag
		Jamunia		Jharkhand	Hazaribag, Giridih, Bokaro, Dhanbad
		Naikari, Bhera		Jharkhand	Ranchi, Ramgarh
		Khanjo, Garga		Jharkhand	Bokaro
		Khadia, Katri		Jharkhand	Dhanbad
		Gowai, Ijri		Jharkhand	Bokaro
				West Bengal	Purulia
		Sali		West Bengal	Bankura
		Singaran, Tamal		West Bengal	West Burdwan
		Nunia		West Bengal	
2	Mundeswari	Harinkhola		West Bengal	East Burdwan, Hooghly
3	Darakeswar			West Bengal	Purulia, Bankura, East Burdwan, Hooghly
		Futiary, Beko, Dudhibheria		West Bengal	Purulia
		Arkasha	Kansachor	West Bengal	Purulia, Bankura
		Dangra		West Bengal	Purulia, Bankura
		Gandheswari, Berai, Khukra		West Bengal	Bankura
		Shankari		West Bengal	Paschim Medinipur
			Amodar	West Bengal	Bankura, Paschim Medinipur
			Tarajuli	West Bengal	Bankura, Paschim Medinipur
		Dev		West Bengal	East Burdwan
4	Shilabati			West Bengal	Purulia, Bankura, Paschim Medinipur
		Jaiponda		West Bengal	Bankura
		Puratan, Champayan, Ketia		West Bengal	Bankura, Paschim Medinipur
		Ruparghghra		West Bengal	Paschim Medinipur
		Donai		West Bengal	Paschim Medinipur
		Kubai	Tamal, Parang	West Bengal	Paschim Medinipur
		Katan		West Bengal	Paschim Medinipur
				West Bengal	Purulia, Bankura, Paschim Medinipur, Jhargram
		Saharjore, Bandhu, Patloi		West Bengal	Purulia

Sl. No.	RIVER	Tributaries		Location	
		Primary	Secondary	STATE	District
5	Kangsabati / Kansai	Kumari	Hanumata, Kerro, Jore, Charan	West Bengal	Jhargram, Purulia
		Jam		West Bengal	Jhargram, Bankura, Purulia
			Tatko	Jharkhand	Purba Singbhum
				West Bengal	Purulia
		Bhairabbanki	Jhinuk	West Bengal	Bankura, Paschim Medinipur
			Tarapheni	West Bengal	Jhargram
		Kalaichu		West Bengal	Paschim Medinipur
6	Old Cossye			West Bengal	Paschim Medinipur
7	New Cossye	Kherai	Bakshi	West Bengal	Paschim & Purba Medinipur
8	Rupnarayan	Kana Dwarakeswar		West Bengal	Hooghly, East Burdwan
		Polashpai		West Bengal	Paschim Medinipur
		Durbachaty		West Bengal	Purba Medinipur
10	Kaliaghai			West Bengal	Paschim & Purba Medinipur
		Kapaleswari, Deuli		West Bengal	Paschim Medinipur
		Chandia		West Bengal	Paschim & Purba Medinipur
		Baghai		West Bengal	Paschim & Purba Medinipur
11	Haldi			West Bengal	Purba Medinipur
12	Rasulpur			West Bengal	Purba Medinipur
13	Pichabani			West Bengal	Purba Medinipur
14	Negua Channel			West Bengal	Paschim & Purba Medinipur
BASIN 6: SUBARNAREKHA					
1	Subarnarekha			Jharkhand	Ranchi, Seraikela-Kharswan, Purba Shingbhum
				West Bengal	Purulia, Jhargram, Paschim Medinipur
				Odisha	Balasore
		Jhumur, Rupai		Jharkhand	Ranchi
		Kakro	Rarhu	Jharkhand	Ranchi
		Karru		Jharkhand	Ranchi
				West Bengal	Purulia
		Kanchi		Jharkhand	Ranchi
		Damra		Jharkhand	Ranchi, Seraikela-Kharswan
		Karkari		Jharkhand	Ranchi, Seraikela-Kharswan
		Chinguru		West Bengal	Purulia
				Jharkhand	Seraikela-Kharswan
		Kharkai	Bankabol, Khadkari, Kandria, Nesa, Burhai	Odisha	Mayurbhanj
			Torlo, Illgara, Roro, Sanjai	Jharkhand	Paschim Shingbhum
		Garra, Sankh, Kodia		Jharkhand	Purba Shingbhum
		Gurma		Jharkhand	Purba Shingbhum
				West Bengal	Purulia
		Singaduba		Jharkhand	Purba Shingbhum
				West Bengal	Paschim Medinipur
		Dulung, Khaijori		West Bengal	Jhargram

INDEX MAP OF RIVER BASINS AND SUB BASINS OF WEST BENGAL



RIVER BASINS AND SUB-BASINS OF WEST BENGAL

CWC Basin Code	River Basin	Sub-Basins	CATCHMENT AREA (Sq. Km) Bihar	Jharkhand	Orissa	Sikkim	WB	B'desh	Nepal	TOTAL (Sq. Km)
	GANGA									
	Bhagirathi and Others (Ganga Lower)									
		Damodar								
	BRAHMAPUTRA									
	SUBARNAREKHA									
		Sub-Total								
		GROSS								

Annexure –III

A) List of Existing Rain Gauge Stations under I. & W. Dept.

Sl. No.	Rain Gauge Station	Type	Name of the River Sub-basin	District	Normal Annual Rainfall (mm)	Division
1	Uttarbhag	ORG	Adi Ganga	South 24 Parganas	2088.00	Metropolitan Drainage Mechanical Division.
2	Bahari	ORG	Ajoy	Birbhum	1612.40	Mayurakshi South Canal Division
3	Bhedia	ORG		Purba Bardhaman	1315.20	Damodar Head Works Divn.
4	Debogram	ORG		Birbhum	1612.40	Mayurakshi South Canal Division
5	Nanur	ORG		Birbhum	1612.40	Mayurakshi South Canal Division
6	Satkahania	ORG		Paschim Bardhaman	1315.20	Damodar Head Works Divn.
7	Sikatia	ORG		Deoghar	1162.10	Dy. Director (Dist. Plan)
8	Balurghat	ORG	Atrayi	Dakshin Dinajpur	1584.90	South Dinajpur (I) Division
9	Salar	ORG	Babla	Murshidabad	1391.10	Mayurakshi South Canal Division
10	Kadisala	ORG	Bakreswar	Birbhum	1612.40	Mayurakshi South Canal Division
11	Balgona	ORG	Banka	Purba Bardhaman	1315.20	EE-II, Damador Canal Division
12	Sanko	ORG		Purba Bardhaman	1315.20	EE-I, Damodar Canal Division
13	Paikor	ORG	Bansloi	Birbhum	1612.40	Mayurakshi North Canal Division
14	Berhampur	ORG	Bhagirathi-Hoogly	Murshidabad	1391.10	Berhampur (I) Division
15	Katwa	ORG		Purba Bardhaman	1315.20	EE-II, Damador Canal Division
16	Bhairab Banki Barrage	ORG	Bhairab Banki	Bankura	1535.50	Kangsabati Canal Division-V
17	Barasat	ARG	Bidyadhari	North 24 Parganas	1560.80	Bidyadhari Drainage Division
18	Chowbhaga	ORG		South 24 parganas	2088.00	Metropolitan Drainage Mechanical Division.
19	Dum Dum	RMC		North 24 Parganas	1560.80	Dy. Director (Dist. Plan)
20	Md.Bazar	ORG	Brahmani	Birbhum	1612.40	Mayurakshi North Canal Division
21	Nalhati	ORG		Birbhum	1612.40	Mayurakshi North Canal Division
22	Barisha	ORG	Chandia	Paschim Medinipur	1535.50	East Midnapur Division
23	Arsa	ORG	Cossye	Purulia	1363.30	Purulia Const. Division
24	Purulia	ORG		Purulia	1363.30	Purulia(I) Division
25	Simulia	ORG		Purulia	1363.30	Bankura Irrigation Divn.
26	Tusuma	ORG		Purulia	1363.30	Bankura Irrigation Divn.
27	Amta	ORG	Damodar	Howrah	1600.00	EE-I, L.D. Constuction Division
28	Antpur	ORG		Hooghly	1418.70	EE-I, L.D.I. Division
29	Asansol	ORG		Paschim Bardhaman	1315.20	Damodar Head Works Divn.
30	Champadanga	ORG		Hooghly	1418.70	EE-I, L.D.I. Division
31	Durgapur	ORG		Paschim Bardhaman	1315.20	Damodar Head Works Divn.
32	Galsi	ORG		Purba Bardhaman	1315.20	Dy. Director (Statistics)
33	Jamalpur	ORG		Purba Bardhaman	1418.70	EE-I, L.D.I. Division
34	Khandakosh	ORG		Purba Bardhaman	1315.20	Right Bank (I) Division
35	Lohai(Raina)	ORG		Purba Bardhaman	1315.20	Right Bank (I) Division
36	Maithon	CWC		Dhanbad	1355.20	Dy. Director (Dist. Plan)
37	Maliara	ORG		Bankura	1340.40	Right Bank (I) Division
38	Panchet	CWC		Dhanbad	1355.20	Dy. Director (Dist. Plan)
39	Para	ORG		Purulia	1363.30	Purulia I&P Division
40	Raghunathpur	ORG		Purulia	1363.30	Purulia Const. Division
41	Rondia	ORG		Purba Bardhaman	1315.20	Damodar Head Works Divn.
42	Tenughat	CWC		Bokaro	1247.50	Dy. Director (Dist. Plan)

Sl. No.	Rain Gauge Station	Type	Name of the River Sub-basin	District	Normal Annual Rainfall (mm)	Division
43	Tilaiya	CWC	Damodar	Koderma	1116.20	Dy. Director (Dist. Plan)
44	Uchalan	ORG		Bankura	1315.20	Right Bank (I) Division
45	Chandrakona	ORG	Donai	Paschim Medinipur	1535.50	Kangsabati Canal Division-I
46	Lodhashuli	ORG	Dulung	Jhargram	1535.50	Kangsabati Canal Division-V
47	Arambag	ORG	Dwarakeswar	Hooghly	1418.70	Hooghly Irrigation Division
48	Bankura	ORG		Bankura	1330.90	Bankura Irrigation Divn.
49	Bowaichandi	ORG		Purba Bardhaman	1315.20	Right Bank (I) Division
50	Indus	ORG		Bankura	1340.40	Right Bank (I) Division
51	Kamarpukur	ORG		Hooghly	1418.70	K.C. Division No.III
52	Kotolpur	ORG		Bankura	1330.90	K.C. Division No.III
53	Salbandh	ORG		Bankura	1340.40	Right Bank (I) Division
54	Deocha Barrage	ORG	Dwarka	Birbhum	1612.40	Mayurakshi North Canal Division
55	Mollarpur	ORG		Birbhum	1612.40	Mayurakshi North Canal Division
56	Rampurhat	ORG		Birbhum	1612.40	Mayurakshi North Canal Division
57	Singur	ORG	Ghea	Hooghly	1418.70	EE-I, L.D.I. Division
58	Itamogra	ORG	Haldi	Purba Medinipur	1669.60	Contai (I) Division
59	Hinglow Dam	ORG	Hinglow	Birbhum	1612.40	Mayurakshi South Canal Division
60	Khayrashole	ORG		Birbhum	1612.40	Mayurakshi South Canal Division
61	Alipore	RMC	Hooghly	Kolkata	1709.20	Dy. Director (Dist. Plan)
62	Bongaon	ORG	Ichamati	North 24 Parganas	1559.80	Bidyadhari Drainage Division
63	Tentulia	ORG		North 24 Parganas	1560.80	Basirhat Irrigation Divn.
64	Swarupganj	ORG	Jalangi	Nadia	1261.60	Nadia (I) Division
65	Banarhat	ORG	Jaldhaka	Jalpaiguri	3463.00	Jalpaiguri (I) Division
66	Mainaguri	ORG		Jalpaiguri	3463.30	Jalpaiguri (I) Division
67	Amgachia	ORG	Kaliaghai	Purba Medinipur	1669.60	Contai (I) Division
68	Kesiapata	ORG		Jhargram	1535.50	K. Canal Division-V
69	Jhargram	ORG	Kangsabati	Paschim Medinipur	1535.50	K. Canal Division-V
70	Manikpara	ORG		Jhargram	1535.50	K. Canal Division-V
71	Midnapore	ARG		Paschim Medinipur	1535.50	West Midnapur Division
72	Mohanpur	ORG		Paschim Medinipur	1535.50	West Midnapur Division
73	Mukutmanipur	ORG		Bankura	1330.90	Bankura Irrigation Divn.
74	Sabang	ORG	Kapaleswari	Paschim Medinipur	1535.50	Kaliaghai-Kapaleswari-Baghai Project Div.
75	Dhaniakhali	ARG	Khari-Behula-Ghea	Hooghly	1418.70	Dy. Director (Dist. Plan)
76	Memari	ORG		Purba Bardhaman	1418.70	EE-I, L.D.I. Division
77	Kultore Barrage	ORG	Kopai	Birbhum	1612.40	Mayurakshi South Canal Division
78	Shyambati	ORG		Birbhum	1612.40	Mayurakshi South Canal Division
79	Adalia	ORG	Kubai	Paschim Medinipur	1535.50	K. Canal Division-I
80	Kirnahar	ORG	Kuia	Birbhum	1612.40	Mayurakshi South Canal Division
81	Balarampur	ORG	Kumari	Purulia	1363.30	Purulia(I) Division
82	Kharidwar	ORG		Purulia	1363.30	Bankura Irrigation Divn.
83	Phulberia	ORG		Purulia	1363.30	Bankura Irrigation Divn.
84	Purihansa	ORG		Purulia	1363.30	Bankura Irrigation Divn.
85	Gushkara	ORG	Kunur	Purba Bardhaman	1315.20	Damodar Head Works Divn.
86	English Bazar	ORG		Malda	1419.40	Malda (I) Division

Sl. No.	Rain Gauge Station	Type	Name of the River Sub-basin	District	Normal Annual Rainfall (mm)	Division
87	Islampur	ORG	Mahananda	Uttar Dinajpur	1727.60	North Dinajpur (I) Division
88	Raiganj	ORG		Uttar Dinajpur	1727.60	North Dinajpur (I) Division
89	Siliguri	ORG		Darjeeling	3118.50	Siliguri (I) Division
90	Malbazar	ORG	Mal	Jalpaiguri	3463.30	Jalpaiguri (I) Division
91	Mathabhanga	ORG	Mansai	Coochbehar	3443.70	Coochbehar (I) Division
92	Haripur	ORG	Mayurakshi	Dumka	1381.50	Mayurakshi Headquarter Division
93	Kandi	ORG		Murshidabad	1391.10	Berhampur (I) Division
94	Khushiary	ORG		Dumka	1381.50	Mayurakshi Headquarter Division
95	Maharo	ORG		Dumka	1381.50	Mayurakshi Headquarter Division
96	Massanjore	ORG		Dumka	1381.50	Mayurakshi Headquarter Division
97	Narayanpur	ARG		Murshidabad	1391.10	Berhampur (I) Division
98	Suri	ORG		Birbhum	1381.50	Mayurakshi Headquarter Division
99	Tilpara Barrage	ORG		Birbhum	1612.40	Mayurakshi Headquarter Division
100	Raina	ORG	Mundeswari	Purba Bardhaman	1315.20	Right Bank (I) Division
101	Sehera Bazar	ORG		Purba Bardhaman	1330.90	Right Bank (I) Division
102	Panskura	ORG	New Cossye	Purba Medinipur	1669.60	East Midnapur Division
103	Gangarampur	ORG	Punarbhaba	Dakshin Dinajpur	1584.90	South Dinajpur (I) Division
104	Tufanganj	ORG	Raidak-I	Coochbehar	3443.70	Coochbehar (I) Division
105	Contai	CWC	Rasulpur	Purba Medinipur	1669.60	Contai (I) Division
106	Ghatal	ORG	Rupnarayan	Paschim Medinipur	1535.50	West Midnapur Division
107	Tamluk	ORG		Purba Medinipur	1669.60	East Midnapur Division
108	Barabisha	CWC	Sankosh	Alipurduar	3463.30	Dy. Director (Dist. Plan)
109	Domjur	ORG	Saraswati	Howrah	1600.00	EE-I, LD Constuction Division
110	Kantabandh	ORG	Shali	Bankura	1340.40	Right Bank (I) Division
111	Sonamukhi	ORG		Bankura	1330.90	Right Bank (I) Division
112	Amlagora	ORG	Shilabati	Paschim Medinipur	1535.50	K. Canal Division-I
113	Panikotar	ORG		Paschim Medinipur	1535.50	K. Canal Division-I
114	Tantloi	ORG	Siddheswari	Dumka	1381.50	Mayurakshi Headquarter Division
115	Baghmundi	ORG	Subarnarekha	Purulia	1363.30	Purulia(I) Division
116	Digha	ORG		Purba Medinipur	1669.60	Contai (I) Division
117	Gopiballavpur	ORG		Jhargram	1535.50	Jhargram Flood Management & Planning Div.
118	Jhalda	ORG		Purulia	1363.30	Purulia(I) Division
119	Sagar Island	AWS	Sundarban Area	South 24 Parganas	2088.00	Dy. Director (Dist. Plan)
120	Salboni	ORG	Tamal	Paschim Medinipur	1535.50	K. Canal Division-I
121	Tarapheni Barrage	ORG	Tarapheni	Jhargram	1535.50	K. Canal Division-V
122	Darjeeling	RMC	Teesta	Darjeeling	3118.50	Dy. Director (Dist. Plan)
123	Gangtok	RMC		East Sikkim	2739.00	Dy. Director (Dist. Plan)
124	Jalpaiguri	ORG		Jalpaiguri	3463.30	Jalpaiguri (I) Division
125	Alipurduar	ORG	Torsa	Alipurduar	3463.30	Alipurduar (I) Division
126	Coochbehar	ORG		Coochbehar	3443.70	Coochbehar (I) Division
127	Hasimara	ORG		Alipurduar	3463.30	Alipurduar (I) Division

**ORG: Ordinary Rain Gauge (I&WD); ARG: Automatic Rain Gauge (IMD); AWS: Automatic Weather Station (IMD); RMC:*

Annexure –III

B) List of Existing River Gauge Stations under I. & W. Dept.

Sl. No.	River Gauge Station	Name of the River Sub-basin	Danger Level (Metre)	Extreme Danger Level (Metre)	District	Division
1	Budra	Ajoy	39.42	40.34	Purba Bardhaman	Damodar Head Works Divn.
2	Gheropara		39.42	40.42	Birbhum	Mayurakshi South Canal Division
3	Katwa		14.48	15.04	Purba Bardhaman	EE-II, Damador Canal Division
4	Amta	Amta Channel	5.64	6.24	Howrah	EE-I, LD Constuction Division
5	Balurghat	Atrayi	23.15	23.76	Dakshin Dinajpur	South Dinajpur (I) Division
6	Bazarshow	Babla	15.02	15.65	Murshidabad	Mayurakshi South Canal Division
7	Bansloi Rail bridge	Bansloi	31.85	32.76	Birbhum	Mayurakshi North Canal Division
8	Berhampur	Bhagirathi-Hoogly	17.22	17.83	Murshidabad	Berhampur (I) Division
9	Kalna		7.63	8.24	Purba Bardhaman	EE-II, Damador Canal Division
10	Katwa		13.71	14.32	Purba Bardhaman	EE-II, Damador Canal Division
11	Swarupganj		8.44	9.05	Nadia	Nadia (I) Division
12	Jagdhari Road Bridge	Brahmani	33.00	33.40	Birbhum	Mayurakshi North Canal Division
13	Barisha	Chandia	4.55	5.00	Paschim Medinipu	East Midnapur Division
14	Hanskhali	Churni	7.53	8.14	Nadia	Nadia (I) Division
15	Champadanga	Damodar	12.90	13.50	Hooghly	EE-I L.D.I.Division
16	Edilpur		32.79	32.95	Purba Bardhaman	EE-I Damodar canal division
17	Giara		16.16	16.77	Hooghly	EE-I L.D.I.Division
18	Jamalpur		23.24	23.54	Purba Bardhaman	EE-I L.D.I.Division
19	Rondia		52.13	52.89	Purba Bardhaman	Damodar Head Works Divn.
20	Chopra	Dauk	69.46	70.07	Uttar Dinajpur	North Dinajpur (I) Division
21	Chengmari	Diana	200.50	201.20	Jalpaiguri	Jalpaiguri (I) Division
22	Khanyadihi	Durbachati	5.03	5.65	Purba Medinipur	East Midnapur Division
23	Arambag	Dwarakeswar	17.22	17.83	Hooghly	Hooghly Irrigation Division
24	Bankura		76.50	77.11	Bankura	Bankura Irrigation Divn.
25	Patakhola		76.50	77.11	Bankura	Bankura Irrigation Divn.
26	Shakepore		11.75	12.35	Hooghly	Hooghly Irrigation Division
27	Ranagram	Dwarka	17.36	17.86	Murshidabad	Berhampur (I) Division
28	Sankoghat		20.40	21.30	Murshidabad	Berhampur (I) Division
29	Teljana	Fulhar	27.43	28.35	Malda	Malda (I) Division
30	Itahar	Gamari	26.82	27.41	Uttar Dinajpur	North Dinajpur (I) Division
31	Manikchakghat	Ganga	24.69	25.30	Malda	Malda (I) Division
32	Akheriganj	Ganga-Padma	18.44	19.05	Murshidabad	Berhampur (I) Division
33	Geria		20.94	21.55	Murshidabad	Ganga Anti Erosion Division-I
34	Nimtita		21.90	22.51	Murshidabad	Ganga Anti Erosion Division-I
35	Nurpur		21.03	21.64	Murshidabad	Ganga Anti Erosion Division-I
36	Muchighata	Hurhura khal	6.16	6.77	Howrah	EE-I, LD Constuction Division
37	RD Setu (Bangaon)	Ichamati	4.70	5.25	North 24 Parganas	Bidyadhari Drainage Division
38	Tentulia		5.10	5.40	North 24 Parganas	Basirhat Irrigation Divn.
39	Nagrakata	Jaldhaka	160.70	161.80	Jalpaiguri	Jalpaiguri (I) Division
40	NH 31 Crossing		80.10	80.90	Jalpaiguri	Jalpaiguri (I) Division
41	Gaighata	Jamuna	4.45	5.05	North 24 Parganas	Bidyadhari Drainage Division
42	Gobardanga		4.30	4.90	North 24 Parganas	Bidyadhari Drainage Division
43	Amgachia	Kaliaghai	5.79	6.40	Purba Medinipur	Contai (I) Division
44	Bhakrabad		8.40	8.85	Paschim Medinipu	Kaliaghai-Kapaleswari-Baghai Project Div.
45	Dehati		6.55	7.00	Paschim Medinipu	Kaliaghai-Kapaleswari-Baghai Project Div.
46	Kalimondop		5.03	5.65	Paschim Medinipu	Kaliaghai-Kapaleswari-Baghai Project Div.
47	Alipurduar	Kaljani	45.10	45.70	Alipurduar	Alipurduar (I) Division
48	Mohanpur	Kangsabati	25.75	26.36	Paschim Medinipu	West Midnapur Division
49	Narayanbarh	Kapaleswari	5.33	5.94	Paschim Medinipu	Kaliaghai-Kapaleswari-Baghai Project Div.
50	Angarpur	Kuia	19.05	20.05	Murshidabad	Mayurakshi South Canal Division

Sl. No.	River Gauge Station	Name of the River Sub-basin	Danger Level (Metre)	Extreme Danger Level (Metre)	District	Division
51	Tarapur	Kuia	22.71	23.35	Murshidabad	Berhampur (I) Division
52	Railway Bridge	Kullick	31.20	32.69	Uttar Dinajpur	North Dinajpur (I) Division
53	English Bazar	Mahananda	21.00	21.75	Malda	Malda (I) Division
54	Hill Curt Road		115.98	116.59	Darjeeling	Siliguri (I) Division
55	Sonapur		75.77	76.38	Uttar Dinajpur	North Dinajpur (I) Division
56	Mathabhanga	Mansai	47.70	48.20	Coochbehar	Coochbehar (I) Division
57	Majdia	Mathabhanga	7.82	8.43	Nadia	Nadia (I) Division
58	Narayanpur*	Mayurakshi	27.99	28.79	Murshidabad	Berhampur (I) Division
59	Makdampur	Nagar	31.54	31.86	Uttar Dinajpur	North Dinajpur (I) Division
60	Dobandi	New Cossye	5.02	5.63	Purba Medinipur	East Midnapur Division
61	Panskura		9.29	9.90	Purba Medinipur	East Midnapur Division
62	Kalmijole	Old Cossye	9.29	9.90	Paschim Medinipu	West Midnapur Division
63	Gangarampur	Punarbhaba	25.82	26.42	Dakshin Dinajpur	South Dinajpur (I) Division
64	LRP Crossing	Raidak-I	47.00	47.90	Alipurduar	Alipurduar (I) Division
65	Tufanganj		35.30	35.90	Coochbehar	Coochbehar (I) Division
66	LRP Crossing	Raidak-II	48.40	49.30	Alipurduar	Alipurduar (I) Division
67	Bandar	Rupnarayan	6.85	7.46	Paschim Medinipu	West Midnapur Division
68	Denan		4.42	5.02	Purba Medinipur	East Midnapur Division
69	Gopiganj		5.03	5.65	Paschim Medinipu	West Midnapur Division
70	Ranichak		5.33	5.94	Paschim Medinipu	West Midnapur Division
71	LRP Crossing	Sankosh	48.50	49.40	Alipurduar	Alipurduar (I) Division
72	Banka	Shilabati	15.08	15.69	Paschim Medinipu	West Midnapur Division
73	Gadghat		8.99	9.60	Paschim Medinipu	West Midnapur Division
74	Gopiballavpur	Subarnarekha	45.50	46.50	Jhargram	Jhargram Flood Management & Planning Div.
75	Sonakonia		16.15	16.75	Paschim Medinipu	Contai (I) Division
76	Kachua	Sui	25.49	26.09	Uttar Dinajpur	North Dinajpur (I) Division
77	Pajol		27.43	28.00	Uttar Dinajpur	North Dinajpur (I) Division
78	Bansihari	Tangon	25.60	26.21	Dakshin Dinajpur	South Dinajpur (I) Division
79	Radhikapur		33.45	34.05	Uttar Dinajpur	North Dinajpur (I) Division
80	Coronation Bridge	Teesta	150.00	153.60	Darjeeling	Jalpaiguri (I) Division
81	Domohani		85.95	86.30	Jalpaiguri	Jalpaiguri (I) Division
82	Mekhliganj		150.00	153.00	Coochbehar	Jalpaiguri (I) Division
83	Teesta Bazar		211.00	213.00	Darjeeling	Jalpaiguri (I) Division
84	Coochbehar	Torsa	42.07	42.68	Coochbehar	Coochbehar (I) Division
85	Hasimara		116.30	117.50	Alipurduar	Alipurduar (I) Division

Annexure –III

C) List of Existing Dam Barrage Monitoring Stations under I. & W. Dept.

Sl. No.	Dam / Barrage	Name of the River Sub-basin	Conservation / Pond Level (ft.)	Maximum Flood Level (ft.)	District	Division
1	Chandil Dam	Subarnarekha	630.00	630.00	Kolkata	Dy. Director (Dist. Plan)
2	Durgapur Barrage	Damodar	211.50	211.50	Paschim Bardham	Damodar Head Works Divn.
3	Galudih Barrage	Subarnarekha	302.00	332.00	Kolkata	Dy. Director (Dist. Plan)
4	Hinglow Dam	Hinglow	321.00	324.00	Birbhum	Mayurakshi South Canal Division
5	Mahananda Barrage	Mahananda	352.00	352.00	Darjeeling	Mahananda Barrage Division
6	Maithon Dam	Damodar	480.00	495.00	Paschim Bardham	Damodar Head Works Divn.
7	Massanjore Dam	Mayurakshi	398.00	398.00	Birbhum	Mayurakshi Headquarter Division
8	Mukutmonipur Dam	Kangsabati	434.00	440.00	Bankura	K.C. Division No.-II
9	Panchet Dam	Damodar	410.00	425.00	Paschim Bardham	Damodar Head Works Divn.
10	Sikatia Barrage	Ajay	558.00	559.70	Kolkata	Dy. Director (Dist. Plan)
11	Teesta Barrage	Teesta	375.00	378.30	Jalpaiguri	Teesta Barrage Division
12	Tenughat Dam	Damodar	852.00	864.00	Paschim Bardham	Damodar Head Works Divn.
13	Tilpara Barrage	Mayurakshi	206.00	206.00	Birbhum	Mayurakshi Headquarter Division

D) List of Existing River Gauge Discharge Stations under I. & W. Dept.

Sl. No.	River Gauge Discharge Station	Name of the River / Channel	Danger Level (Metre)	Extreme Danger Level (Metre)	District	Division
1	Amuliaghat	Ajoy	104.73	105.33	Purba Bardhaman	Burdwan Inv. & Planning Division
2	Amta	Amta Channel	5.64	6.24	Howrah	Executive Engineer-I, I.& P. Division.(S)
3	Champadanga	Lower Damodar	12.90	13.50	Hooghly	Executive Engineer-I, I.& P. Division.(S)
4	Kapastikri	Kangsabati	16.00	16.60	Nadia	Dy. Director (Statistics)
5	Englishbazar	Mahananda	21.00	21.75	Malda	Malda (I) Division
6	Harinkhola	Mundeswari	12.80	13.41	Paschim Medinipu	Executive Engineer-I, I.& P. Division.(S)
7	Sehagori	Short Cut Channel			Howrah	Executive Engineer-I, I.& P. Division.(S)

Annexure IV-A: Districtwise Monthly Rainfall Statistics of West Bengal for the Year 2019

Month →	January			Febuary			March			April		
Districts / Rainfall (mm)	Actual	Normal	% Dep	Actual	Normal	% Dep	Actual	Normal	% Dep	Actual	Normal	% Dep
Coochbehar	0.40	8.90	-95.50%	14.60	16.00	-8.80%	42.30	32.20	31.40%	195.30	148.50	31.50%
Darjeeling (including Kalimpong)	0.40	48.30	-99.20%	26.70	33.80	-21.00%	46.60	57.70	-19.20%	129.10	127.20	1.50%
Jalpaiguri (including Alipurduar)	0.70	9.20	-92.40%	21.30	17.80	19.70%	50.60	39.70	27.50%	136.80	159.10	-14.00%
Malda	0.00	13.60	-100.00%	38.10	10.50	262.90%	3.60	14.50	-75.20%	77.00	39.70	94.00%
North Dinajpur	0.00	21.50	-100.00%	24.20	2.00	1110.00%	2.80	8.00	-65.00%	78.50	28.50	175.40%
South Dinajpur	0.00	8.90	-100.00%	16.70	13.30	25.60%	4.30	19.00	-77.40%	71.40	57.80	23.50%
North Bengal Average	**0.30**	**18.40**	**-98.60%**	**23.60**	**15.60**	**51.60%**	**25.00**	**28.50**	**-12.20%**	**114.70**	**93.50**	**22.70%**
Bankura	0.00	12.00	-100.00%	33.80	18.00	87.80%	23.20	22.00	5.50%	69.50	46.50	49.50%
Birbhum	0.10	13.40	-99.30%	27.60	16.10	71.40%	20.00	21.20	-5.70%	54.50	40.40	34.90%
Burdwan (Purba & Paschim)	0.00	10.70	-100.00%	64.00	22.20	188.30%	16.30	19.80	-17.70%	47.80	37.40	27.80%
East Midnapore	0.00	15.90	-100.00%	137.50	18.60	639.20%	28.60	31.80	-10.10%	58.70	52.00	12.90%
Hooghly	0.00	11.90	-100.00%	86.40	26.60	224.80%	32.40	28.20	14.90%	71.10	51.60	37.80%
Howrah	0.00	12.20	-100.00%	150.60	24.90	504.80%	33.40	32.00	4.40%	42.60	53.80	-20.80%
Kolkata	0.00	14.40	-100.00%	147.20	24.70	496.00%	69.60	33.50	107.80%	60.10	56.10	7.10%
Murshidabad	0.00	16.80	-100.00%	34.50	11.20	208.00%	18.70	19.00	-1.60%	66.30	54.20	22.30%
Nadia	0.00	12.20	-100.00%	75.30	17.60	327.80%	22.60	21.10	7.10%	69.80	50.90	37.10%
North 24 Parganas	0.00	15.60	-100.00%	139.70	17.80	684.80%	81.60	30.30	169.30%	63.20	56.40	12.10%
Puraulia	0.10	14.30	-99.30%	32.50	20.70	57.00%	28.50	24.60	15.90%	53.10	37.90	40.10%
South 24 Parganas	0.00	13.60	-100.00%	180.60	26.70	576.40%	82.40	37.90	117.40%	54.80	52.20	5.00%
West Midnapore (including Jhargram)	0.00	12.20	-100.00%	107.20	24.10	344.80%	63.60	39.00	63.10%	75.70	64.30	17.70%
South Bengal Average	**0.00**	**13.50**	**-99.90%**	**93.60**	**20.70**	**352.00%**	**40.10**	**27.70**	**44.50%**	**60.60**	**50.30**	**20.40%**
West Bengal Average	**0.10**	**15.00**	**-99.40%**	**71.50**	**19.10**	**274.70%**	**35.30**	**28.00**	**26.30%**	**77.60**	**63.90**	**21.50%**

*Data source: IMD-RMC, Kolkata

Annexure IV-A: Districtwise Monthly Rainfall Statistics of West Bengal for the Year 2019

Month →	May			June			July			August		
Districts / Rainfall (mm)	Actual	Normal	% Dep	Actual	Normal	% Dep	Actual	Normal	% Dep	Actual	Normal	% Dep
Coochbehar	315.80	329.00	-4.00%	403.10	642.70	-37.30%	1002.80	821.80	22.00%	270.20	657.40	-58.90%
Darjeeling (including Kalimpong)	141.00	273.40	-48.40%	260.30	575.40	-54.80%	1069.20	852.20	25.50%	486.90	617.60	-21.20%
Jalpaiguri (including Alipurduar)	270.30	339.70	-20.40%	639.60	721.10	-11.30%	1253.50	959.90	30.60%	306.30	666.50	-54.00%
Malda	121.10	114.50	5.80%	98.80	223.30	-55.80%	373.50	335.20	11.40%	104.00	272.80	-61.90%
North Dinajpur	79.80	216.70	-63.20%	215.30	326.10	-34.00%	349.50	433.50	-19.40%	159.50	366.00	-56.40%
South Dinajpur	108.30	168.60	-35.80%	139.20	286.90	-51.50%	373.20	364.30	2.40%	136.60	243.10	-43.80%
North Bengal Average	**172.70**	**240.30**	**-28.10%**	**292.70**	**462.60**	**-36.70%**	**737.00**	**627.80**	**17.40%**	**243.90**	**470.60**	**-48.20%**
Bankura	175.90	78.00	125.50%	113.80	247.90	-54.10%	226.00	342.10	-33.90%	319.60	319.20	0.10%
Birbhum	139.90	95.60	46.30%	72.20	237.70	-69.60%	242.30	331.40	-26.90%	191.10	314.70	-39.30%
Burdwan (Purba & Paschim)	129.90	73.20	77.50%	90.90	217.40	-58.20%	195.80	279.90	-30.00%	233.10	275.30	-15.30%
East Midnapore	61.80	106.60	-42.00%	143.60	278.20	-48.40%	154.70	340.40	-54.60%	422.80	346.40	22.10%
Hooghly	109.80	106.40	3.20%	110.30	248.00	-55.50%	166.60	299.30	-44.30%	254.30	259.60	-2.00%
Howrah	62.10	121.90	-49.10%	84.60	234.30	-63.90%	142.30	344.40	-58.70%	479.00	324.60	47.60%
Kolkata	90.50	124.90	-27.50%	91.50	287.50	-68.20%	159.90	376.70	-57.60%	548.60	349.20	57.10%
Murshidabad	188.60	123.60	52.60%	85.40	221.80	-61.50%	246.30	317.60	-22.40%	104.70	263.40	-60.30%
Nadia	101.90	113.90	-10.50%	73.70	207.10	-64.40%	174.70	273.90	-36.20%	230.60	214.80	7.40%
North 24 Parganas	88.70	138.90	-36.10%	98.70	293.40	-66.40%	208.70	334.80	-37.70%	421.60	340.70	23.70%
Puraulia	115.40	66.60	73.30%	99.60	240.90	-58.70%	239.00	287.70	-16.90%	344.90	307.40	12.20%
South 24 Parganas	82.00	136.70	-40.00%	143.40	323.90	-55.70%	235.30	444.30	-47.00%	489.70	386.40	26.70%
West Midnapore (including Jhargram)	113.00	116.00	-2.60%	128.00	257.50	-50.30%	216.90	329.30	-34.10%	397.90	326.60	21.80%
South Bengal Average	**112.30**	**107.90**	**4.10%**	**102.70**	**253.50**	**-59.50%**	**200.70**	**330.90**	**-39.40%**	**341.40**	**309.90**	**10.20%**
West Bengal Average	**131.40**	**149.70**	**-12.20%**	**162.70**	**319.50**	**-49.10%**	**370.00**	**424.70**	**-12.90%**	**310.60**	**360.60**	**-13.90%**

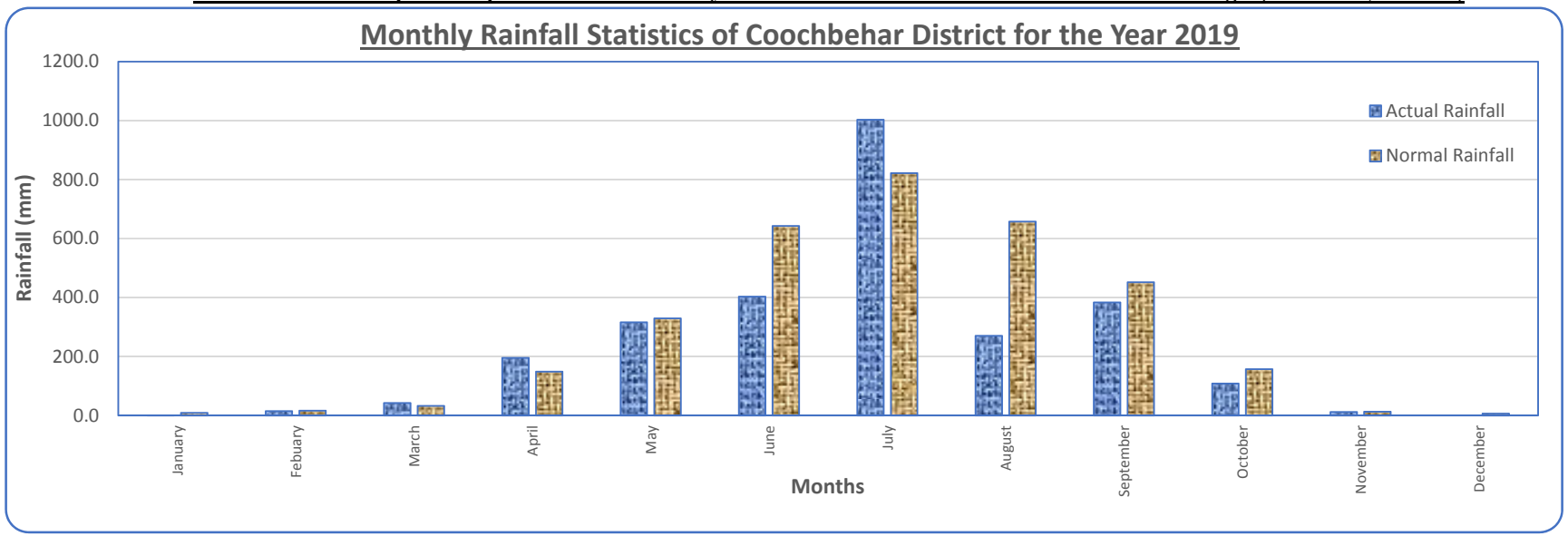
*Data source: IMD-RMC, Kolkata

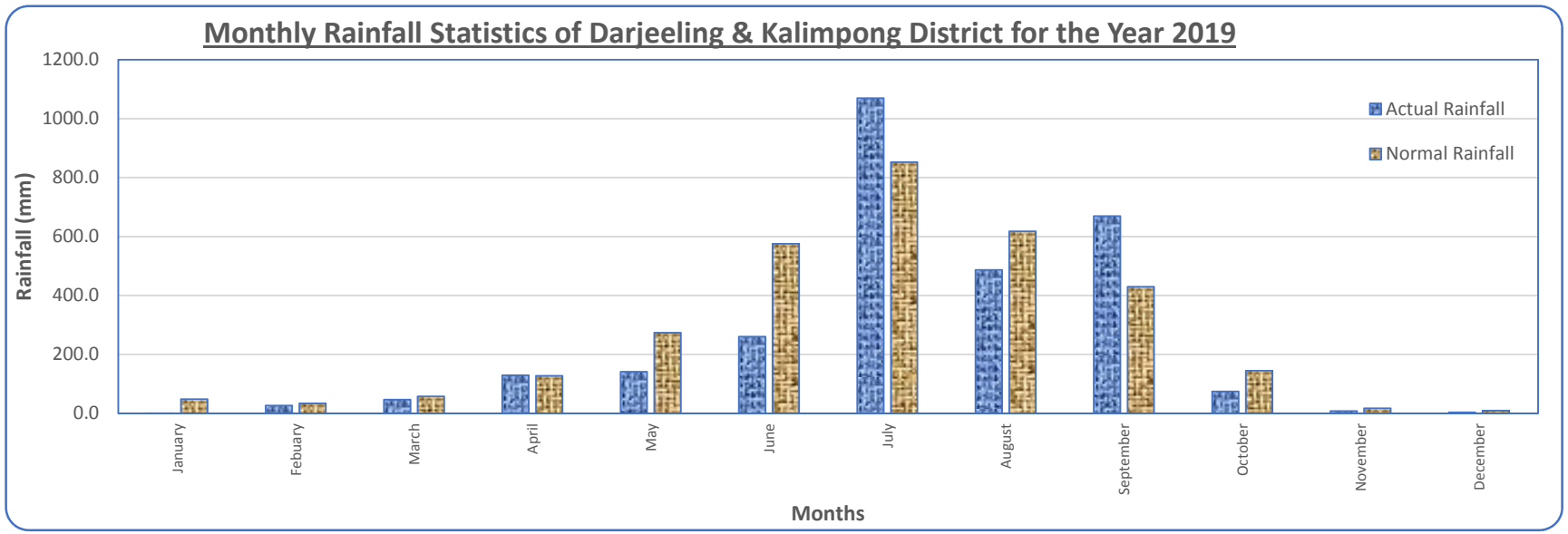
Annexure IV-A: Districtwise Monthly Rainfall Statistics of West Bengal for the Year 2019

Month →	September			October			November			December		
Districts / Rainfall (mm)	Actual	Normal	% Dep	Actual	Normal	% Dep	Actual	Normal	% Dep	Actual	Normal	% Dep
Coochbehar	383.10	451.70	-15.20%	108.20	156.80	-31.00%	11.70	12.60	-7.10%	0.00	6.50	-100.00%
Darjeeling (including Kalimpong)	669.40	429.70	55.80%	74.40	144.80	-48.60%	7.70	17.40	-55.70%	3.20	9.20	-65.20%
Jalpaiguri (including Alipurduar)	628.30	491.50	27.80%	128.80	175.60	-26.70%	3.10	16.70	-81.40%	3.20	7.20	-55.60%
Malda	364.90	281.00	29.90%	145.60	120.90	20.40%	0.00	12.40	-100.00%	0.50	6.70	-92.50%
North Dinajpur	373.00	375.20	-0.60%	66.40	130.80	-49.20%	0.00	7.60	-100.00%	0.00	6.40	-100.00%
South Dinajpur	314.90	278.30	13.20%	166.60	117.50	41.80%	0.00	13.80	-100.00%	5.80	5.40	7.40%
North Bengal Average	**455.60**	**384.60**	**18.50%**	**115.00**	**141.10**	**-18.50%**	**3.80**	**13.40**	**-72.00%**	**2.10**	**6.90**	**-69.30%**
Bankura	267.30	249.00	7.30%	173.10	119.50	44.90%	11.60	11.80	-1.70%	14.70	10.50	40.00%
Birbhum	255.10	288.90	-11.70%	196.00	110.40	77.50%	0.50	14.60	-96.60%	1.50	7.20	-79.20%
Burdwan (Purba & Paschim)	215.80	225.70	-4.40%	191.70	99.50	92.70%	16.80	6.60	154.50%	12.10	5.00	142.00%
East Midnapore	421.10	340.70	23.60%	330.50	166.00	99.10%	159.00	38.90	308.70%	11.30	6.70	68.70%
Hooghly	206.30	240.10	-14.10%	131.70	112.00	17.60%	59.80	16.40	264.60%	14.20	8.00	77.50%
Howrah	284.10	293.50	-3.20%	93.10	126.20	-26.20%	93.30	29.20	219.50%	3.00	8.90	-66.30%
Kolkata	387.00	312.70	23.80%	137.60	159.80	-13.90%	111.40	28.20	295.00%	11.80	9.40	25.50%
Murshidabad	198.50	263.70	-24.70%	184.40	127.50	44.60%	3.10	11.40	-72.80%	1.00	5.40	-81.50%
Nadia	169.80	202.10	-16.00%	144.60	97.80	47.90%	52.50	10.50	400.00%	13.20	5.90	123.70%
North 24 Parganas	322.70	300.30	7.50%	204.70	149.20	37.20%	98.20	26.60	269.20%	8.50	8.50	0.00%
Puraulia	307.10	258.60	18.80%	172.00	93.40	84.20%	0.00	15.60	-100.00%	28.50	8.90	220.20%
South 24 Parganas	381.90	349.40	9.30%	216.00	186.70	15.70%	195.80	51.50	280.20%	8.10	8.90	-9.00%
West Midnapore (including Jhargram)	361.70	271.10	33.40%	125.50	113.90	10.20%	40.00	15.50	158.10%	7.80	5.40	44.40%
South Bengal Average	**290.60**	**276.60**	**5.10%**	**177.00**	**127.80**	**38.40%**	**64.80**	**21.30**	**204.20%**	**10.40**	**7.60**	**37.50%**
West Bengal Average	**342.70**	**310.70**	**10.30%**	**157.40**	**132.00**	**19.20%**	**45.50**	**18.80**	**142.00%**	**7.80**	**7.40**	**5.90%**

*Data source: IMD-RMC, Kolkata

Annexure IV-B: Graphical Representation of Monthly Rainfall Statistics at different Districts of West Bengal (after IMD, Kolkata)





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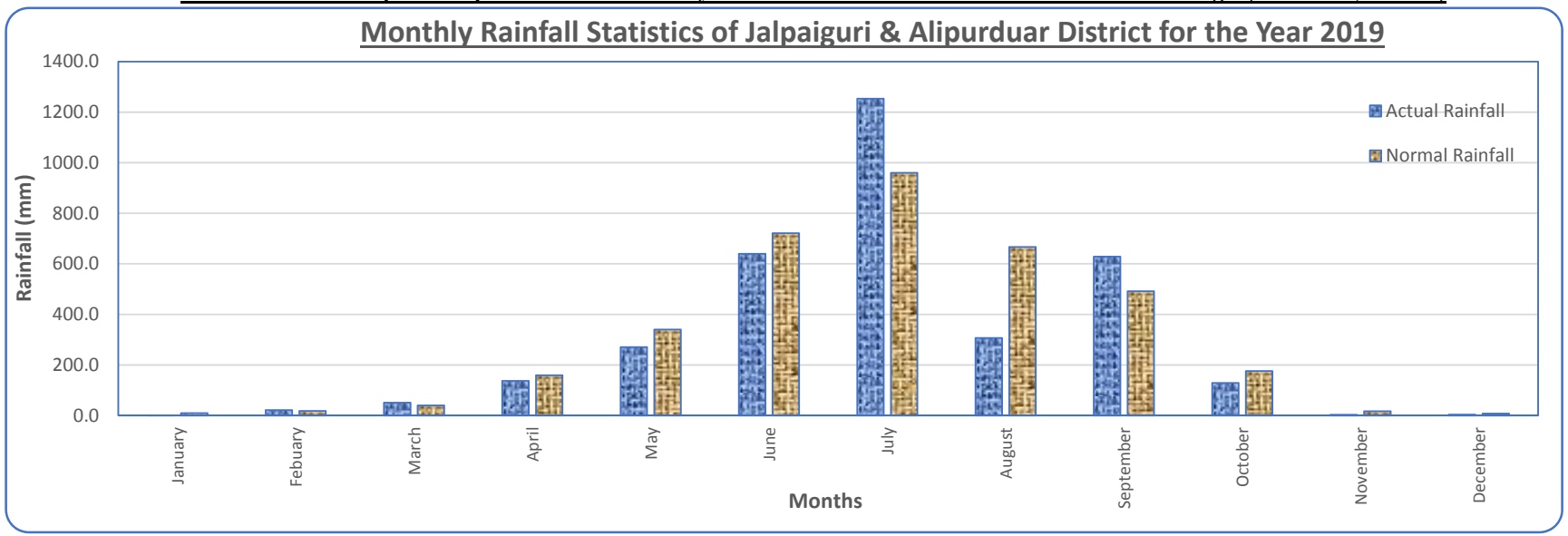

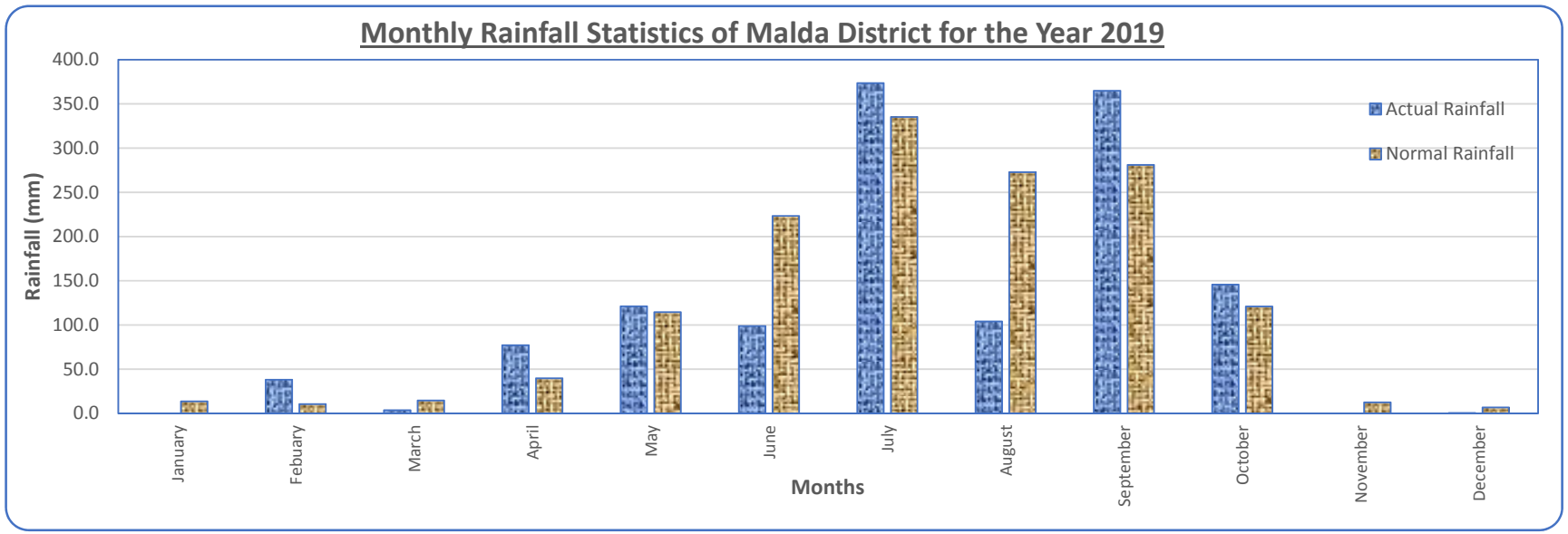

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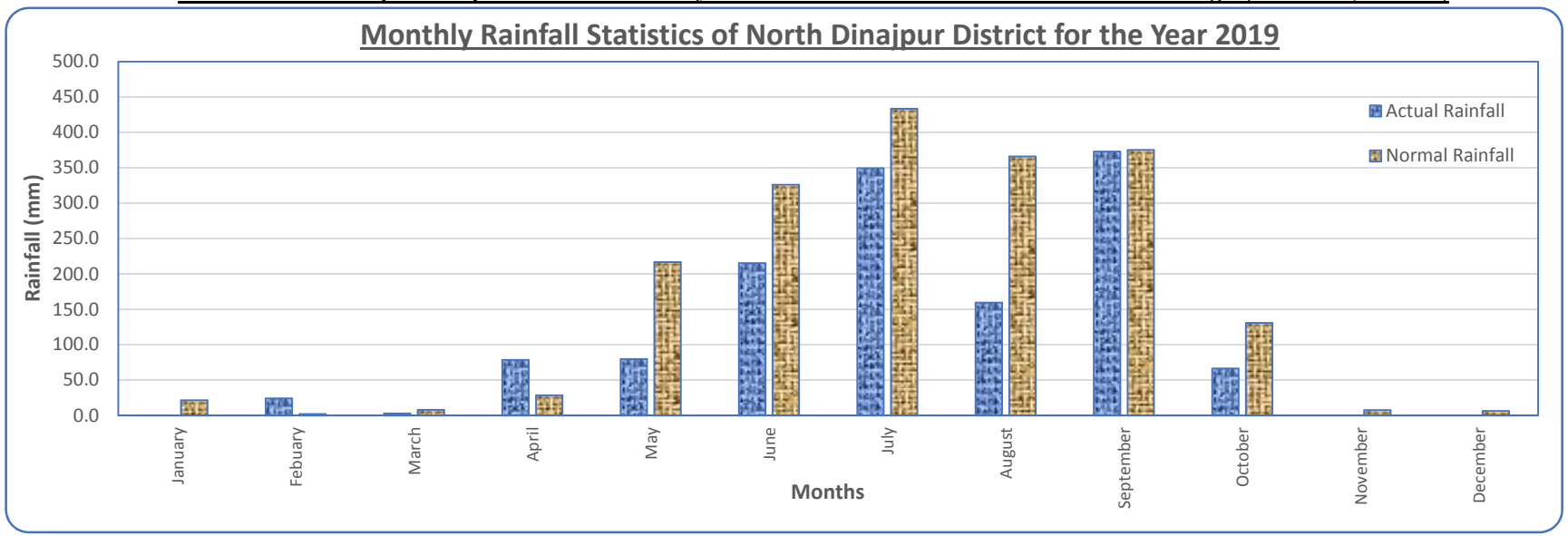
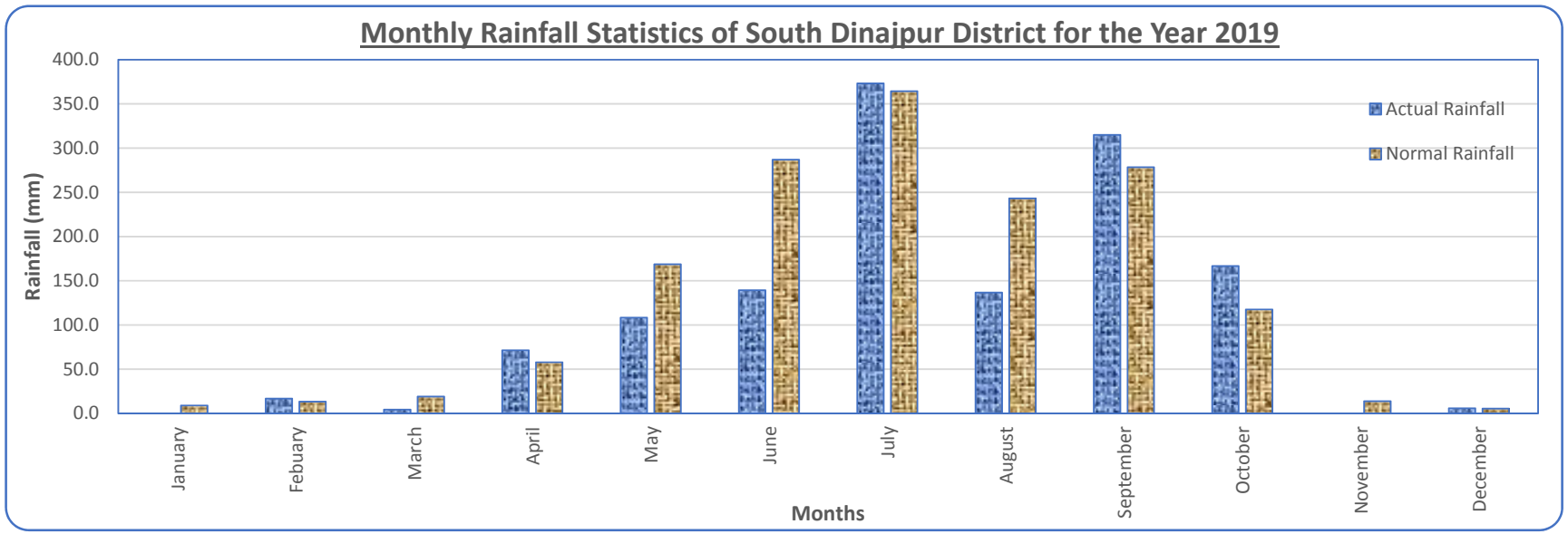
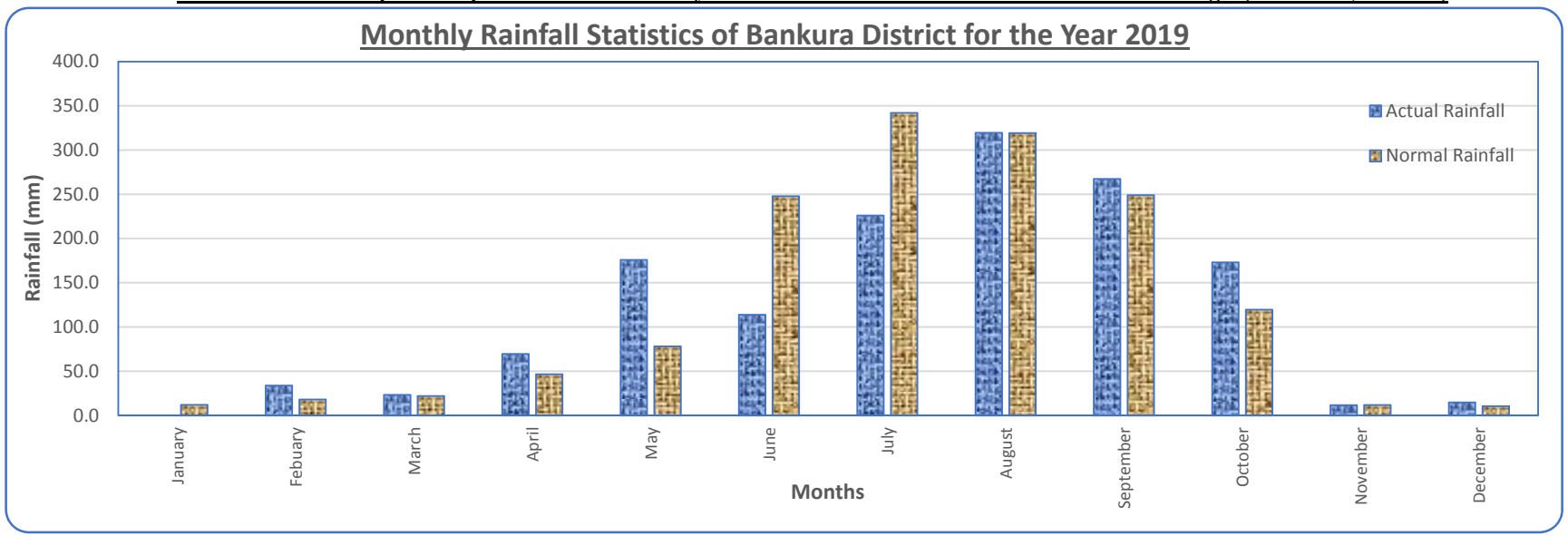
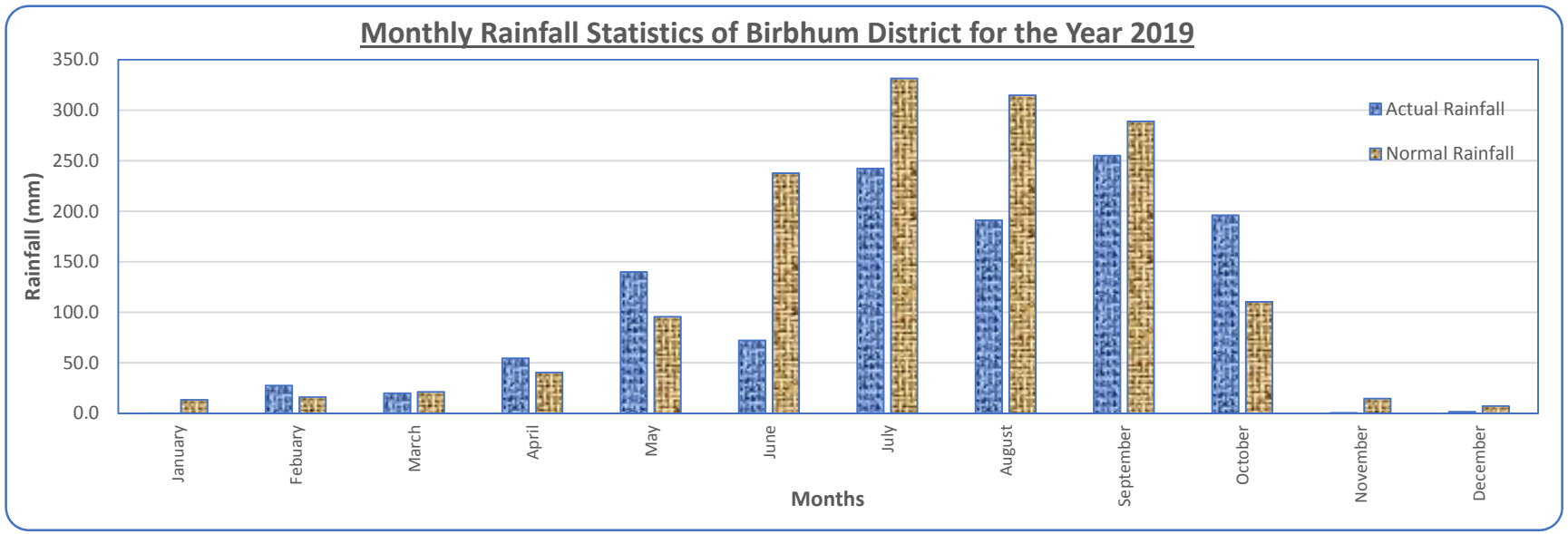


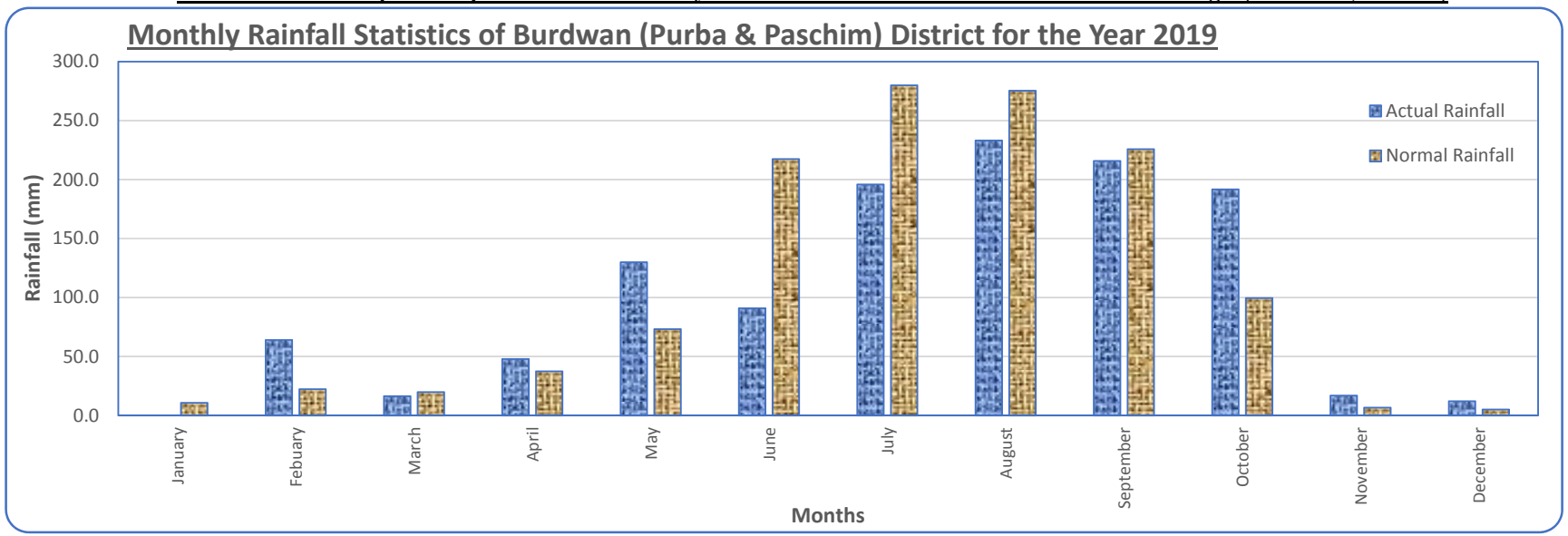


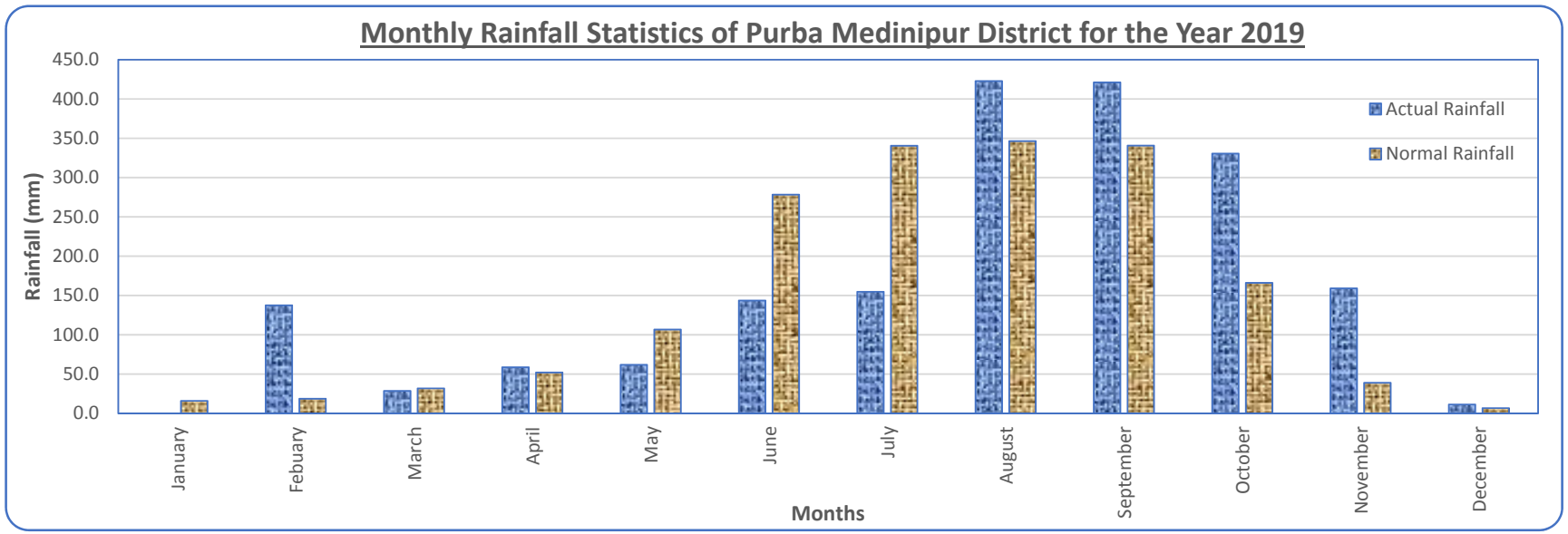
Annexure IV-B: Graphical Representation of Monthly Rainfall Statistics at different Districts of West Bengal (after IMD, Kolkata)



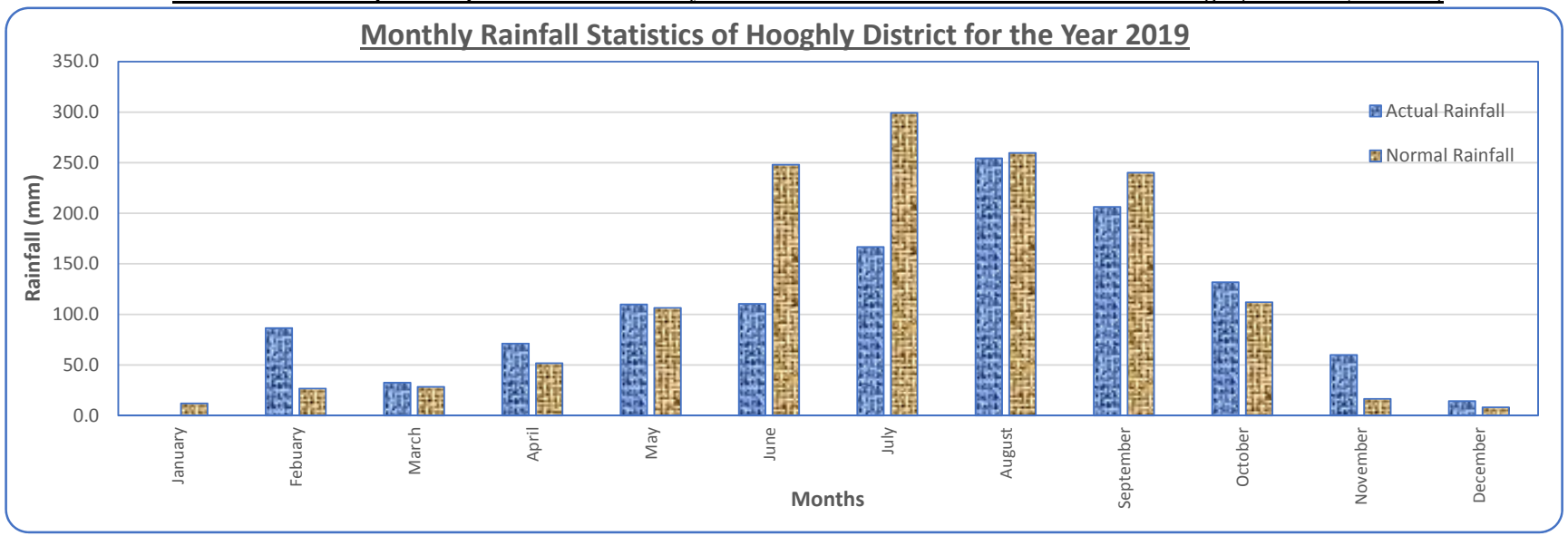


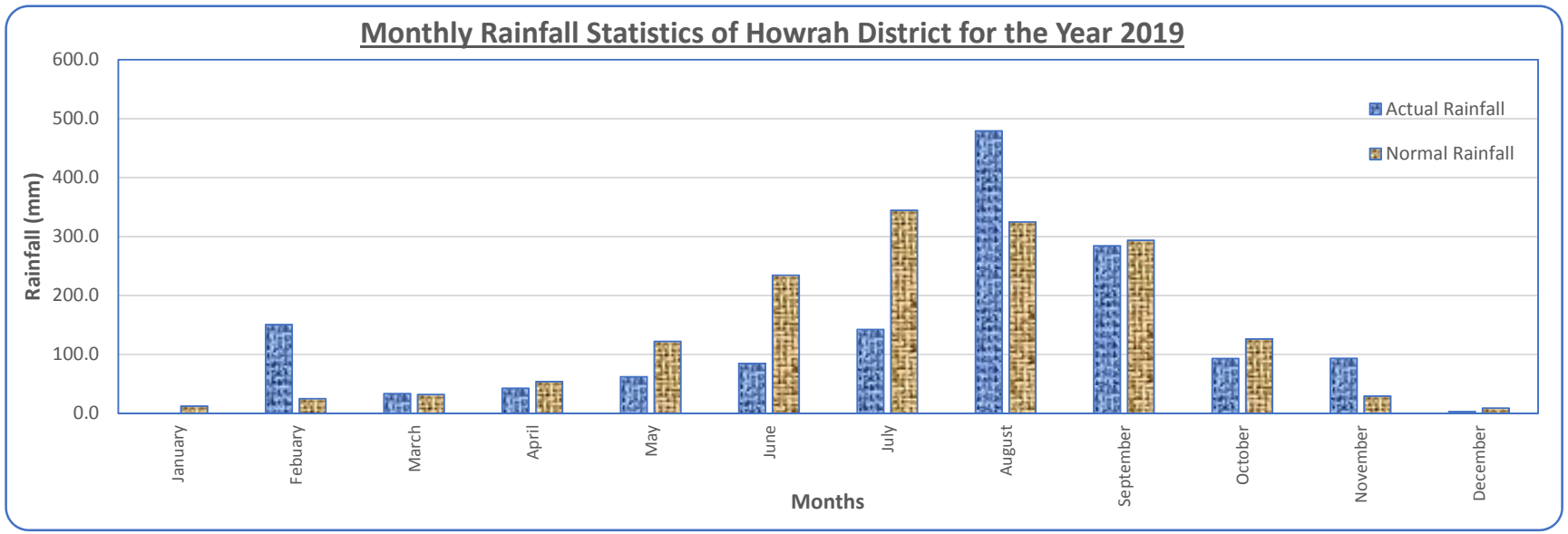
Annexure IV-B: Graphical Representation of Monthly Rainfall Statistics at different Districts of West Bengal (after IMD, Kolkata)



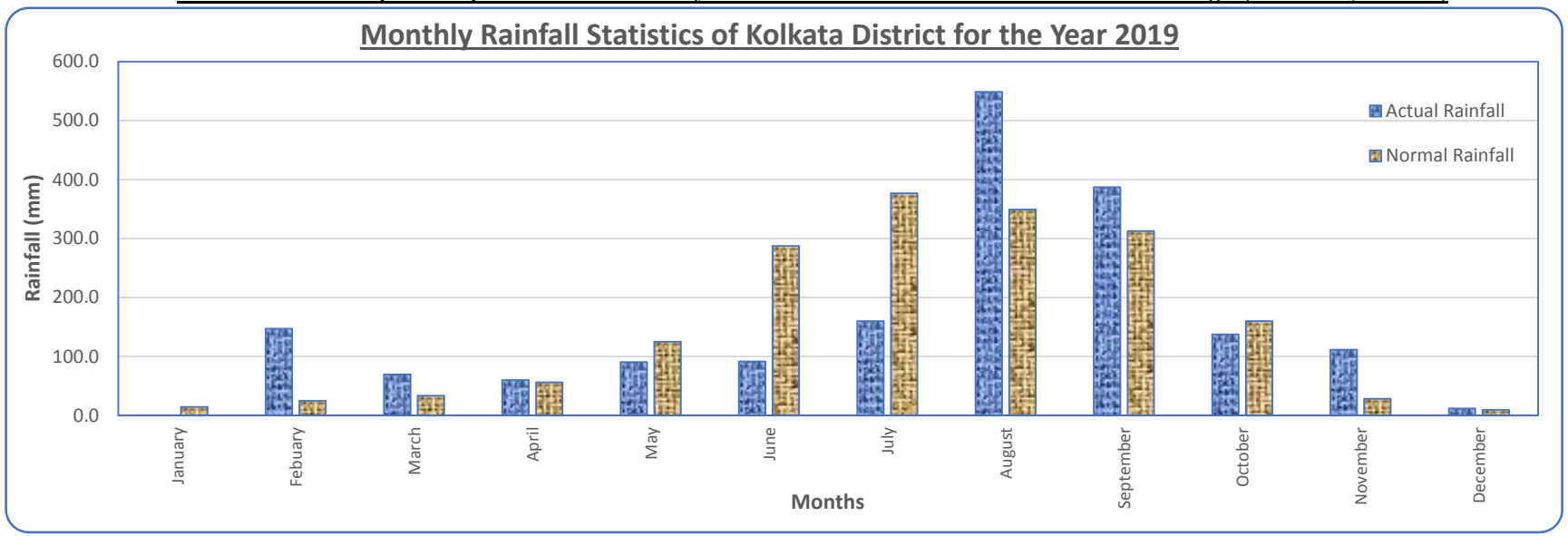


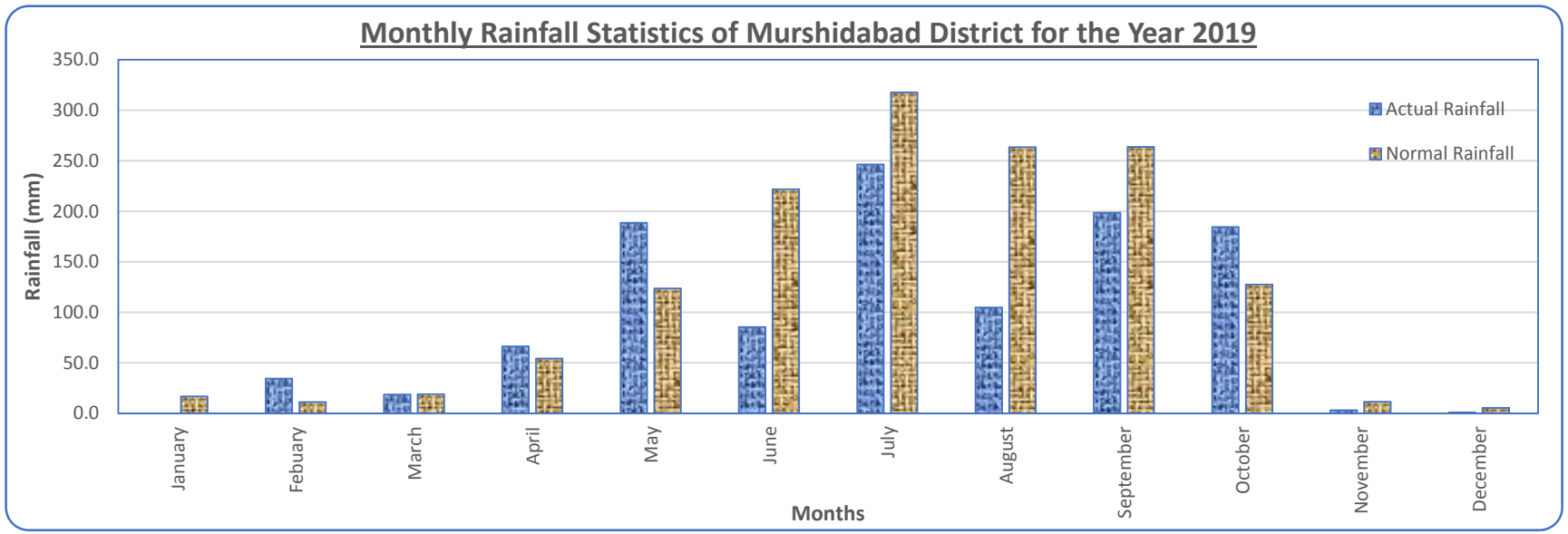
Annexure IV-B: Graphical Representation of Monthly Rainfall Statistics at different Districts of West Bengal (after IMD, Kolkata)



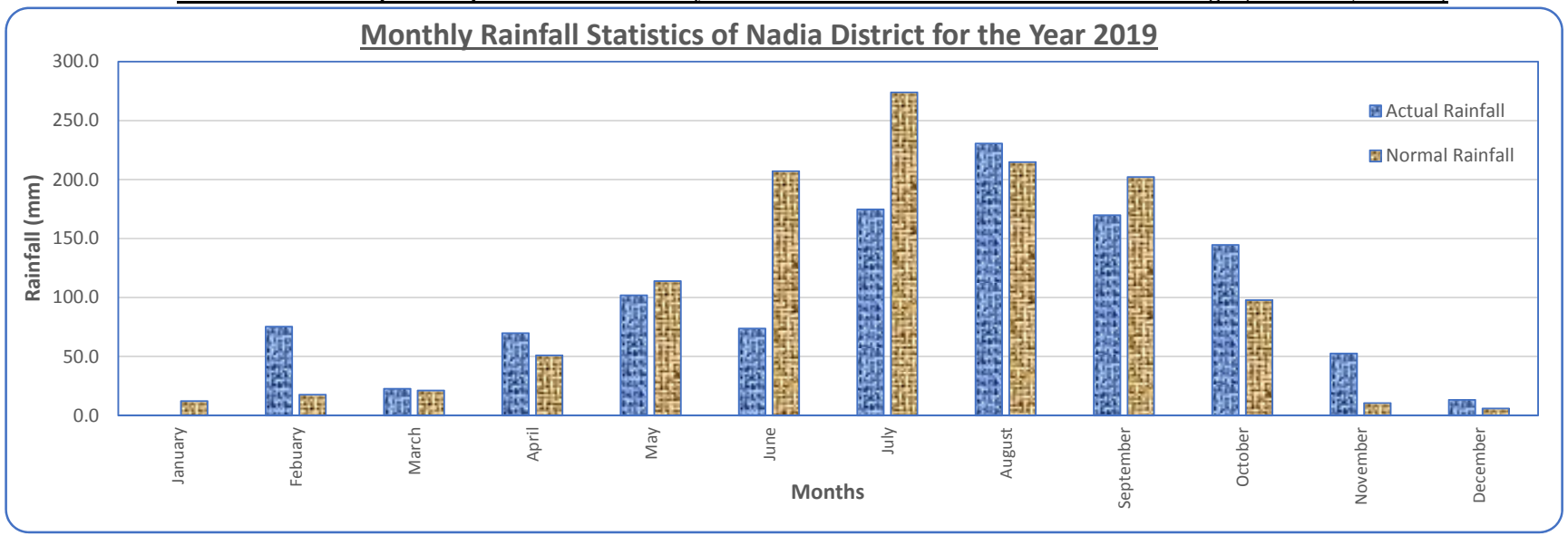


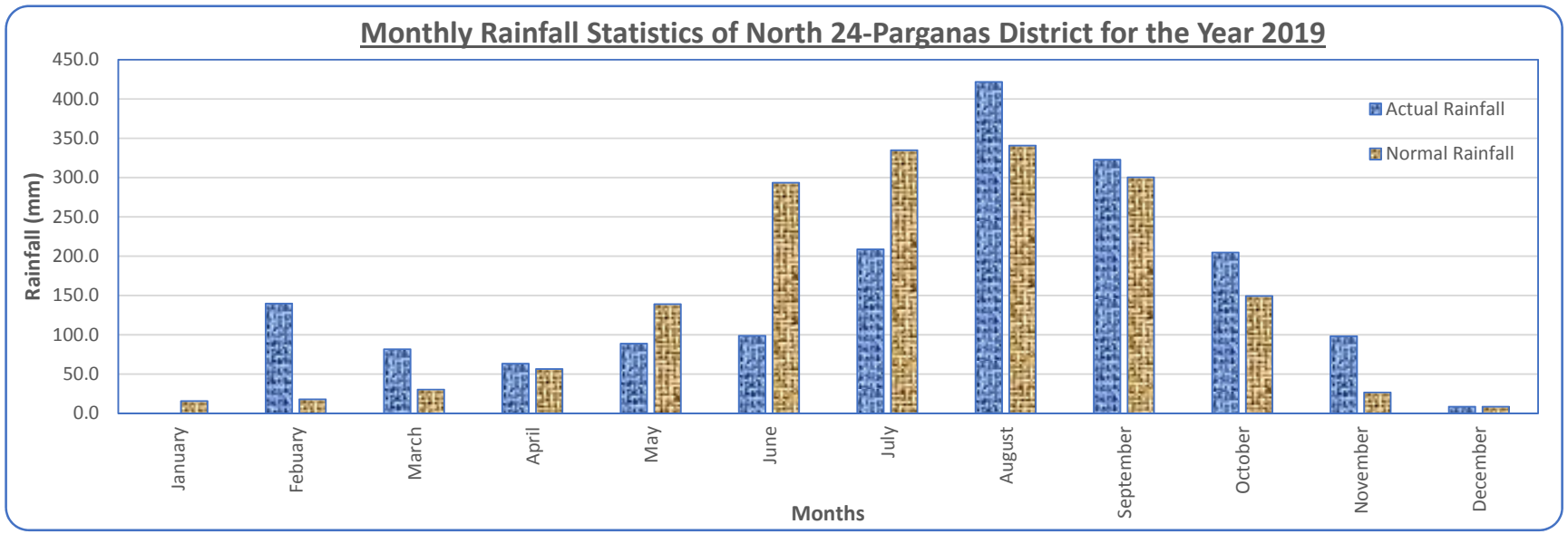
Annexure IV-B: Graphical Representation of Monthly Rainfall Statistics at different Districts of West Bengal (after IMD, Kolkata)



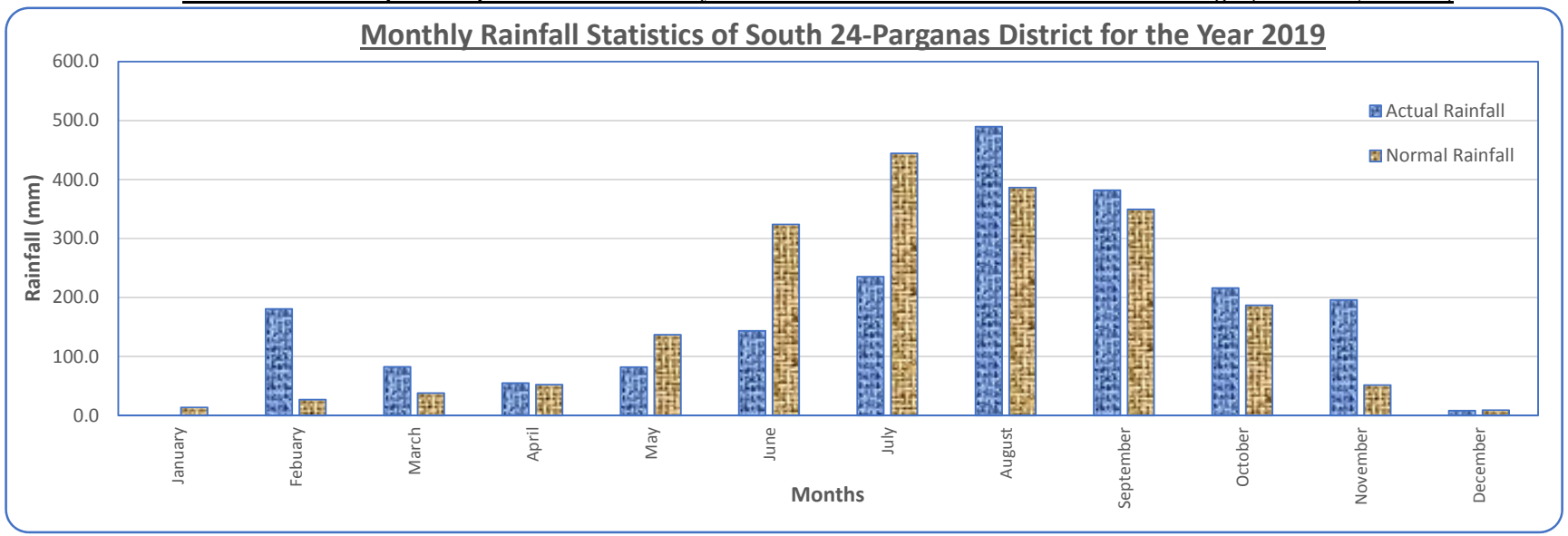


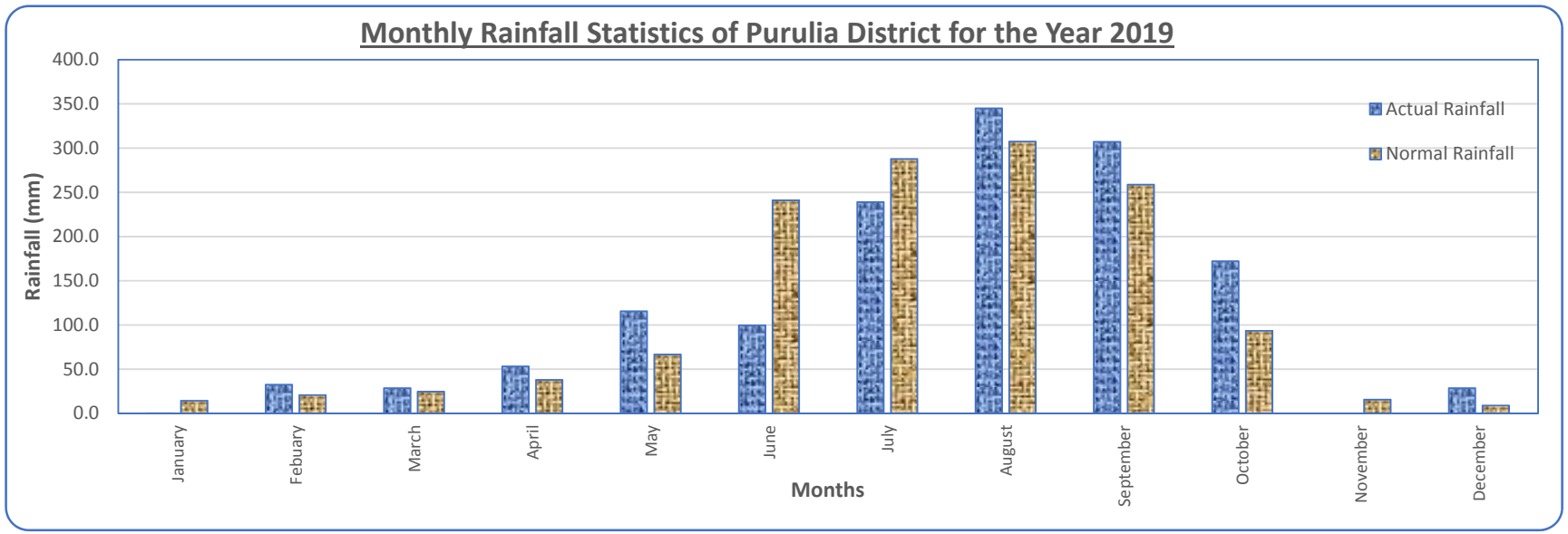
Annexure IV-B: Graphical Representation of Monthly Rainfall Statistics at different Districts of West Bengal (after IMD, Kolkata)



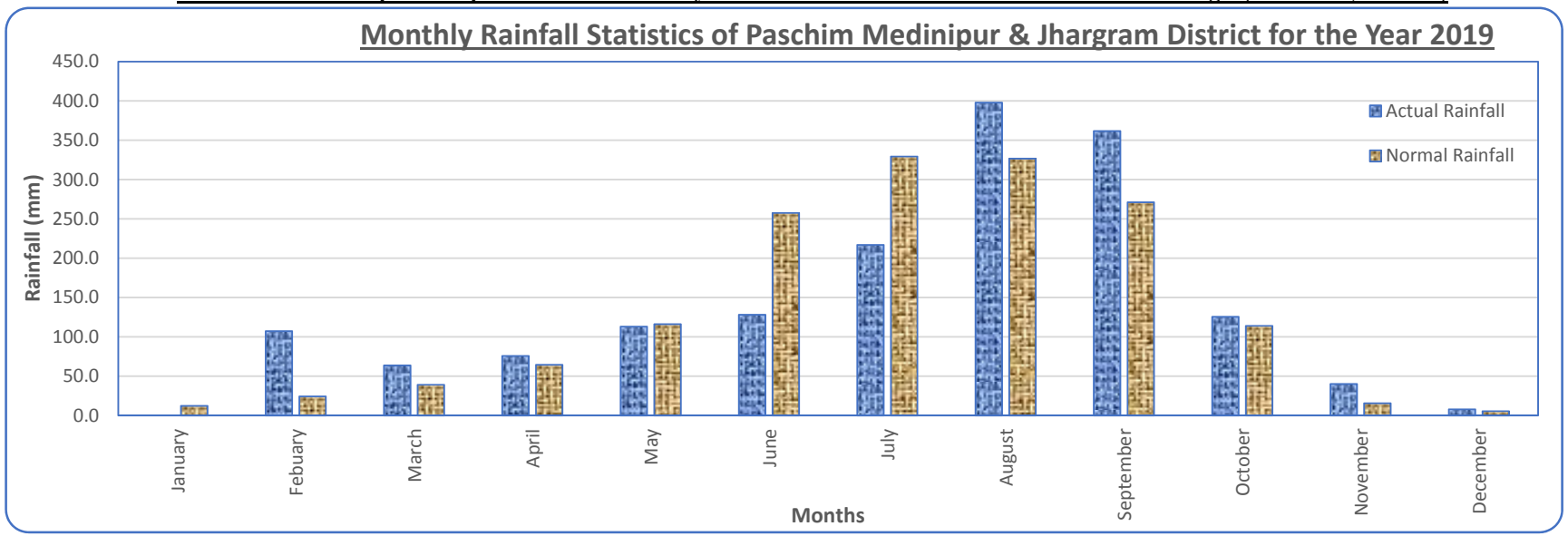


Annexure IV-B: Graphical Representation of Monthly Rainfall Statistics at different Districts of West Bengal (after IMD, Kolkata)





Annexure IV-B: Graphical Representation of Monthly Rainfall Statistics at different Districts of West Bengal (after IMD, Kolkata)



Annexure-V: Season-wise Average Rainfall Statistics of West Bengal for the Year 2019

Seasonal Rainfall (mm)	Winter Avg. Rainfall			Pre-Monsoon Avg. Rainfall			Monsoon Avg. Rainfall			Post-Monsoon Avg. Rainfall			Annual Avg. Rainfall		
	(1st January to 28th February)			(1st March to 31st May)			(1st June to 30th September)			(1st October to 31st December)			(1st January to 31st December)		
Districts	**Actual**	**Normal**	**% Dep**	**Actual**	**Normal**	**% Dep**	**Actual**	**Normal**	**% Dep**	**Actual**	**Normal**	**% Dep**	**Actual**	**Normal**	**% Dep**
Coochbehar	15.00	24.90	**-39.80%**	553.40	509.70	**8.60%**	2059.20	2573.60	**-20.00%**	119.90	175.90	**-31.80%**	2747.50	3284.10	**-16.30%**
Darjeeling (including Kalimpong)	27.10	82.10	**-67.00%**	316.70	458.30	**-30.90%**	2485.80	2474.90	**0.40%**	85.30	171.40	**-50.20%**	2914.90	3186.70	**-8.50%**
Jalpaiguri (including Alipurduar)	22.00	27.00	**-18.50%**	457.70	538.50	**-15.00%**	2827.70	2839.00	**-0.40%**	135.10	199.50	**-32.30%**	3442.50	3604.00	**-4.50%**
Malda	38.10	24.10	**58.10%**	201.70	168.70	**19.60%**	941.20	1112.30	**-15.40%**	146.10	140.00	**4.40%**	1327.10	1445.10	**-8.20%**
North Dinajpur	24.20	23.50	**3.00%**	161.10	253.20	**-36.40%**	1097.30	1500.80	**-26.90%**	66.40	144.80	**-54.10%**	1349.00	1922.30	**-29.80%**
South Dinajpur	16.70	22.20	**-24.80%**	184.00	245.40	**-25.00%**	963.90	1172.60	**-17.80%**	172.40	136.70	**26.10%**	1337.00	1576.90	**-15.20%**
North Bengal Average	**23.90**	**34.00**	**-29.80%**	**312.40**	**362.30**	**-13.80%**	**1729.20**	**1945.50**	**-11.10%**	**120.90**	**161.40**	**-25.10%**	**2186.30**	**2503.20**	**-12.70%**
Bankura	33.80	30.00	**12.70%**	268.60	146.50	**83.30%**	926.70	1158.20	**-20.00%**	199.40	141.80	**40.60%**	1428.50	1476.50	**-3.30%**
Birbhum	27.70	29.50	**-6.10%**	214.40	157.20	**36.40%**	760.70	1172.70	**-35.10%**	198.00	132.20	**49.80%**	1200.80	1491.60	**-19.50%**
Burdwan (Purba & Paschim)	64.00	32.90	**94.50%**	194.00	130.40	**48.80%**	735.60	998.30	**-26.30%**	220.60	111.10	**98.60%**	1214.20	1272.70	**-4.60%**
East Midnapore	137.50	34.50	**298.60%**	149.10	190.40	**-21.70%**	1142.20	1305.70	**-12.50%**	500.80	211.60	**136.70%**	1929.60	1742.20	**10.80%**
Hooghly	86.40	38.50	**124.40%**	213.30	186.20	**14.60%**	737.50	1047.00	**-29.60%**	205.70	136.40	**50.80%**	1242.90	1408.10	**-11.70%**
Howrah	150.60	37.10	**305.90%**	138.10	207.70	**-33.50%**	990.00	1196.80	**-17.30%**	189.40	164.30	**15.30%**	1468.10	1605.90	**-8.60%**
Kolkata	147.20	39.10	**276.50%**	220.20	214.50	**2.70%**	1187.00	1326.10	**-10.50%**	260.80	197.40	**32.10%**	1815.20	1777.10	**2.10%**
Murshidabad	34.50	28.00	**23.20%**	273.60	196.80	**39.00%**	634.90	1066.50	**-40.50%**	188.50	144.30	**30.60%**	1131.50	1435.60	**-21.20%**
Nadia	75.30	29.80	**152.70%**	194.30	185.90	**4.50%**	648.80	897.90	**-27.70%**	210.30	114.20	**84.20%**	1128.70	1227.80	**-8.10%**
North 24 Parganas	139.70	33.40	**318.30%**	233.50	225.60	**3.50%**	1051.70	1269.20	**-17.10%**	311.40	184.30	**69.00%**	1736.30	1712.50	**1.40%**
Puraulia	32.60	35.00	**-6.90%**	197.00	129.10	**52.60%**	990.60	1094.60	**-9.50%**	200.50	117.90	**70.10%**	1420.70	1376.60	**3.20%**
South 24 Parganas	180.60	40.30	**348.10%**	219.20	226.80	**-3.40%**	1250.30	1504.00	**-16.90%**	419.90	247.10	**69.90%**	2070.00	2018.20	**2.60%**
West Midnapore (including Jhargram)	107.20	36.30	**195.30%**	252.30	219.30	**15.00%**	1104.50	1184.50	**-6.80%**	173.30	134.80	**28.60%**	1637.30	1574.90	**4.00%**
South Bengal Average	**93.60**	**34.20**	**173.90%**	**212.90**	**185.90**	**14.50%**	**935.40**	**1170.90**	**-20.10%**	**252.20**	**156.70**	**60.90%**	**1494.10**	**1547.70**	**-3.50%**
State Average	**71.60**	**34.10**	**109.80%**	**244.30**	**241.60**	**1.10%**	**1186.10**	**1415.50**	**-16.20%**	**210.70**	**158.20**	**33.20%**	**1712.70**	**1849.40**	**-7.40%**

*Data source: IMD-RMC, Kolkata

Annexure VI: Station-wise Monthly Rainfall Statistics during Monsoon, 2019

Sl	RIVER BASIN	Location of Rain Gauge Station	District	District wise Normal Annual Rainfall (mm)	Station wise Monthly Total Rainfall (mm)					Cum. Monsoon Rnf. (mm)	One Day Max. Rnf. (mm)	Rainfall Type	Date of Max. Rainfall occured
					Jun-19	Jul-19	Aug-19	Sep-19	Oct-19				
1	Teesta	Gangtok	East Sikkim	2739.00	406.20	801.20	584.40	400.60	104.20	2296.60	117.80	Heavy	26.6.19
2		Darjeeling	Darjeeling	3118.50	99.60	787.80	429.60	429.90	18.40	1765.30	138.60	V. Heavy	8.7.19
3		Malbazar	Jalpaiguri	3468.30	574.10	1154.70	343.50	887.50	535.08	3703.40	267.10	E. Heavy	24.7.19
4		Jalpaiguri			411.40	1200.00	271.30	524.50	57.70	2850.10	204.00	V. Heavy	14.7.19
5	Jaldhaka	Banarhat			782.60	1457.70	239.20	802.30	198.00	4024.80	238.00	V. Heavy	24.7.19
6		Mainaguri			440.50	1181.00	321.00	482.00	84.00	2877.00	194.00	V. Heavy	14.7.19
7		Mathabhanga	Coochbehar	3443.70	260.95	905.20	146.40	421.20	82.00	2484.40	124.00	Heavy	24.7.19
8	Sankosh	Barabisha	Alipurduar	3468.30	549.00	1653.96	232.80	758.80	103.20	3297.76	397.60	E. Heavy	24.7.19
9	Torsa	Hasimara			1023.60	1378.20	480.20	780.20	53.20	4788.20	251.80	E. Heavy	26.6.19
10		Alipurduar			699.20	1521.80	298.40	795.00	145.40	4248.00	405.40	E. Heavy	26.6.19
11		Coochbehar	Coochbehar	3443.70	343.10	1134.10	205.80	471.70	100.60	2914.40	197.40	V. Heavy	13.7.19
12		Tufanganj			407.10	992.00	188.80	468.40	103.00	3122.20	170.80	V. Heavy	23.7.19
13	Mahananda-Fulhar	Siliguri	Darjeeling	3118.50	438.20	1403.80	216.30	637.40	123.40	3208.50	233.00	V. Heavy	24.7.19
14		Islampur	Uttar Dinajpur	1727.60	69.80	439.20	56.80	201.30	20.50	987.10	58.20	Normal	14.7.19
15		Raiganj			169.40	385.30	201.40	512.40	37.00	1660.70	105.40	Heavy	23.9.19
16		English Bazar	Malda	1419.40	106.30	368.50	160.40	306.20	195.00	1403.10	99.80	Heavy	30.9.19
17	Atreyee	Balurghat	Dakshin Dinajpur	1584.90	91.60	779.50	180.80	323.60	235.60	1897.60	132.80	V. Heavy	23.7.19
18	Punarbhaba	Gangarampur			181.00	326.45	154.50	402.60	191.00	1591.00	77.55	Heavy	24.7.19
19	Bhagirathi - Hooghly	Berhampore	Murshidabad	1391.10	125.80	265.60	143.80	197.80	171.60	1230.40	64.60	Heavy	26.10.19
20		Katwa	Purba Burdwan	1315.20	70.56	180.78	126.32	125.13	76.36	892.95	47.84	Normal	13.7.19
21	Jalangi	Swarupganj	Nadia	1261.60	74.00	215.60	250.80	216.60	103.40	1118.40	60.00	Normal	6.8.19
22	Pagla-Bansloi	Paikor	Birbhum	1392.80	90.70	268.00	154.60	130.20	103.20	1024.20	55.20	Normal	30.9.19
23	Brahamani-Dwarka	Md. Bazar			81.75	301.50	139.50	364.25	182.50	1380.25	64.50	Heavy	29.9.19
24		Rampurhat			153.40	214.40	187.80	306.80	152.00	1480.20	84.40	Heavy	29.9.19
25		Mallarpur			112.40	255.50	230.70	378.10	193.90	1378.30	93.40	Heavy	29.9.19
26		Deocha			68.40	271.60	130.40	412.40	135.10	1312.80	73.70	Heavy	29.9.19
27	Mayurakshi-Babla	Haripur	Dumka	1381.50	158.80	339.80	95.80	311.60	134.20	1040.20	93.00	Heavy	30.9.19
28		Khusiary			116.60	395.40	169.00	397.40	156.20	1234.60	87.00	Heavy	29.9.19
29		Maharo			102.00	516.40	262.20	304.00	147.00	1331.60	114.00	Heavy	30.9.19
30		Massanjore			59.40	374.80	312.20	297.80	320.40	1552.40	180.20	V. Heavy	7.10.19
31		Tantloi			45.00	133.40	225.41	301.60	194.80	900.21	73.40	Heavy	30.9.19
32		Tilpara Barrage	Birbhum	1392.80	60.00	274.00	214.00	335.00	219.40	1370.00	60.80	Normal	25.10.19
33		Shyambati			42.00	294.00	162.00	231.00	180.00	1339.00	100.00	Heavy	25.7.19
34		Kandi	Murshidabad	1391.10	89.70	223.90	138.10	262.00	182.60	1161.00	100.00	Heavy	25.7.19
35	Ajay-Hinglow	Sikatia	Deoghar	1162.10	85.00	260.00	267.40	296.67	155.07	1064.14	76.60	Heavy	29.9.19
36		Hinglow	Birbhum	1392.80	204.00	184.00	233.00	432.00	149.00	1438.00	95.00	Heavy	30.9.19
37		Debogram			83.50	283.50	182.50	228.00	161.00	1378.75	84.00	Heavy	25.10.19
38		Satkahania	Paschim Burdwan	1315.20	54.20	85.20	100.40	92.10	64.60	479.50	35.00	Normal	25.7.19
39		Guskara			69.00	222.00	393.00	289.00	171.50	1468.00	70.00	Heavy	25.10.19
40		Tilaiya	Kodarma	1116.20	91.80	250.80	245.60	402.20	77.40	1067.80	108.40	Heavy	29.9.19
41		Tenughat	Bokaro	1247.50	72.00	217.40	280.00	286.80	159.60	1015.80	87.00	Heavy	8.8.19
42		Maithon	Dhanbad	1355 20	138.10	261.60	231.00	385.60	242.00	1258.30	88.60	Heavy	8.10.19

Sl	RIVER BASIN	Location of Rain Gauge Station	District	District wise Normal Annual Rainfall (mm)	Station wise Monthly Total Rainfall (mm)					Cum. Monsoon Rnf. (mm)	One Day Max. Rnf. (mm)	Rainfall Type	Date of Max. Rainfall occured
					Jun-19	Jul-19	Aug-19	Sep-19	Oct-19				
43	Damodar	Panchet	Dhanbad	1355.20	75.40	226.60	305.20	377.80	114.00	1099.00	58.00	Normal	28.9.19
44		Asansol	Paschim Burdwan	1315.20	145.80	259.69	258.60	383.20	233.80	1425.40	73.20	Heavy	25.10.19
45		Durgapur			110.00	189.20	403.40	256.00	220.60	1417.20	79.20	Heavy	2.9.19
46		Kanainatsal	Purba Burdwan		98.00	179.00	227.70	159.50	135.50	1162.00	49.10	Normal	15.8.19
47		Sonamukhi	Bankura	1330.90	58.00	168.00	142.50	226.00	110.00	1005.00	80.00	Heavy	2.9.19
48	Khari-Behula-Ghea	Balgona	Purba Burdwan	1315.20	44.00	158.00	220.00	142.60	124.90	1176.30	53.00	Normal	10.7.19
49		Memari			182.00	383.00	251.00	313.00	145.00	1420.00	104.00	Heavy	9.7.19
50	Mundeswari	Seharabazar			67.00	211.00	187.00	281.00	124.00	945.00	90.00	Heavy	25.10.19
51		Raina			67.00	139.00	207.00	108.00	98.00	860.00	56.00	Normal	25.10.19
52	Amta Channel (Damodar)	Champadanga	Hoogly	1418.70	63.00	163.25	228.75	247.75	110.25	1083.00	72.75	Heavy	25.9.19
53		Singur			79.75	110.25	321.27	276.75	98.50	1150.70	62.75	Normal	25.9.19
54		Amta	Howrah	1600.00	155.00	175.00	335.00	329.00	100.00	1432.00	75.00	Heavy	18.8.19
55		Domjur			83.00	147.00	373.00	385.00	112.00	1399.00	105.00	Heavy	8.8.19
56	Dwarakeswar	Bankura	Bankura	1330.90	104.60	326.80	333.00	338.20	238.20	1725.00	93.20	Heavy	2.9.19
57		Indus			115.50	193.50	413.50	347.00	175.00	1394.50	103.00	Heavy	6.8.19
58		Arambag	Hoogly	1418.70	184.50	230.50	337.75	259.50	152.00	1441.50	80.00	Heavy	21.6.19
59	Shilabati	Amlagora	Paschim Medinipur	1535.50	72.20	144.00	262.40	340.70	27.80	847.10	84.50	Heavy	28.9.19
60		Ghatal			100.60	298.50	486.80	293.20	152.60	1662.70	80.40	Heavy	23.8.19
61	Kangsabati	Simulia	Purulia	1363.30	107.00	213.80	421.00	311.60	203.40	1534.60	86.60	Heavy	24.10.19
62		Purihansa			151.00	220.20	342.00	336.00	136.80	1472.80	83.00	Heavy	4.9.19
63		Tusuma			128.60	190.60	459.00	210.00	225.20	1508.60	81.40	Heavy	23.8.19
64		Kharidwar			151.20	326.40	240.80	286.80	151.60	1446.20	180.40	V. Heavy	6.7.19
65		Phulberia			121.00	293.20	351.60	289.60	170.20	1476.40	117.40	Heavy	6.7.19
66		Mukutmanipur	Bankura	1330.90	247.20	200.80	391.00	175.80	141.00	1427.20	74.80	Heavy	24.10.19
67		Midnapore	Paschim Medinipur	1535.50	133.20	177.40	434.20	429.40	101.20	1694.80	110.60	Heavy	25.9.19
68		Panskura	Purba Medinipur	1669.60	178.15	228.22	619.50	632.25	365.33	2511.08	215.00	V. Heavy	17.8.19
69	Rupnarayan	Tamluk			351.50	413.50	714.50	327.00	116.50	1993.50	157.50	V. Heavy	17.8.19
70	Kaliaghai	Amgachia			112.60	264.70	402.10	312.20	171.00	1620.50	120.00	Heavy	25.10.19
71		Sabang	Paschim Medinipur	1535.50	125.50	330.34	443.67	368.37	100.49	1722.29	138.97	V. Heavy	25.9.19
72	Kangsabati	Jhargram	Jhargram		119.00	198.05	356.15	365.45	113.05	1490.85	86.70	Heavy	18.8.19
73	Chandia	Barisha	Paschim Medinipur		240.80	271.60	483.20	492.40	150.00	2024.00	210.00	V. Heavy	17.8.19
74	Haldi	Itamogra	Purba Medinipur	1669.60	151.70	144.60	709.30	385.40	114.10	1672.00	212.10	V. Heavy	17.8.19
75	Rasulpur	Contai		1669.60	156.20	106.00	300.20	464.20	354.40	1672.00	128.80	V. Heavy	10.10.19
76	Hooghly	Alipore	Kolkata	1709.20	109.60	159.10	548.60	417.30	123.60	1358.20	137.60	V. Heavy	17.8.19
77	Ichhamati	Bangaon	North 24-Parganas	1560.30	61.20	405.40	165.80	257.80	171.40	1387.30	169.40	V. Heavy	25.7.19
78		Tentulia			237.30	122.00	353.00	231.00	216.00	1507.00	68.00	Heavy	5.6.19
79	Bidyadhari	Dumdum			54.10	126.10	437.90	298.20	117.00	1033.30	90.30	Heavy	17.8.19
80		Chowbaga	South 24-Parganas	2088.00	160.00	103.00	451.00	306.00	145.00	1579.00	78.00	Heavy	25.9.19
81	Sundarban Area	Uttarbhag			55.00	73.00	415.00	276.00	161.00	1256.00	70.00	Heavy	3.9.19
82	Subarnarekha	Digha	Purba Medinipur	1669.60	64.50	101.00	305.50	419.50	386.00	1637.00	205.00	V. Heavy	25.10.19

* Data Source: Daily Flood Reports of Central Flood Control Room, I&WD

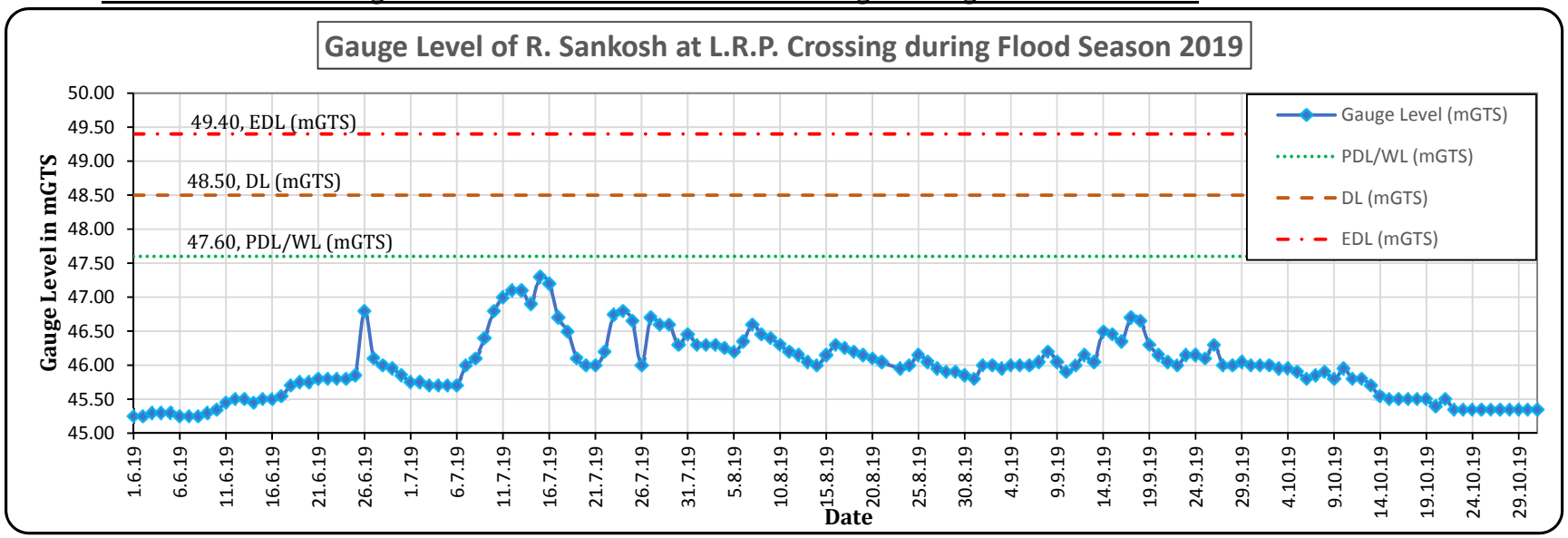
Annexure-VII: Monthly Statistics of River Gauges during Flood Season, 2019

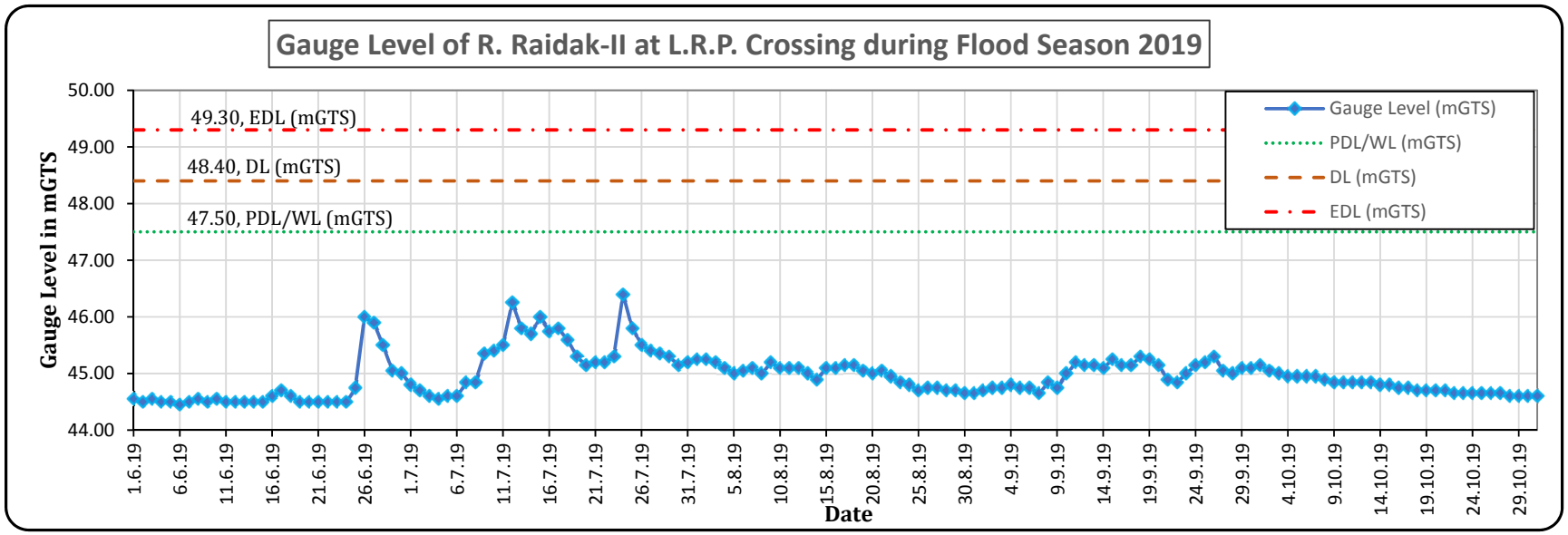
Sl.	River	Gauge Station	District	PDL / WL (mGTS)	DL (mGTS)	EDL (mGTS)	Monthly Avg. River Gauge Level (mGTS)					Max. GL (mGTS)	Max. GL w.r.t reference value	Date of Peak	Min.GL (mGTS)	No. of Days crossing		
							Jun-19	Jul-19	Aug-19	Sep-19	Oct-19					PDL	DL	EDL
1	Sankosh	L.R.P. Crossing	Alipurduar	47.60	48.50	49.40	45.61	46.40	46.10	46.14	45.61	47.30		15.7.19	45.25	0	0	0
2	Raidak-II			47.50	48.40	49.30	44.69	45.32	44.98	44.98	44.79	46.40		24.7.19	44.20	0	0	0
3	Raidak-I			46.10	47.00	47.90	44.05	44.59	44.24	44.19	44.17	45.60		27.6.19	42.50	0	0	0
4		Tufanganj	Coochbehar	34.70	35.30	35.90	32.38	33.78	32.75	32.79	32.49	36.12	0.22 m. above EDL	24.7.19	31.96	5	1	2
5	Torsa	Hasimara	Alipurduar	115.10	116.30	117.50	115.18	115.29	114.97	114.97	114.70	116.40	0.1 m. above DL	25.6.19	114.40	**51**	1	0
6		Coochbehar	Coochbehar	41.46	42.07	42.68	40.51	41.25	41.03	41.15	40.76	41.74	0.28 m. above PDL	13.7.19	40.20	9	0	0
7	Kaljani	Alipurduar	Alipurduar	44.50	45.10	45.70	42.88	43.67	43.15	42.83	43.30	45.40	0.3 m. above DL	26.6.19	42.35	2	3	0
8	Diana	Chengmari	Jalpaiguri	199.90	200.50	201.20	198.88	199.28	198.53	191.93	198.35	201.00	0.5 m. above DL	25.6.19	BG	1	2	0
9	Jaldhaka	Nagrakata		160.10	160.70	161.80	156.72	157.03	156.62	151.40	156.30	158.02		25.6.19	BG	0	0	0
10		NH-31 Crossing		79.30	80.10	80.90	79.15	79.58	79.41	76.85	79.15	80.08	0.78 m. above PDL	12.7.19	BG	**93**	0	0
11	Mansai	Mathabhanga	Coochbehar	47.20	47.70	48.20	45.61	46.40	45.69	45.97	45.35	47.66	0.46 m. above PDL	24.7.19	44.93	8	0	0
12	Teesta	Teesta Bazar	Darjeeling	210.40	211.00	213.00	206.45	209.37	NA	NA	NA	210.80	0.4 m. above PDL	11.7.19	203.40	6	0	0
13		Coronation Bridge		149.40	150.00	153.60	143.26	144.56	143.61	143.40	142.07	146.60		12.7.19	141.25	0	0	0
14		Domohani	Jalpaiguri	85.60	85.95	86.30	85.08	85.51	85.42	82.38	84.70	85.94	0.34 m. above PDL	12.7.19	BG	**21**	0	0
15		Mekhliganj	Coochbehar	65.35	65.95	66.30	63.75	64.74	64.92	62.75	64.04	65.59	0.24 m. above PDL	13.7.19	BG	5	0	0
16	Mahananda	Hill Curt Road	Darjeeling	115.38	115.98	116.59	113.32	113.88	113.51	113.69	113.52	115.98	0.01 m. above DL	28.10.19	113.25	1	1	0
17		Sonapur	North Dinajpur	75.17	75.77	76.38	73.28	73.49	73.28	73.28	73.28	74.28		10.7.19	73.28	0	0	0
18		Englishbazar	Malda	20.25	21.00	21.75	14.68	17.94	17.97	18.55	19.40	21.63	0.63 m. above DL	4.10.19	14.41	**12**	**9**	0
19	Fulhar	Teljana		26.51	27.43	28.35	22.32	25.68	25.93	26.11	25.98	28.56	0.21 m. above EDL	18.7.19	22.11	**18**	**18**	**3**
20	Atreyee	Balurghat	South Dinajpur	22.54	23.15	23.76	18.47	20.56	9.44	18.68	18.10	23.14	0.6 m. above PDL	17.7.19	BG	3	0	0
21	Tangon	Radhikapur		32.85	33.45	34.05	28.44	29.55	28.77	28.97	28.65	32.40		17.7.19	27.01	0	0	0
22	Punarbhaba	Gangarampur		25.22	25.82	26.42	NA	24.06	0.00	22.75	23.70	26.32	0.5 m. above DL	16.7.19	BG	2	2	0
23	Ganga-Padma	Manikchakghat	Malda	24.09	24.69	25.30	21.39	22.52	23.64	24.35	23.88	25.99	0.69 m. above EDL	2.10.19	21.25	**15**	**5**	**16**
24		Akherigunj	Murshidabad	17.83	18.44	19.05	12.84	13.53	14.32	15.31	14.84	17.15		3.10.19	12.84	0	0	0
25	Bansloi	Bansloi Rail Bridge	Birbhum	31.25	31.85	32.76	0.00	NA	0.00	30.40	29.90	32.00	0.15 m. above DL	30.9.19	BG	0	1	0
26	Brahamani	Jagdhari Road Br.		32.40	33.00	33.40	28.70	29.03	29.28	30.55	29.58	32.00		30.9.19	28.60	0	0	0
27	Dwarka	Sankoghat	Murshidabad	19.50	20.40	21.30	NA	16.17	16.12	15.81	18.33	21.53	0.23 m. above EDL	2.10.19	15.05	**5**	**3**	**1**
28		Ranagram		16.76	17.36	17.86	NA	12.78	13.24	12.90	15.26	17.24	0.48 m. above PDL	4.10.19	12.30	5	0	0
29	Mayurakshi	Narayanpur		27.19	27.99	28.79	22.20	22.20	22.20	22.22	22.44	25.10		1.10.19	22.20	0	0	0
30	Kuia	Tarapur		22.11	22.71	23.35	17.15	17.26	18.19	17.80	18.92	20.65		4.10.19	17.15	0	0	0
31	Ajoy	Gheropara	Birbhum	38.42	39.42	40.42	34.01	33.45	34.30	34.24	34.75	37.90		30.9.19	11.06	0	0	0
32	Bhagirathi-Hoogly	Baharampur	Murshidabad	16.62	17.22	17.83	14.26	14.44	14.62	14.64	15.08	16.54		3.10.19	14.09	0	0	0
33		Katwa	Purba Burdwan	13.10	13.71	14.32	9.04	9.48	10.00	9.88	11.14	12.90		2.10.19	9.00	0	0	0
34		Swarupganj	Nadia	7.83	8.44	9.05	5.27	5.65	6.39	6.34	7.55	8.73	0.29 m. above DL	3.10.19	5.19	8	6	0
35	Mathabhanga	Majdia		7.21	7.82	8.43	4.10	4.22	4.77	5.00	5.62	6.66		5.10.19	3.82	0	0	0
36	Churni	Hanskhali		6.92	7.53	8.14	3.54	3.71	4.34	4.46	5.20	6.09		5.10.19	3.34	0	0	0
37	Ichamati	RD Setu (Bongaon)	North 24 Parganas	4.10	4.70	5.25	NA	0.00	2.09	2.35	2.59	2.64		9.10.19	BG	0	0	0
38	Jamuna	Gaighata		3.85	4.45	5.05	NA	0.00	2.45	2.66	2.88	3.01		29.10.19	BG	0	0	0
39	Damodar	Rondiha	Paschim Burdwan	51.53	52.13	52.89	48.07	48.48	49.84	49.92	50.12	50.72		1.10.19	47.85	0	0	0
40		Edilpur	Purba Burdwan	32.19	32.79	32.95	27.50	27.48	27.55	27.51	27.58	27.72		1.10.19	27.39	0	0	0
41		Jamalpur		22.93	23.24	23.54	16.68	16.68	16.69	16.74	17.39	21.00		1.10.19	16.68	0	0	0

Sl.	River	Gauge Station	District	PDL / WL (mGTS)	DL (mGTS)	EDL (mGTS)	Monthly Avg. River Gauge Level (mGTS)					Max. GL (mGTS)	Max. GL w.r.t reference value	Date of Peak	Min.GL (mGTS)	No. of Days crossing		
							Jun-19	Jul-19	Aug-19	Sep-19	Oct-19					PDL	DL	EDL
42	Amta Channel	Amta	Howrah	5.04	5.64	6.24	NA	0.00	2.75	2.80	4.78	6.09	0.45 m. above DL	2.10.19	BG	4	5	0
43	Hurhura	Muchighata		5.56	6.16	6.77	NA	NA	3.71	4.20	5.16	6.88	0.11 m. above EDL	1.10.19	3.50	1	1	1
44	Dwarakeswar	Arambag	Hooghly	16.61	17.22	17.83	11.43	11.43	11.18	11.58	11.52	12.44		26.10.19	5.94	0	0	0
45		Shakepore		11.15	11.75	12.35	7.00	7.00	7.15	7.02	7.15	11.52	0.37 m. above PDL	21.8.19	7.00	1	0	0
46	Shilabati	Banka	Paschim Medinipur	14.47	15.08	15.69	NA	NA	11.72	11.78	11.72	13.60		26.10.19	10.12	0	0	0
47		Gadghat		8.38	8.99	9.60	2.21	2.42	4.31	4.08	4.40	6.95		1.10.19	1.83	0	0	0
48	Rupnarayan	Bandar		6.24	6.85	7.46	1.89	1.96	3.12	2.98	3.45	5.39		2.10.19	1.37	0	0	0
49		Gopiganj		4.41	5.03	5.65	NA	1.76	2.13	1.90	2.18	3.81		2.10.19	0.48	0	0	0
50	Kangsabati	Mohanpur		25.14	25.75	26.36	23.99	24.42	25.02	24.92	24.80	25.10		30.9.19	23.82	0	0	0
51	Old Cossye	Kalmijole		8.68	9.29	9.90	6.35	6.65	6.69	6.07	6.24	7.87		20.8.19	5.90	0	0	0
52	New Cossye	Panskura	Purba Medinipur	8.68	9.29	9.90	NA	NA	7.18	NA	7.09	7.64		20.8.19	6.50	0	0	0
53	Chandia	Barisha	Paschim Medinipur	4.10	4.55	5.00	2.58	2.67	4.06	4.29	3.94	5.75	0.75 m. above EDL	20.8.19	BG	15	15	13
54	Kapaleswari	Narayanbarh		4.72	5.33	5.94	4.72	3.43	4.59	4.62	4.46	6.21	0.27 m. above EDL	20.8.19	3.06	20	15	5
55	Kaliaghai	Bakhrabad		7.80	8.40	8.85	7.95	0.00	7.47	6.98	6.21	10.05	1.2 m. above EDL	19.8.19	BG	8	2	5
56		Dehati		5.95	6.55	7.00	5.95	1.74	5.14	4.42	4.31	6.15	0.2 m. above PDL	20.8.19	BG	6	0	0
57		Amgachia	Paschim Medinipur	5.18	5.79	6.40	3.07	3.58	4.71	4.79	4.66	6.32	0.53 m. above DL	30.9.19	3.02	16	13	0
58		Kalimandop		4.40	5.00	5.33	4.40	3.18	3.82	3.67	3.47	5.00	0 m. above DL	21.8.19	2.90	15	1	0
59	Subarnarekha	Gopiballavpur	Jhargram	44.90	45.50	46.50	40.31	NA	41.27	41.05	41.15	43.20		26.10.19	40.20	0	0	0
60		Sonakonia		15.15	16.15	16.75	NA	NA	10.76	10.61	10.89	14.00		27.10.19	10.00	0	0	0
61	Ajoy	Amuliaghat		104.13	104.73	105.33	101.25	98.76	101.89	101.84	102.42	103.10		29.9.19	8.40	0	0	0
62	Amta Channel	Champadanga	Hooghly	12.30	12.90	13.50	8.13	8.10	9.18	8.81	10.67	14.25	0.75 m. above EDL	1.10.19	2.30	3	2	1
63	Mundeswari	Harinkhola	Hooghly	12.20	12.80	13.41	6.03	NA	6.08	4.87	7.05	11.55		1.10.19	4.50	0	0	0
64	Kangsabati	Kapastikri	Paschim Medinipur	15.40	16.00	16.60	10.25	10.43	11.29	11.36	11.39	13.30		27.10.19	10.22	0	0	0

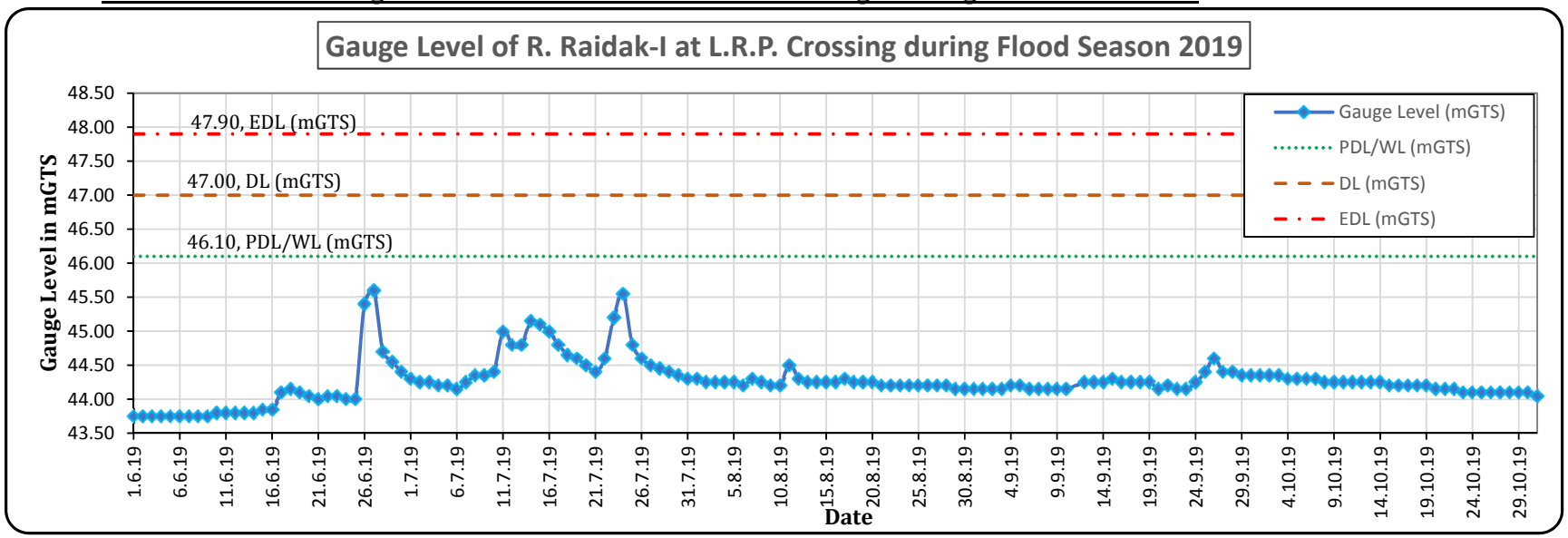
Abbreviation: GL: Gauge Level; BG: Below Gauge; PDL/WL: Primery Danger Level/Warning Level; DL: Danger Level; EDL: Extreme Danger Level

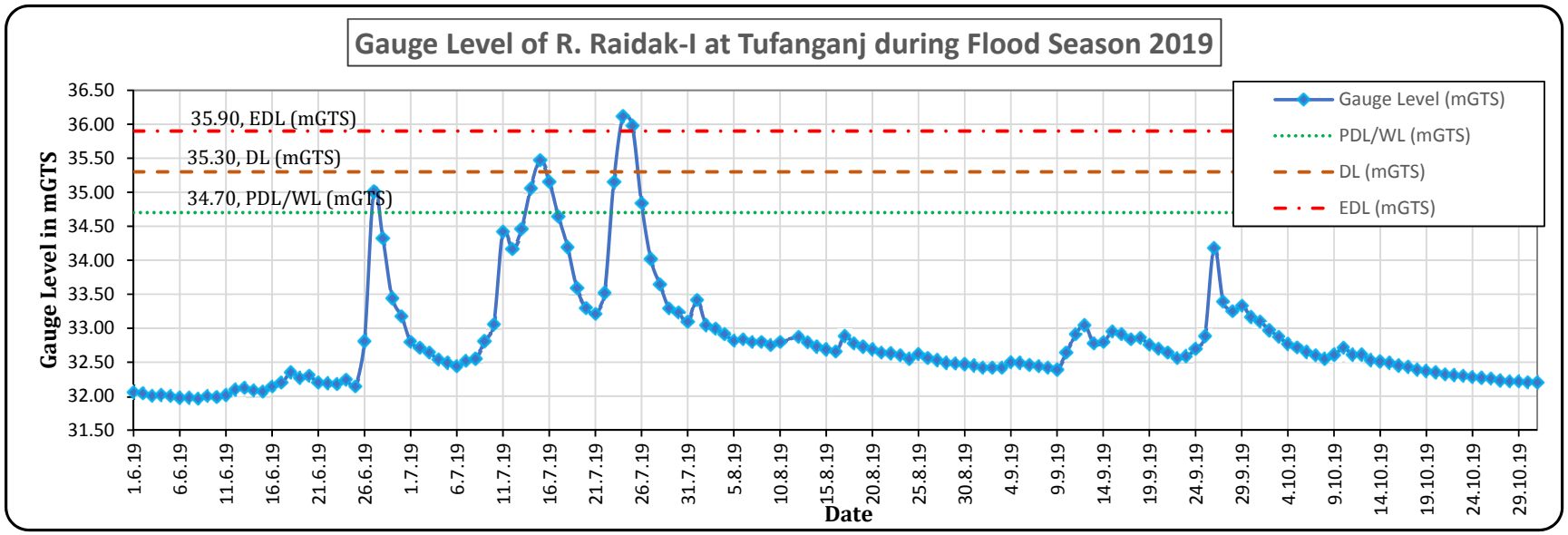
Annexure VIII-A: Gauge Levels of different Rivers of North Bengal during Flood Season 2019



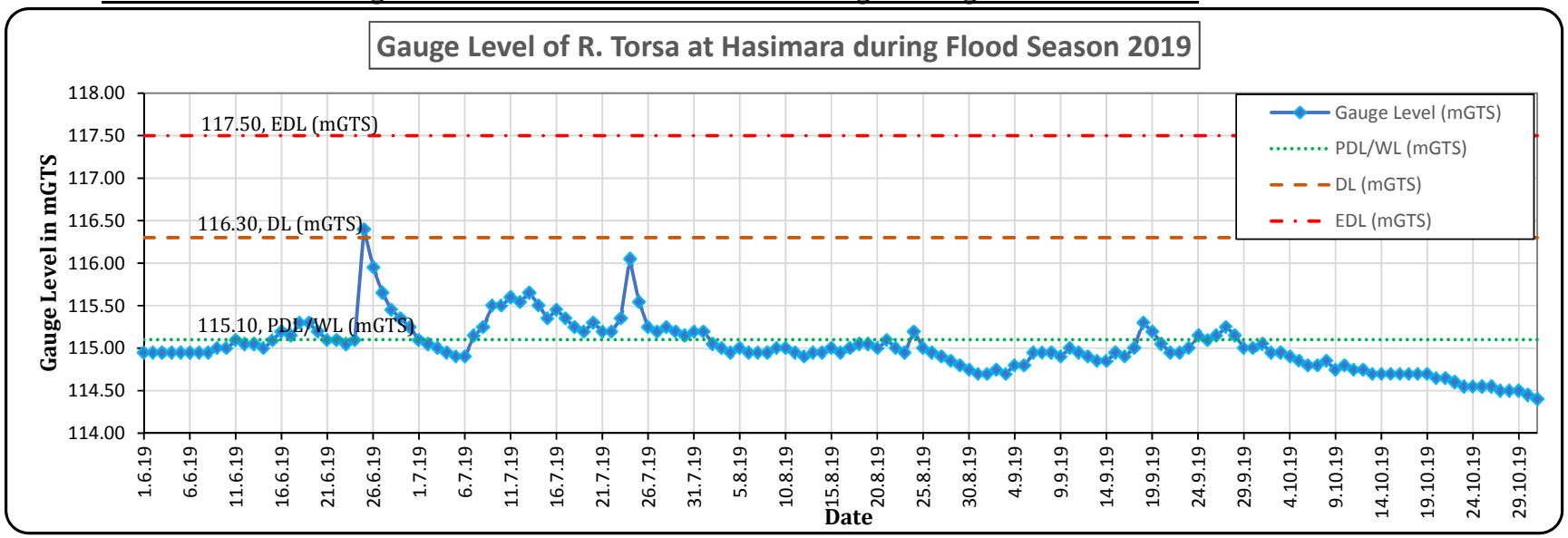


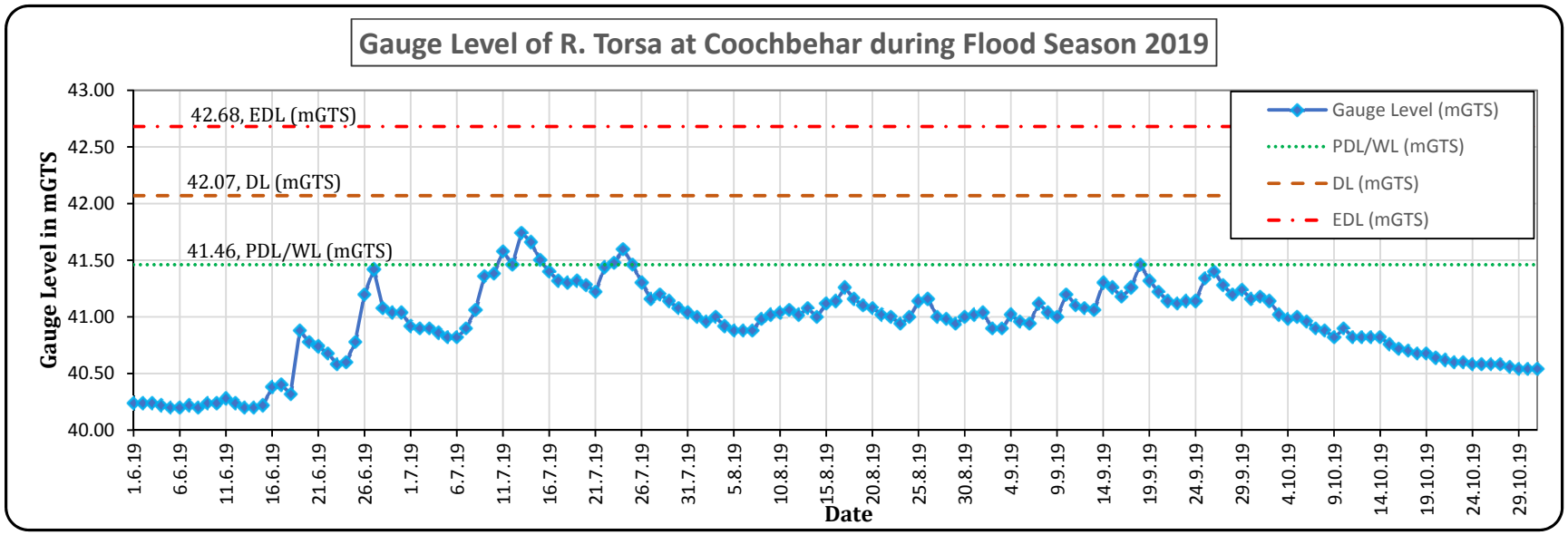
Annexure VIII-A: Gauge Levels of different Rivers of North Bengal during Flood Season 2019



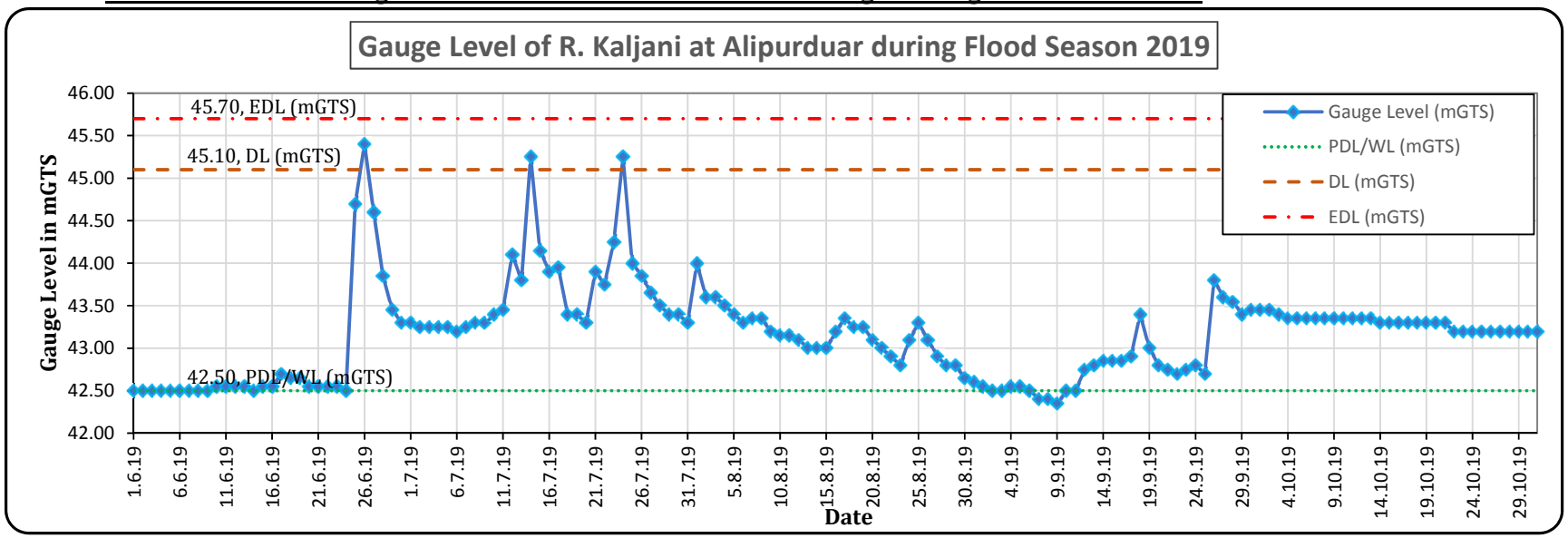


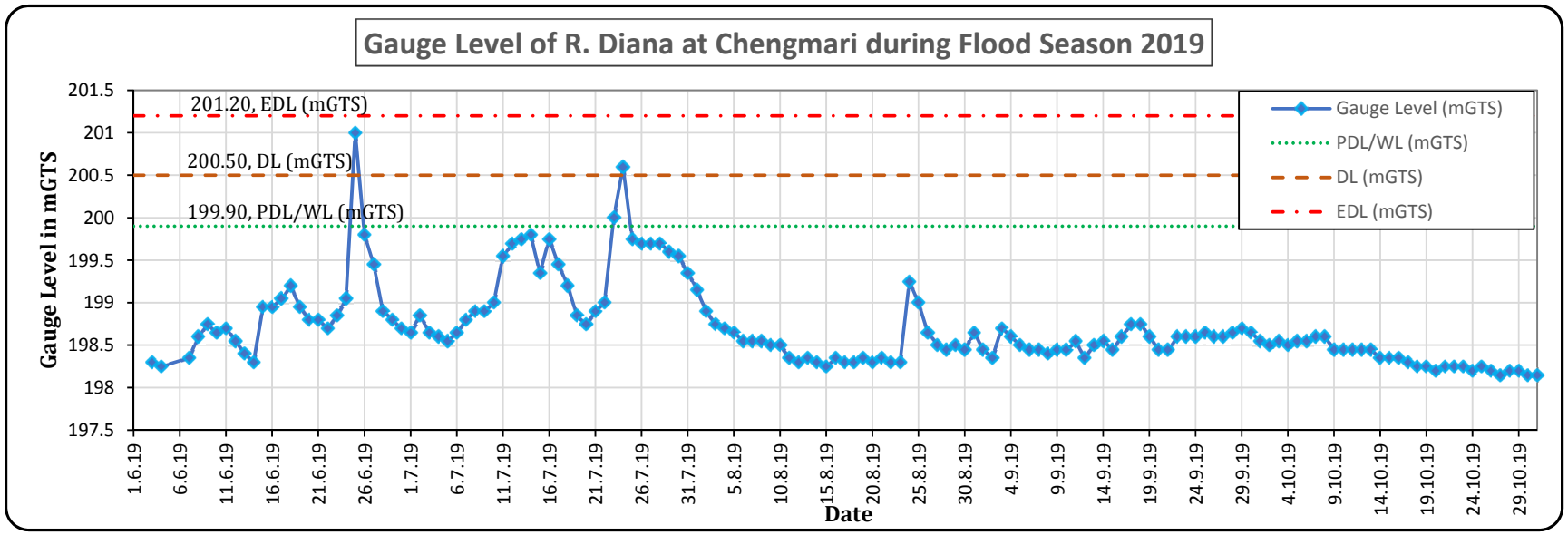
Annexure VIII-A: Gauge Levels of different Rivers of North Bengal during Flood Season 2019



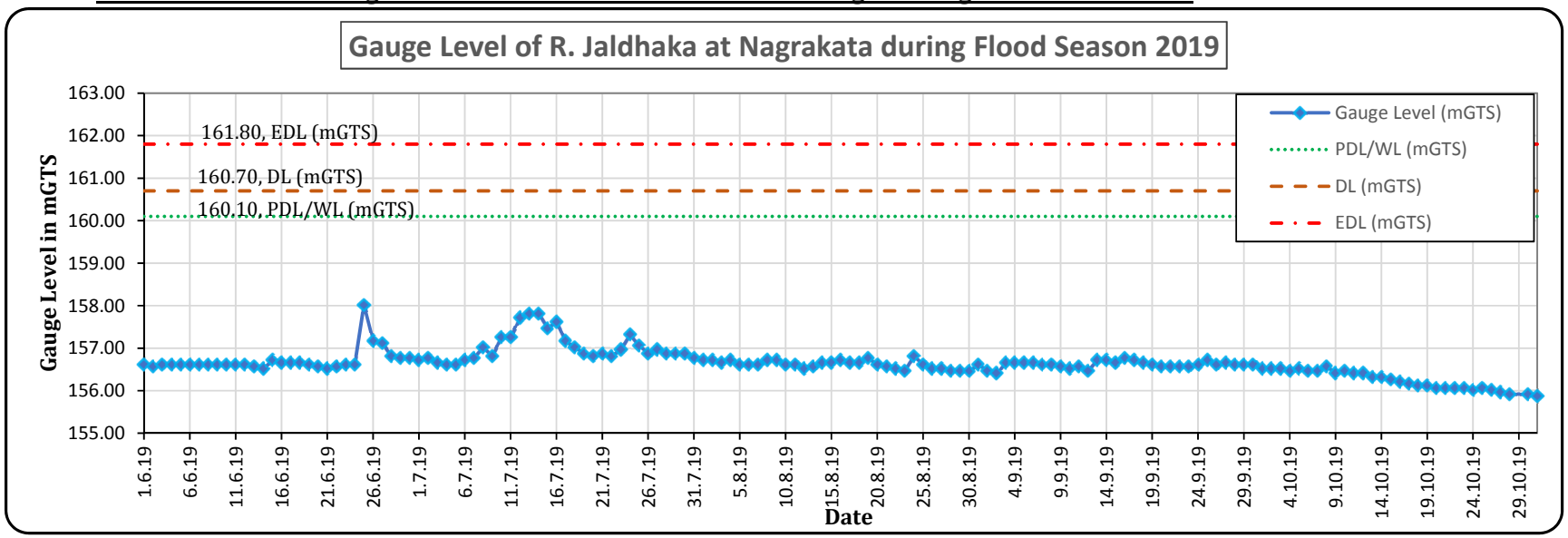


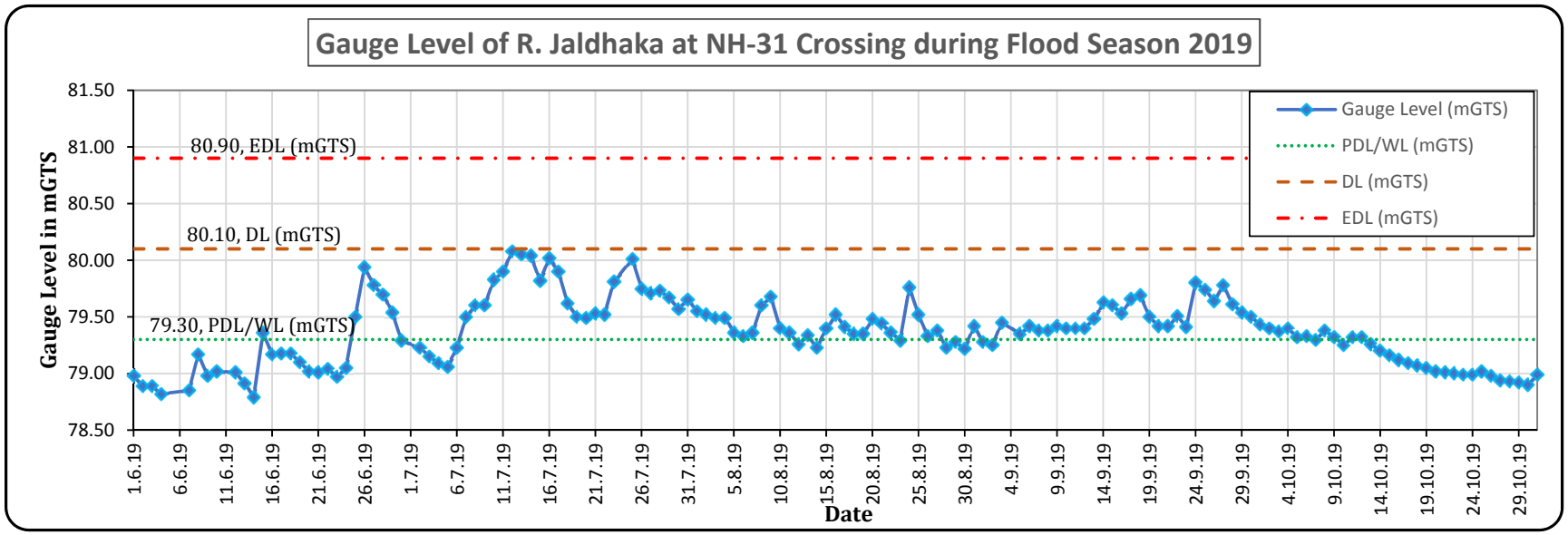
Annexure VIII-A: Gauge Levels of different Rivers of North Bengal during Flood Season 2019



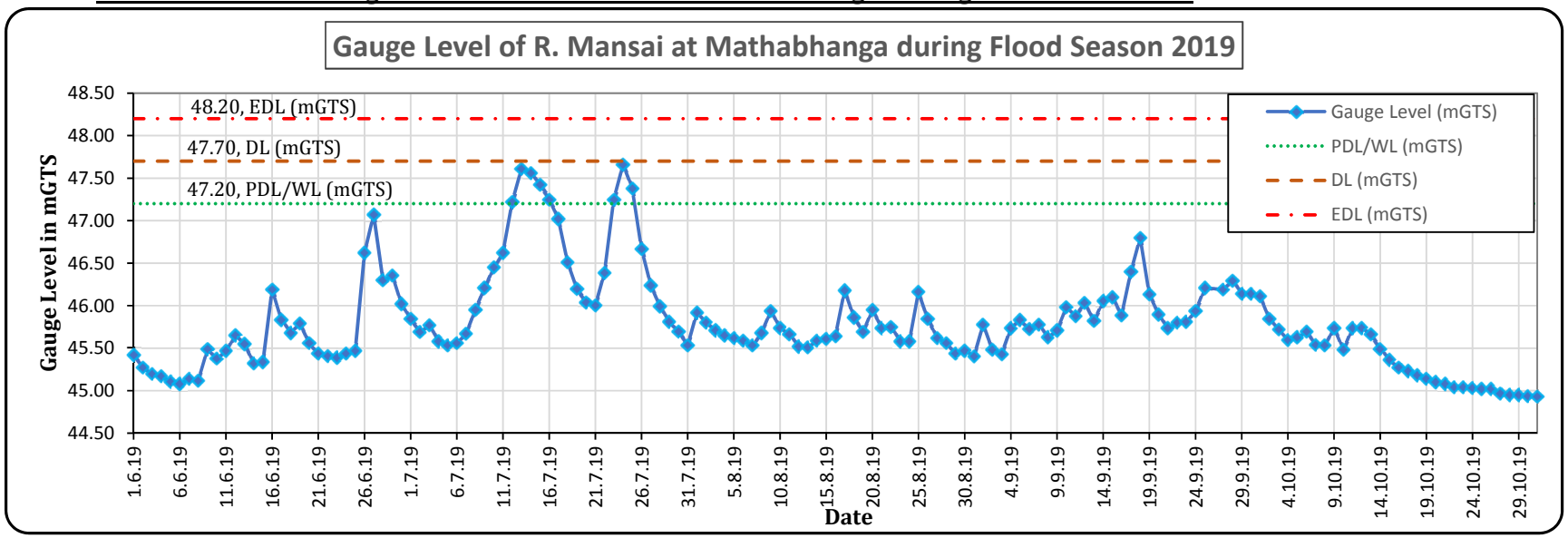


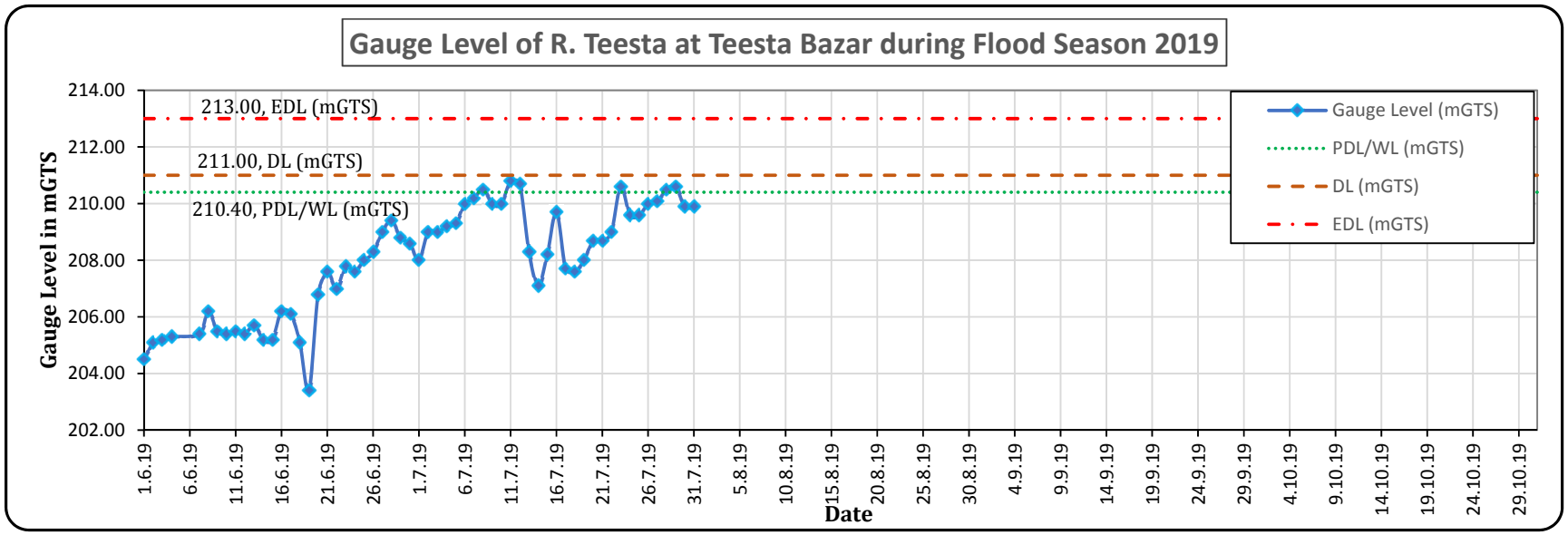
Annexure VIII-A: Gauge Levels of different Rivers of North Bengal during Flood Season 2019



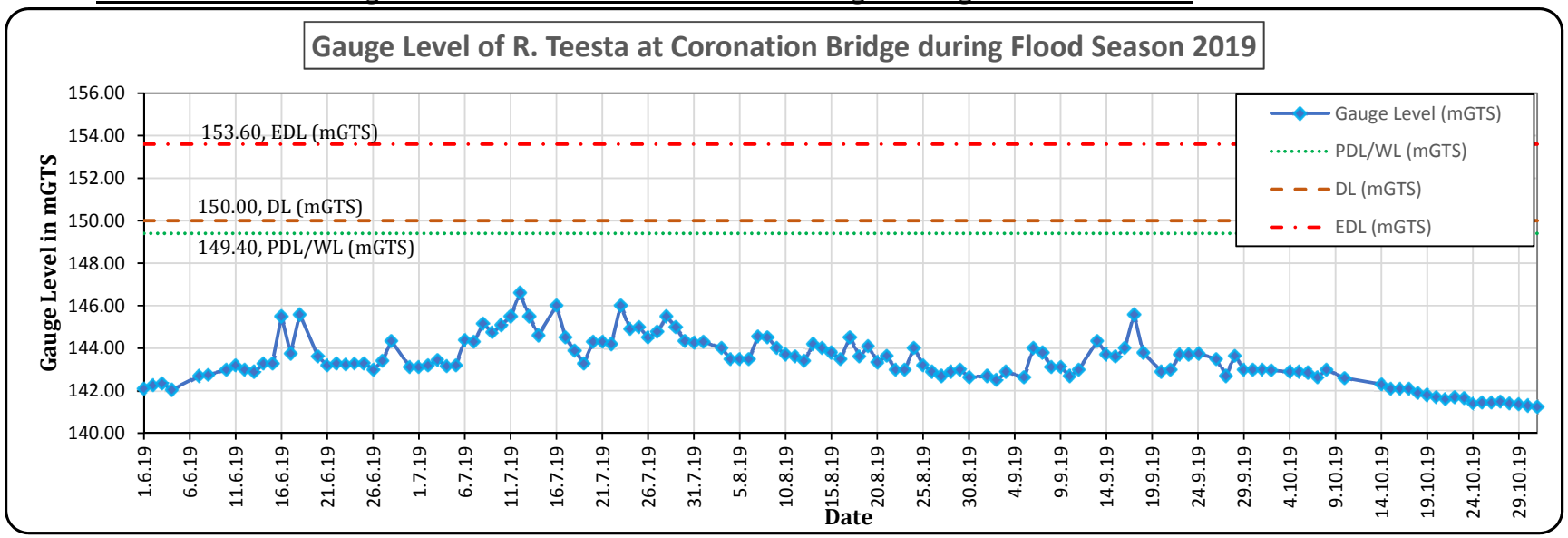


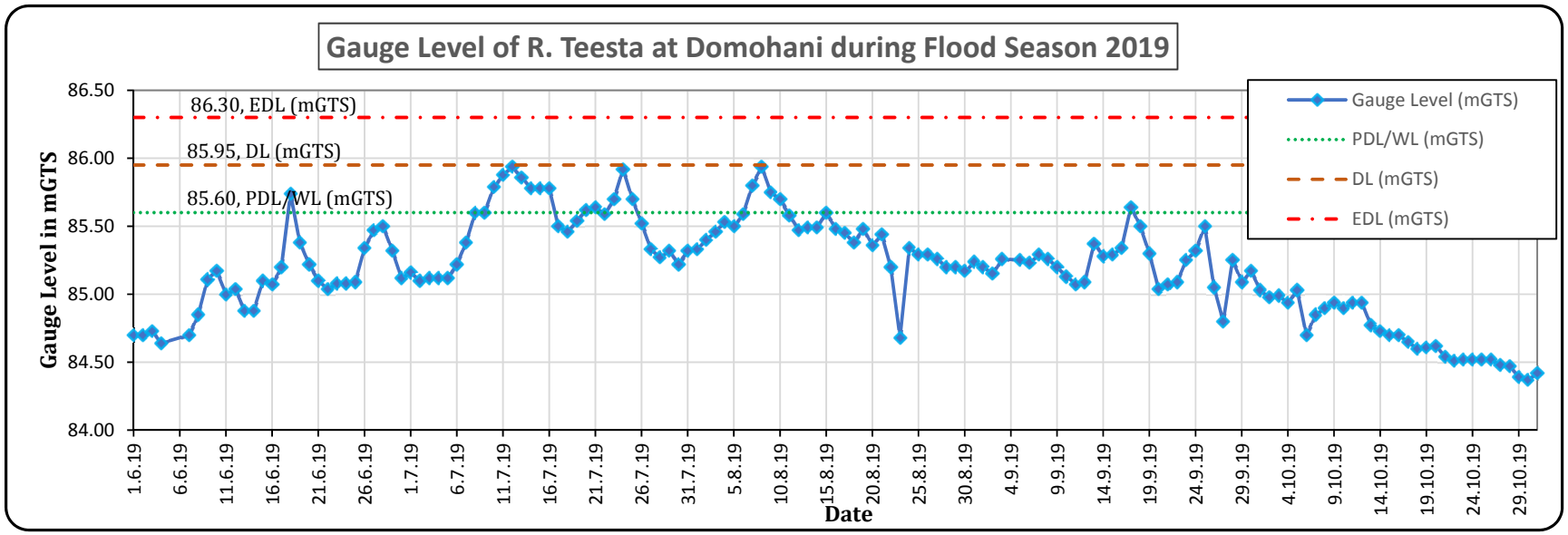
Annexure VIII-A: Gauge Levels of different Rivers of North Bengal during Flood Season 2019



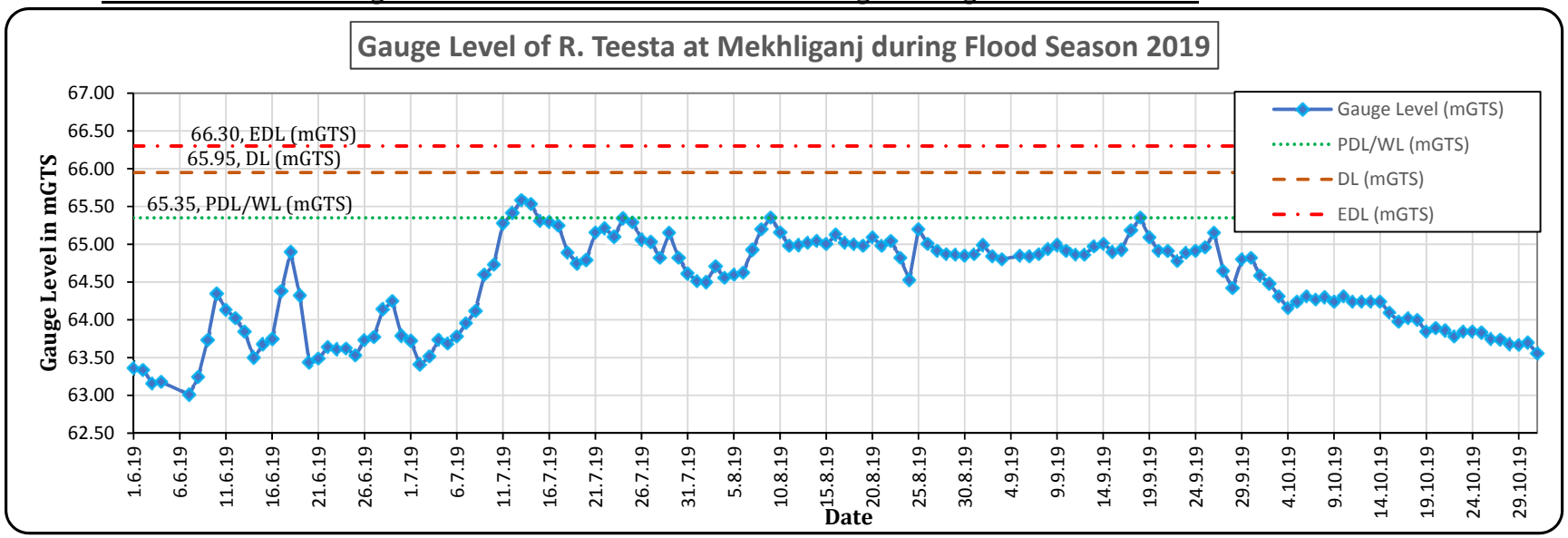


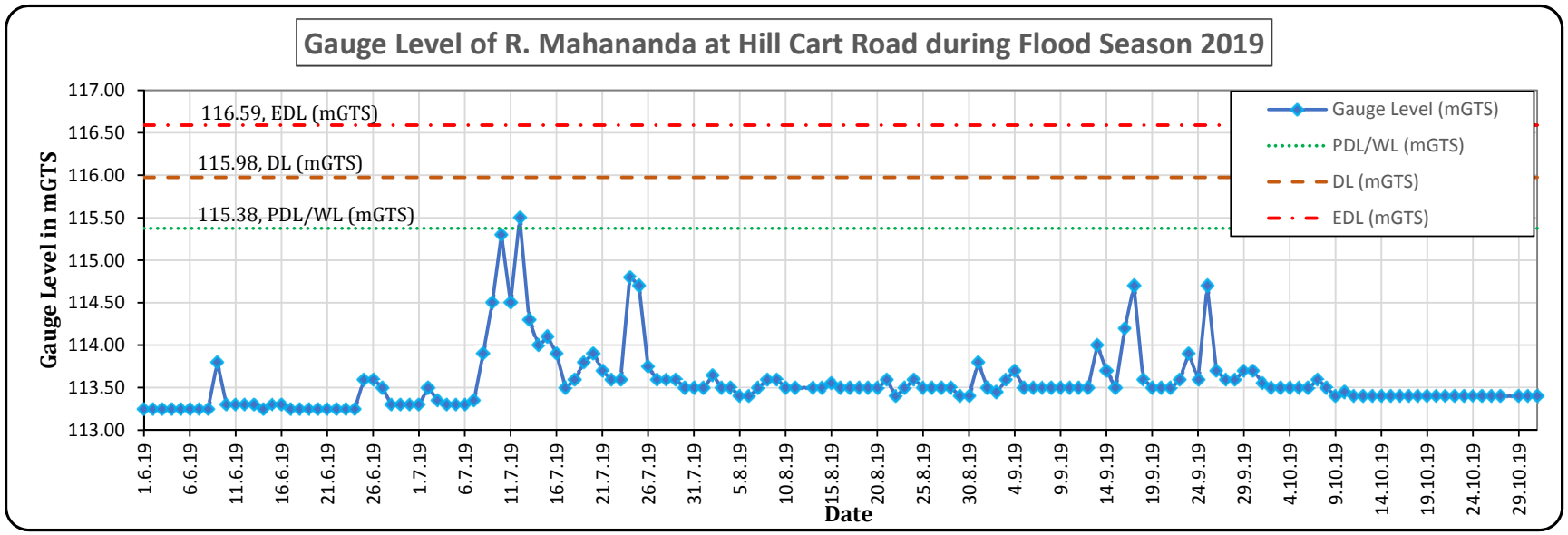
Annexure VIII-A: Gauge Levels of different Rivers of North Bengal during Flood Season 2019



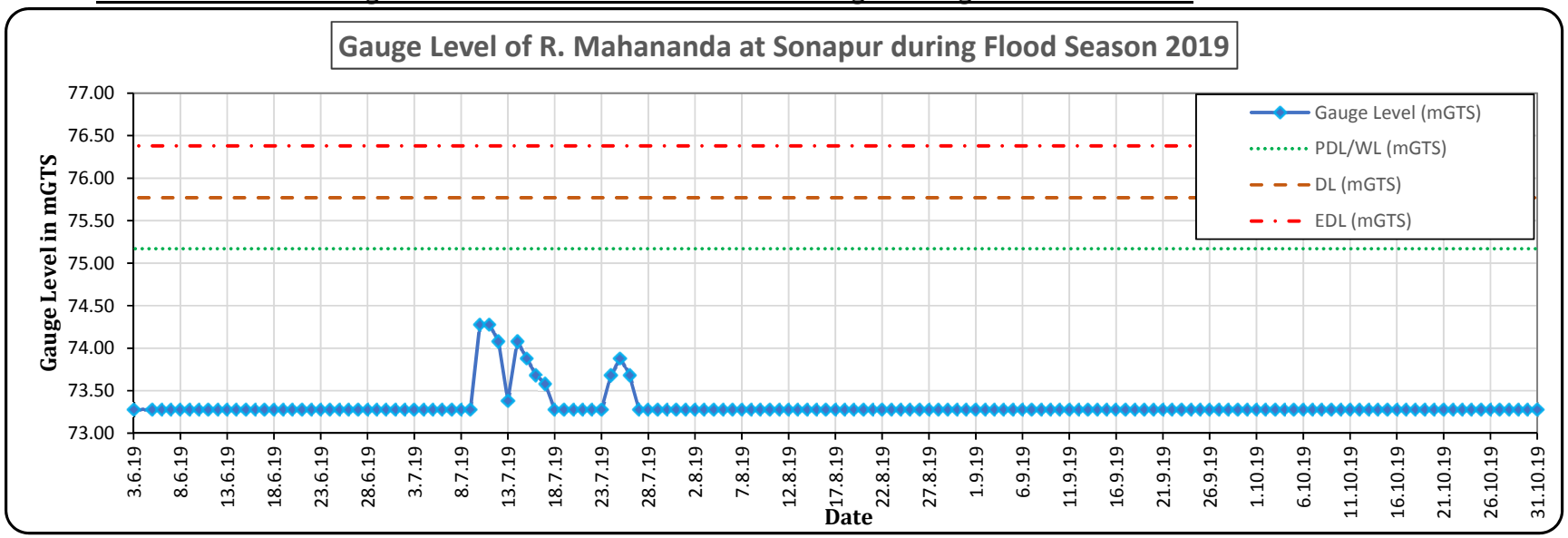


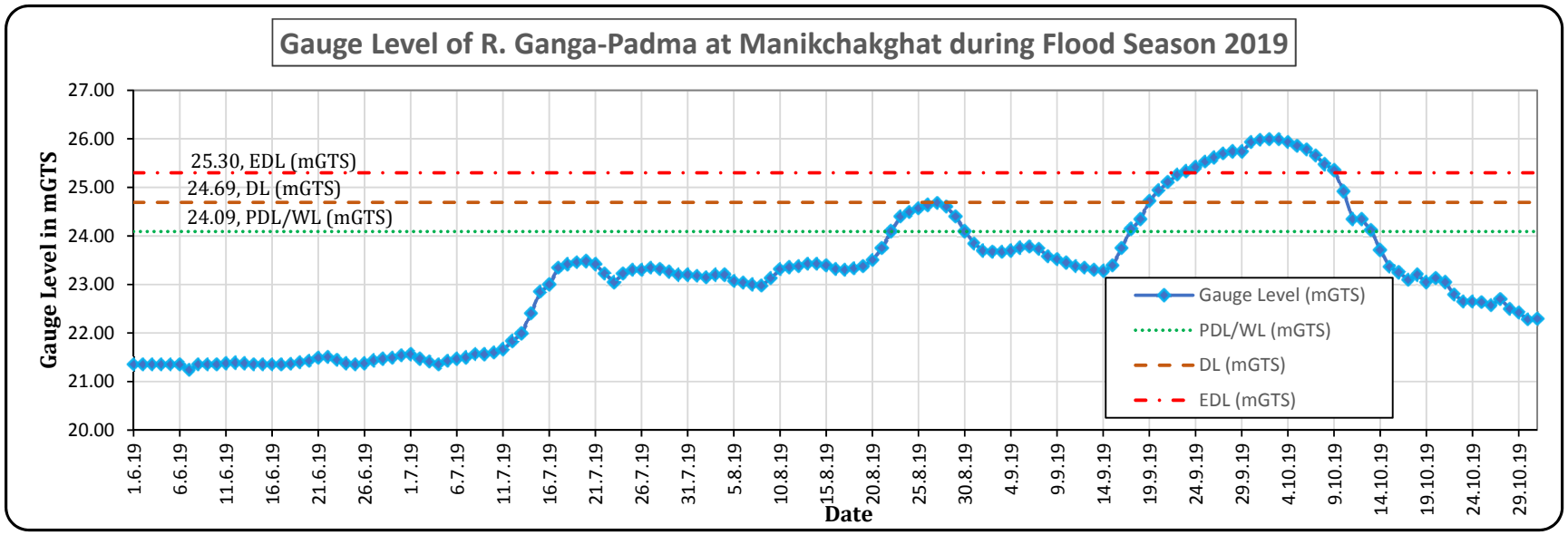
Annexure VIII-A: Gauge Levels of different Rivers of North Bengal during Flood Season 2019



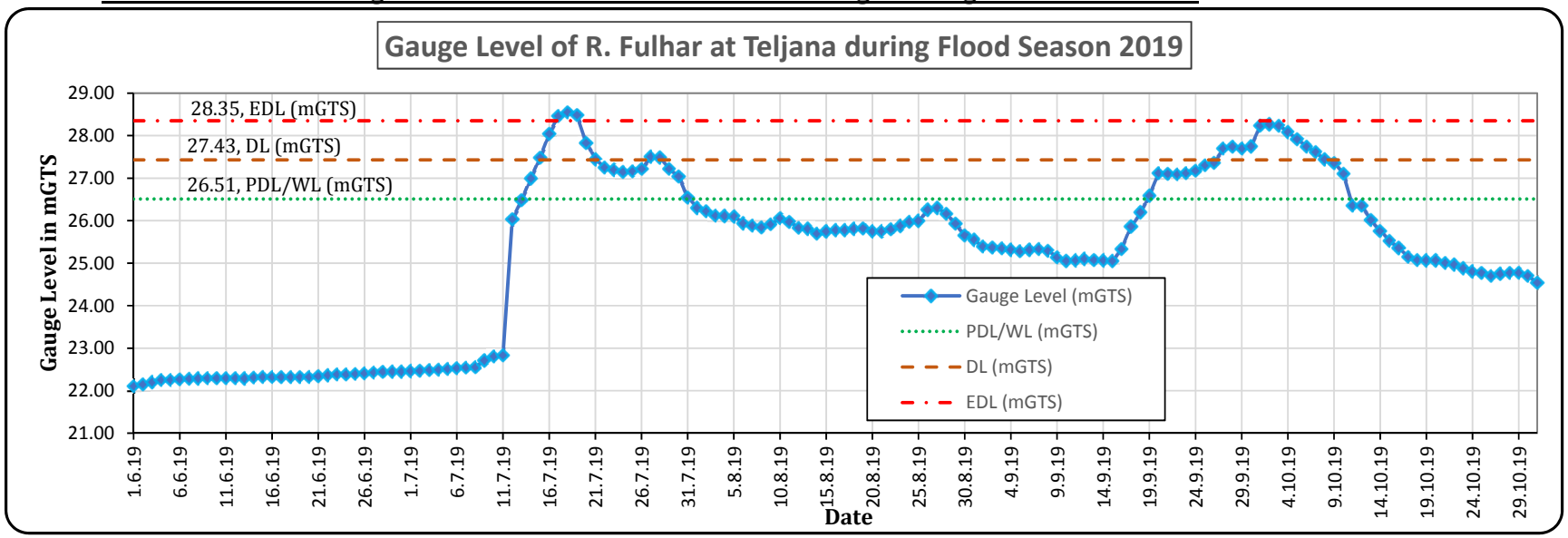


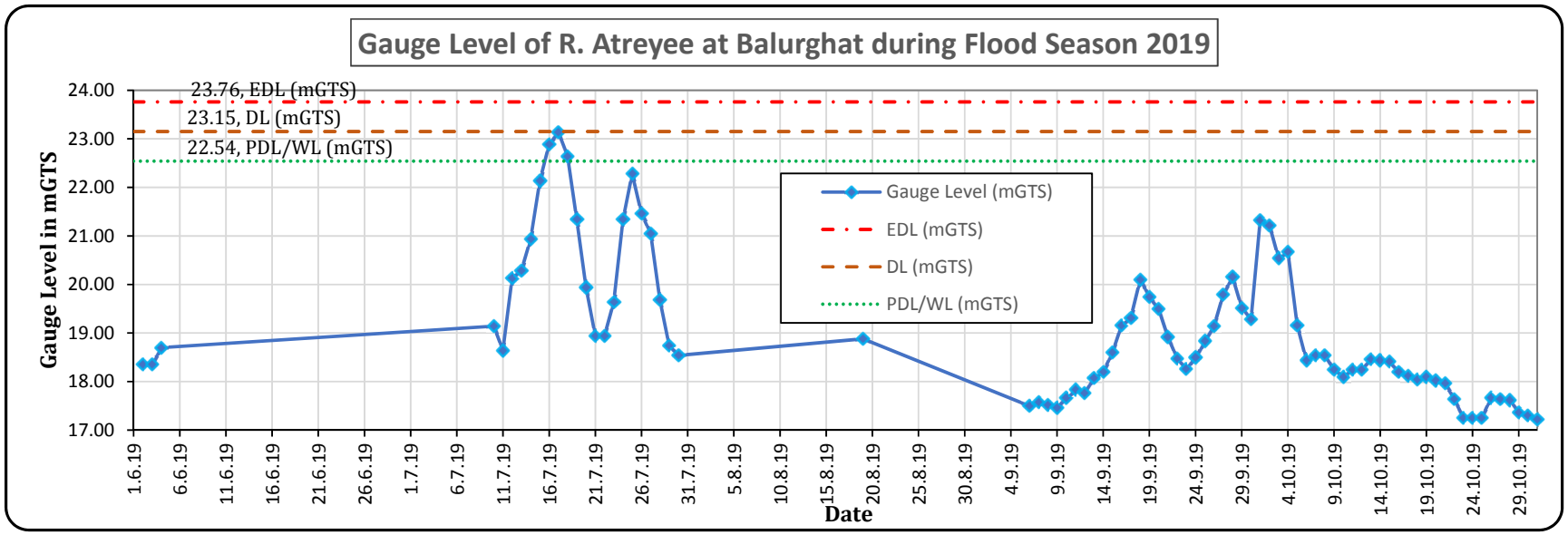
Annexure VIII-A: Gauge Levels of different Rivers of North Bengal during Flood Season 2019



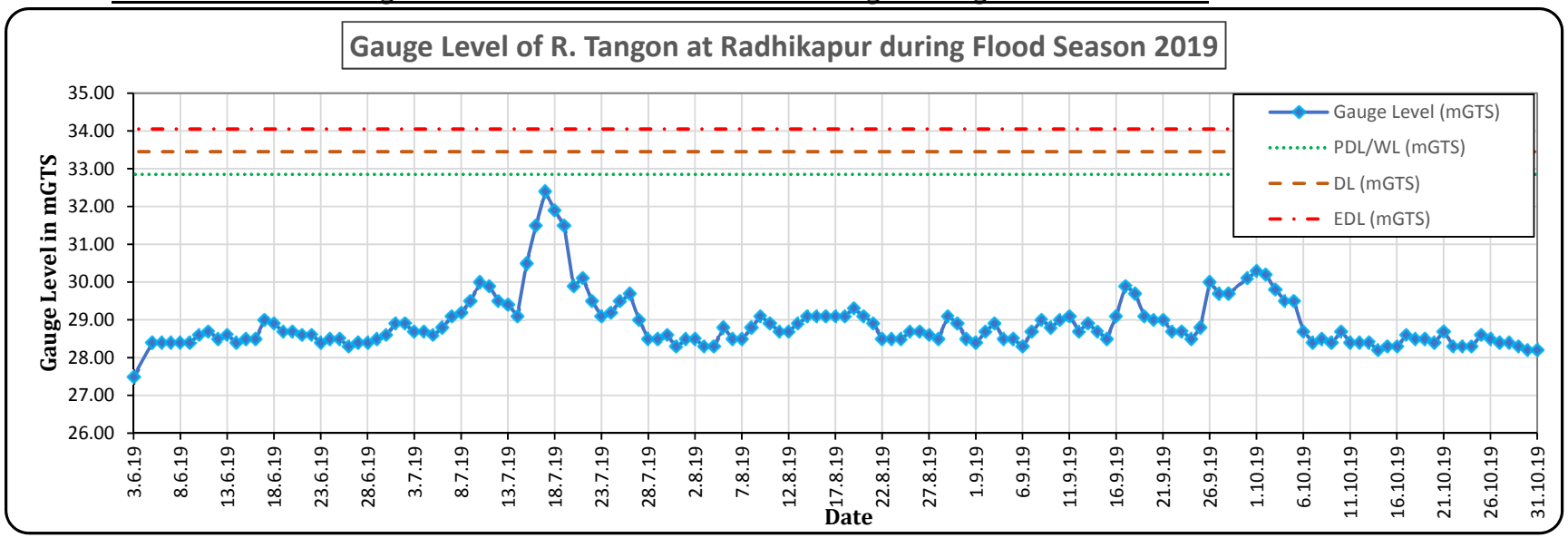


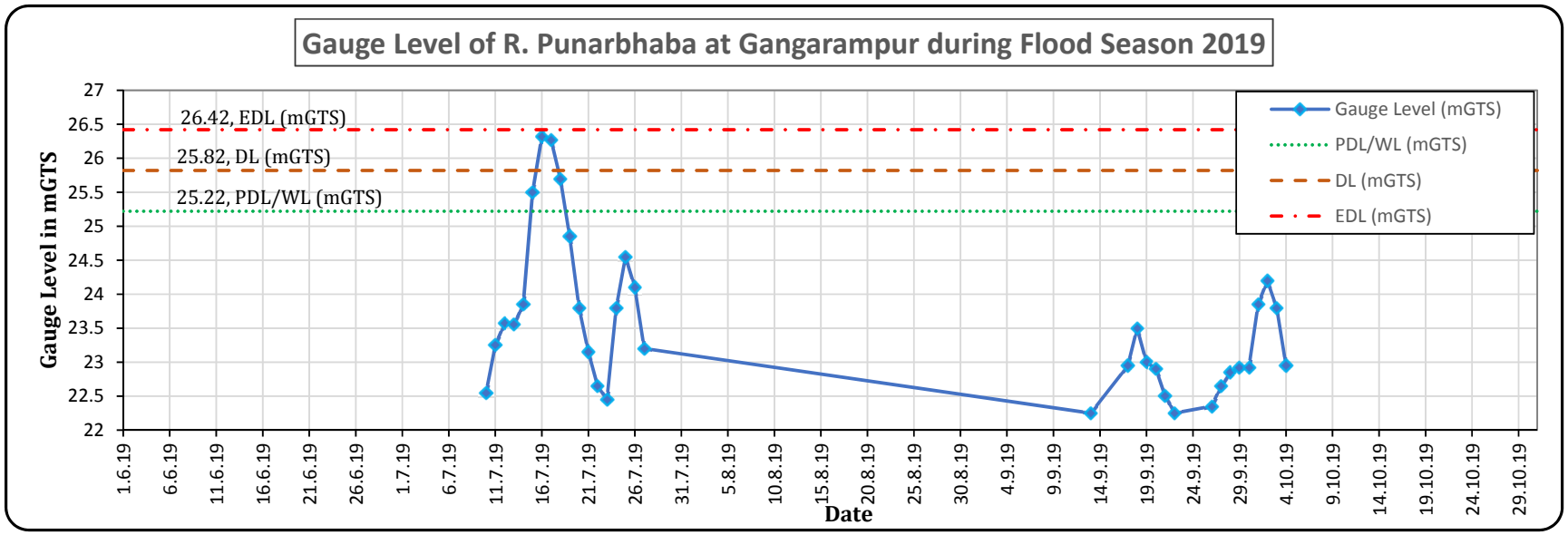
Annexure VIII-A: Gauge Levels of different Rivers of North Bengal during Flood Season 2019



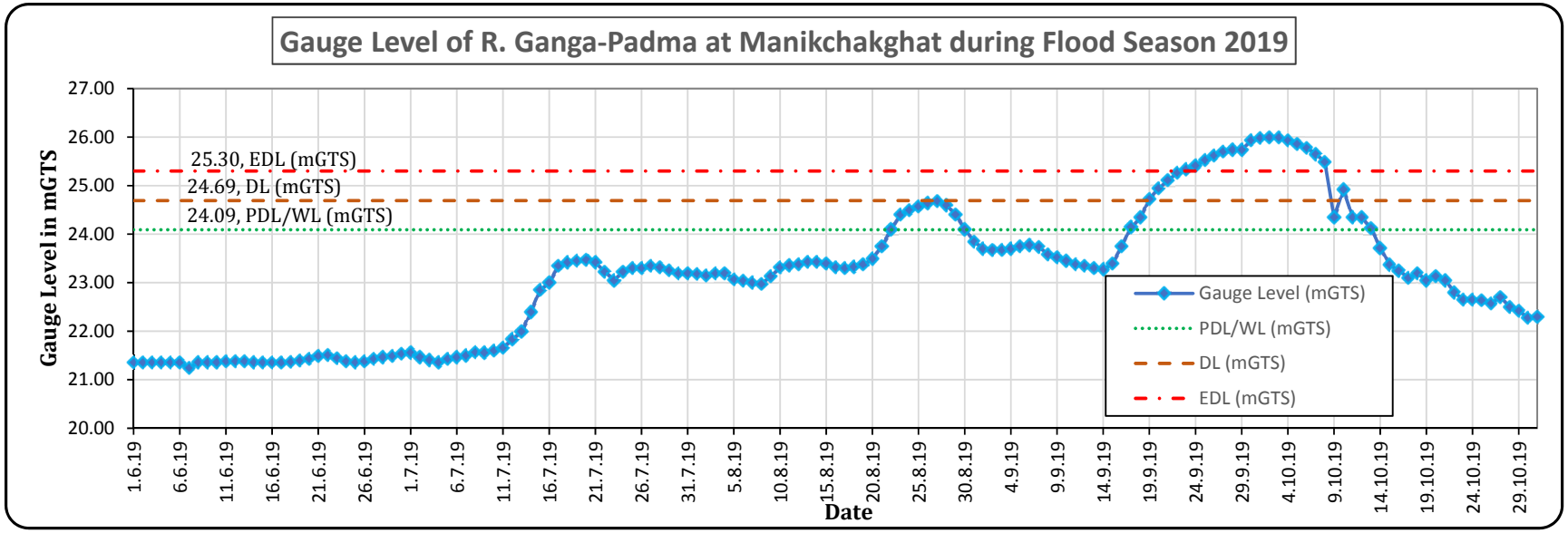


Annexure VIII-A: Gauge Levels of different Rivers of North Bengal during Flood Season 2019

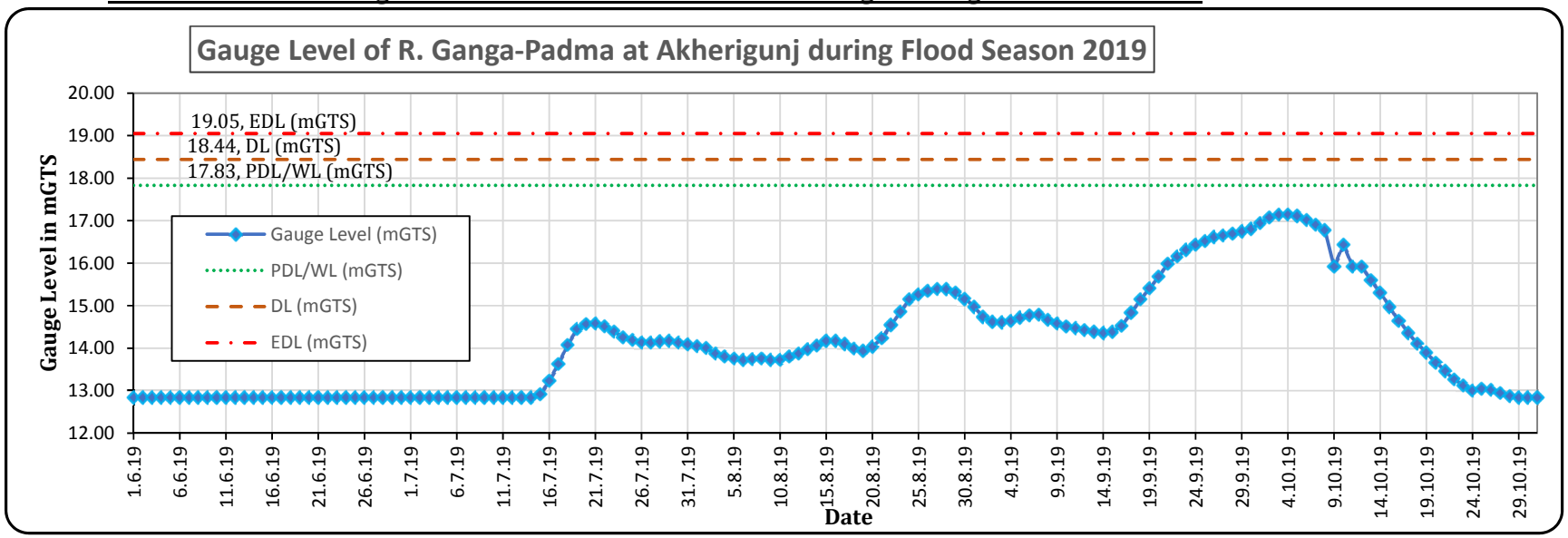


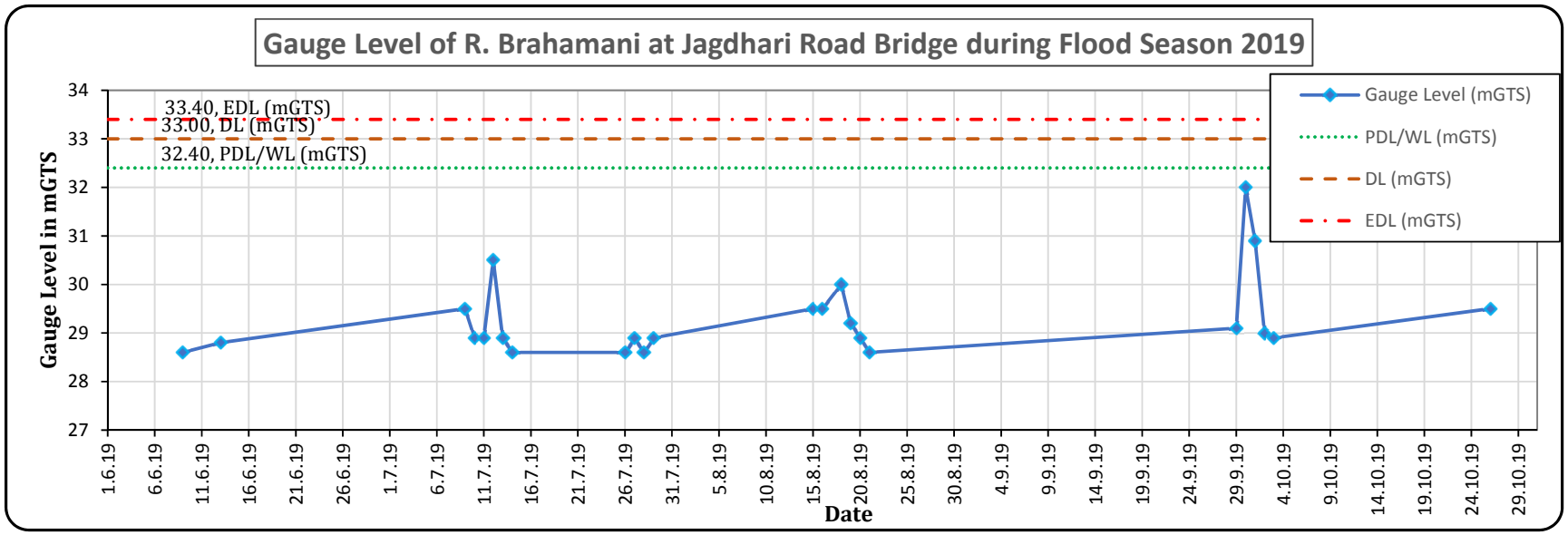


Annexure VIII-A: Gauge Levels of different Rivers of North Bengal during Flood Season 2019

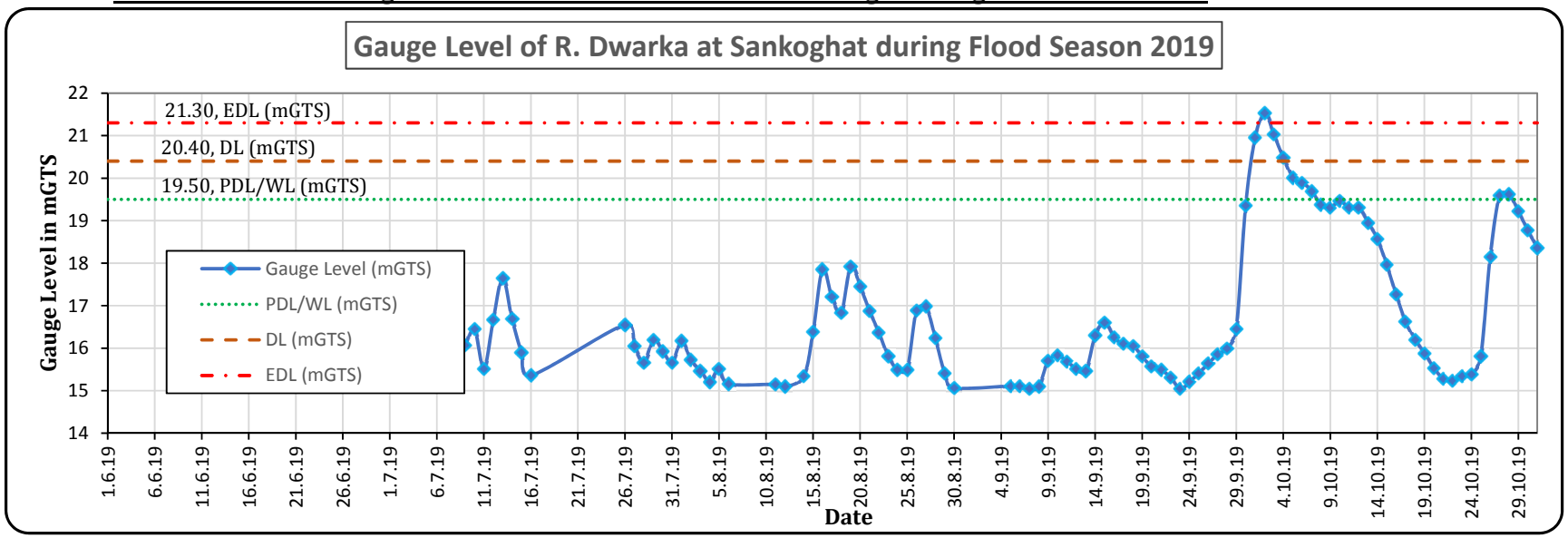


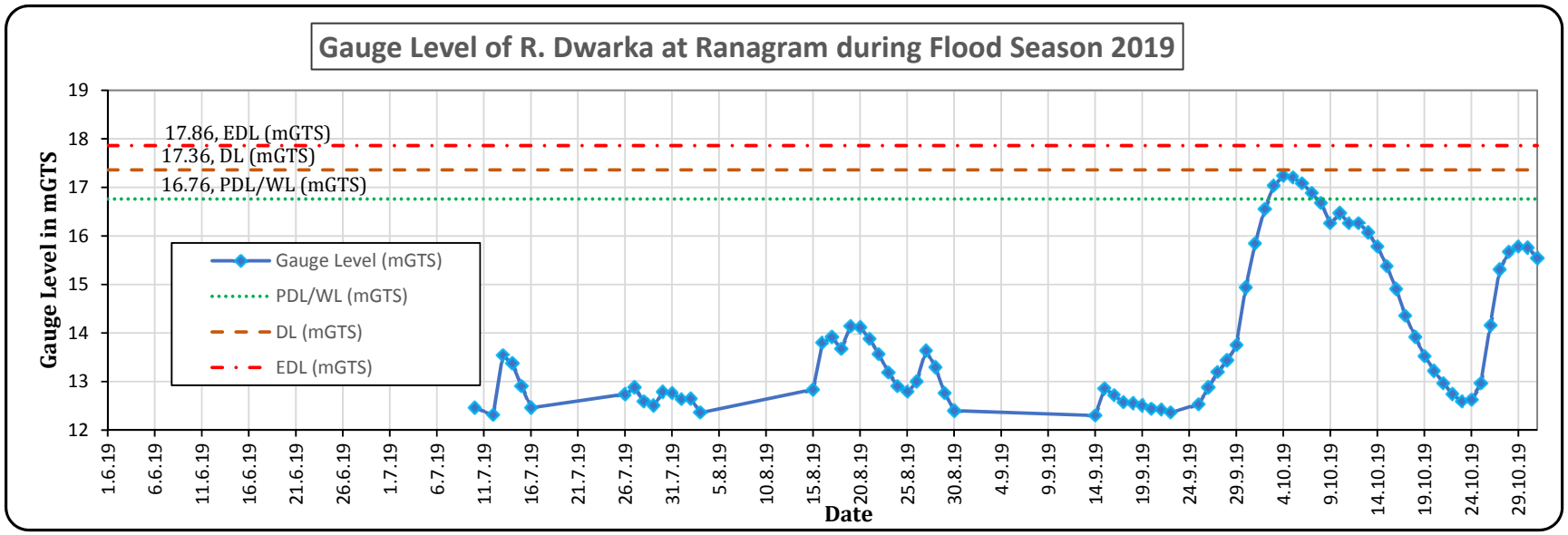
Annexure VIII-B: Gauge Levels of different Rivers of South Bengal during Flood Season 2019



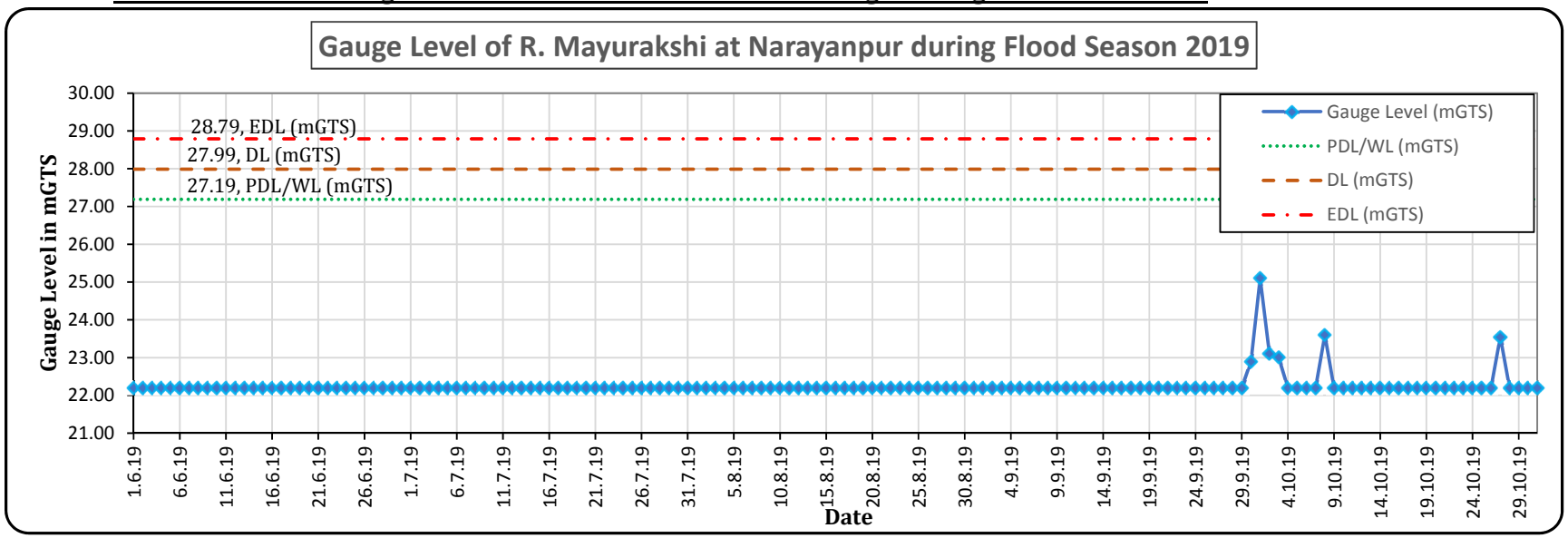


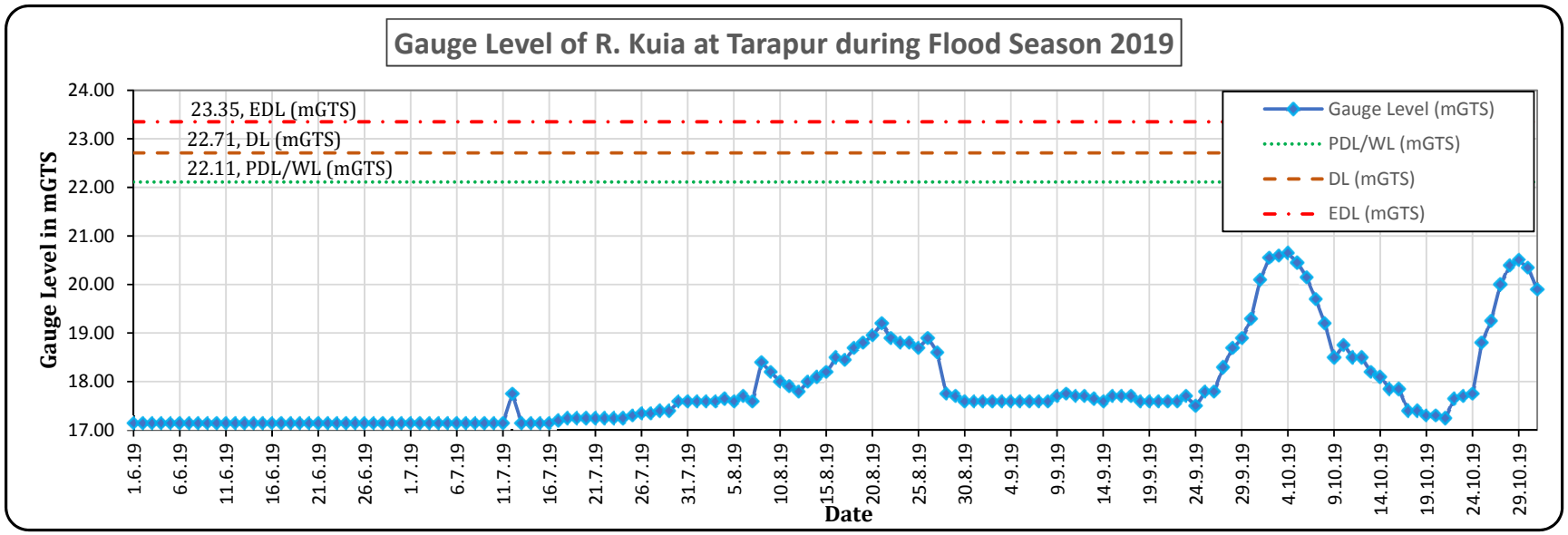
Annexure VIII-B: Gauge Levels of different Rivers of South Bengal during Flood Season 2019



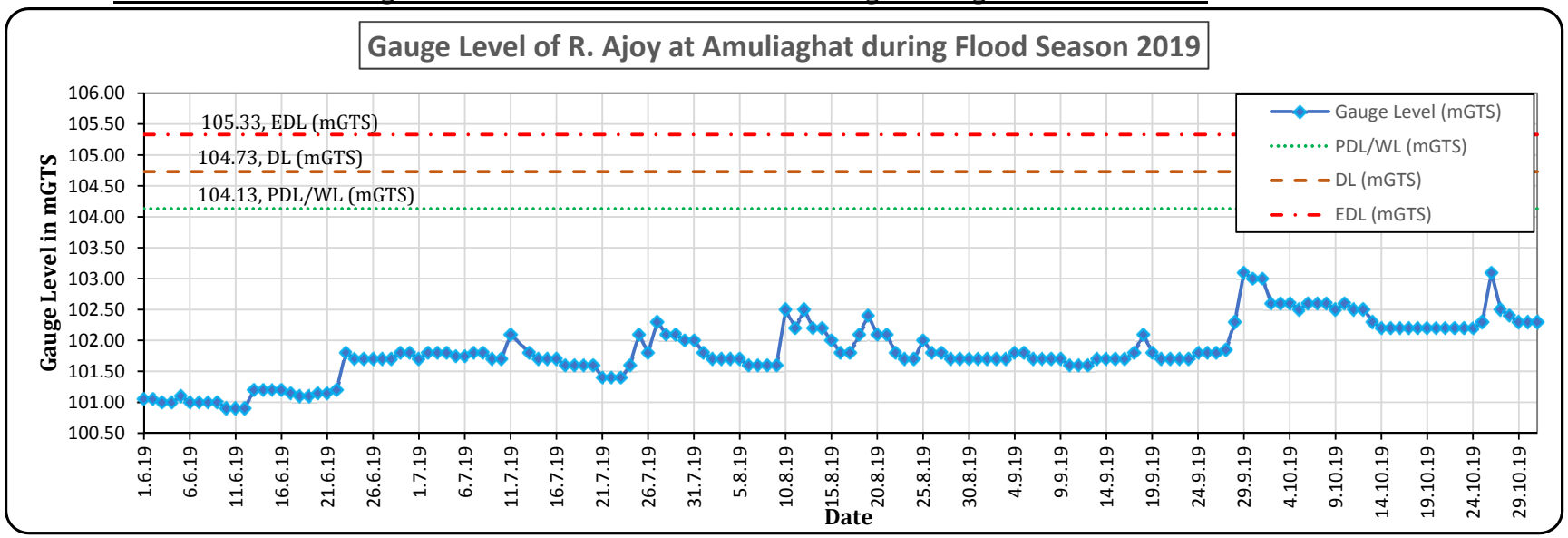


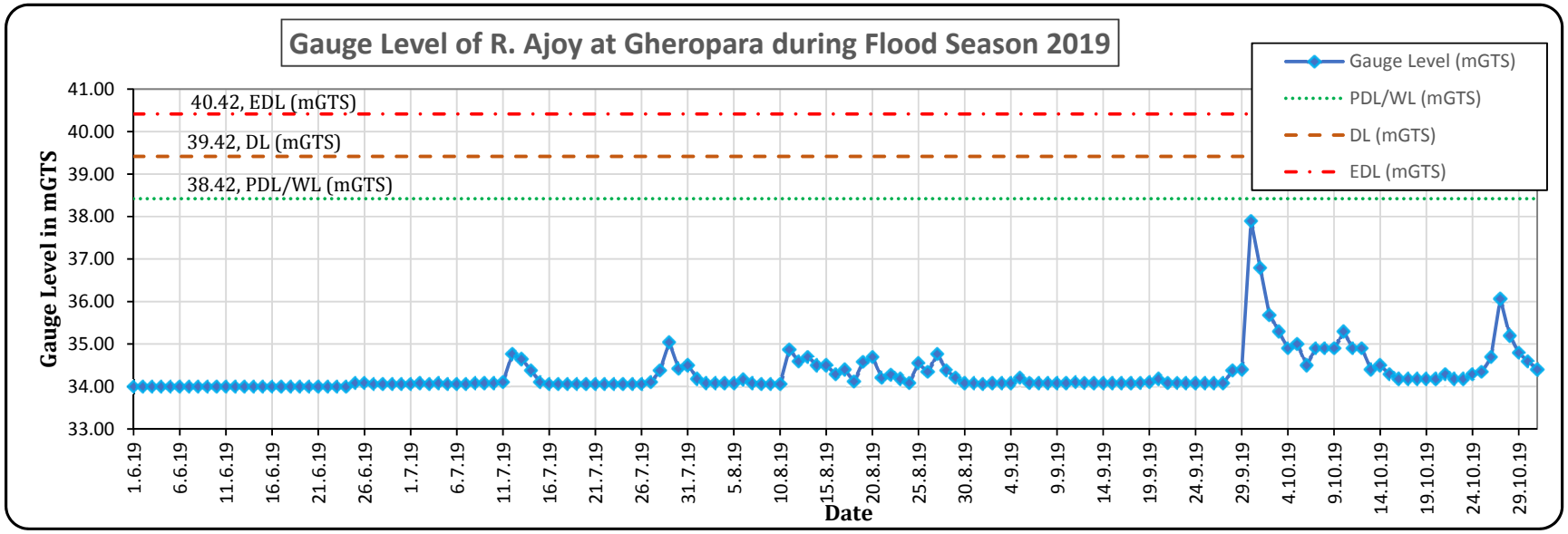
Annexure VIII-B: Gauge Levels of different Rivers of South Bengal during Flood Season 2019



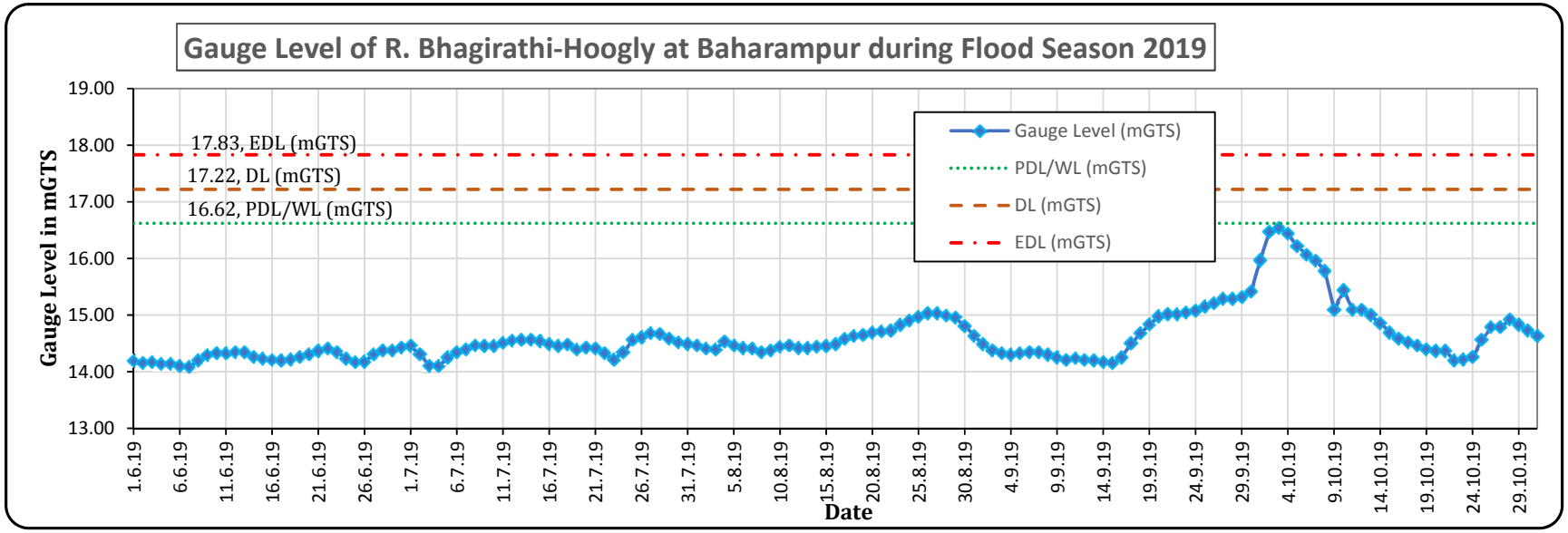


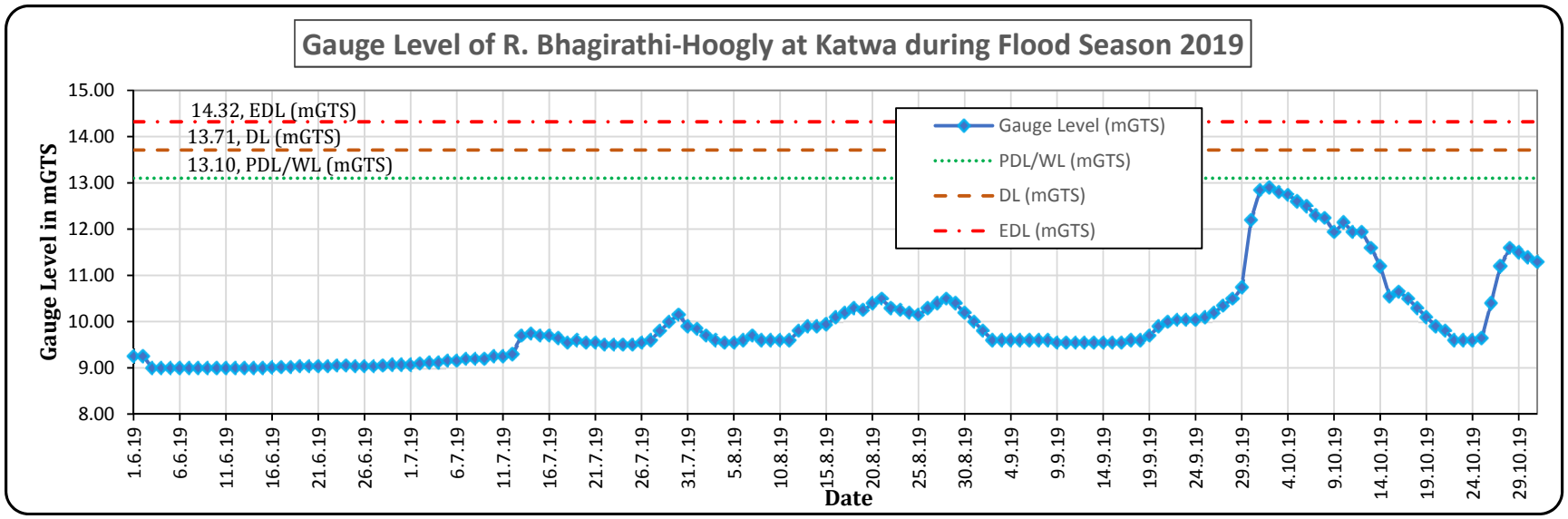
Annexure VIII-B: Gauge Levels of different Rivers of South Bengal during Flood Season 2019



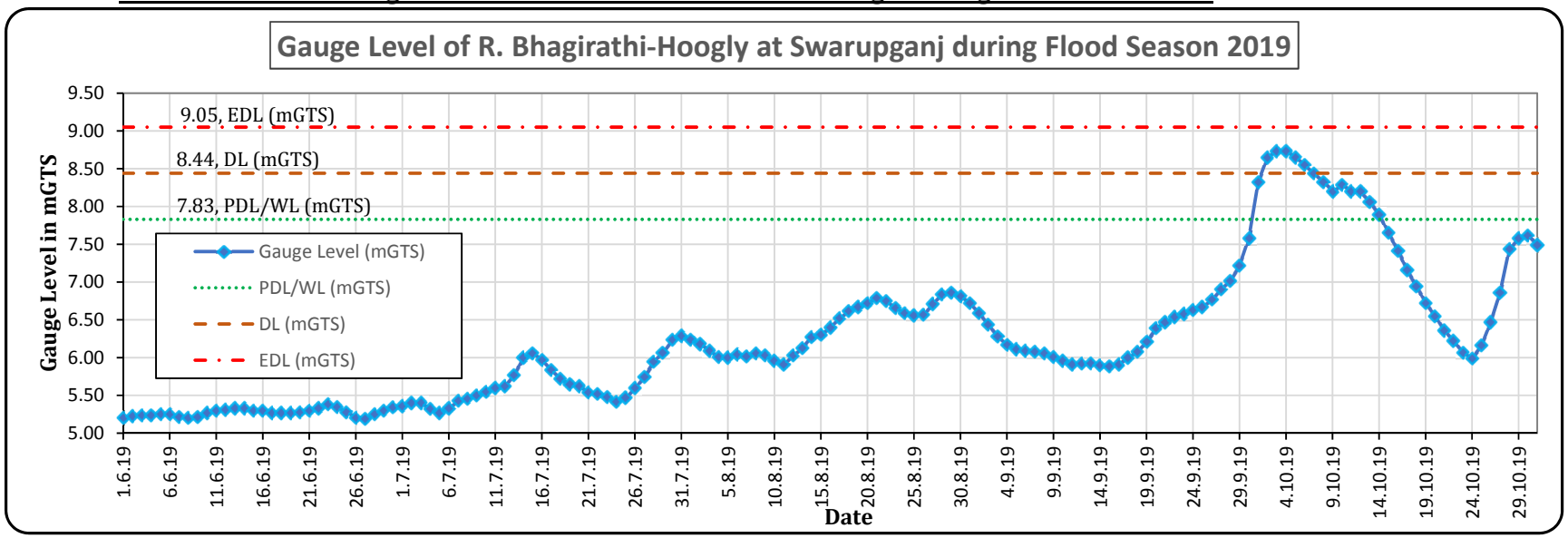


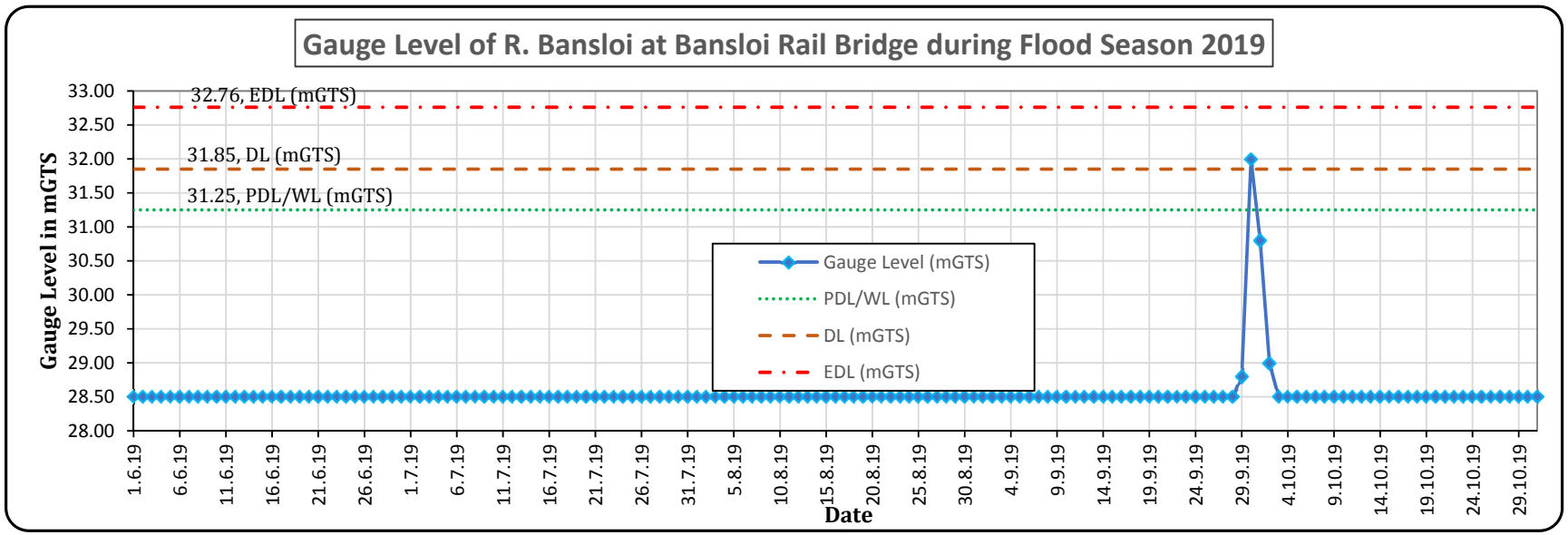
Annexure VIII-B: Gauge Levels of different Rivers of South Bengal during Flood Season 2019



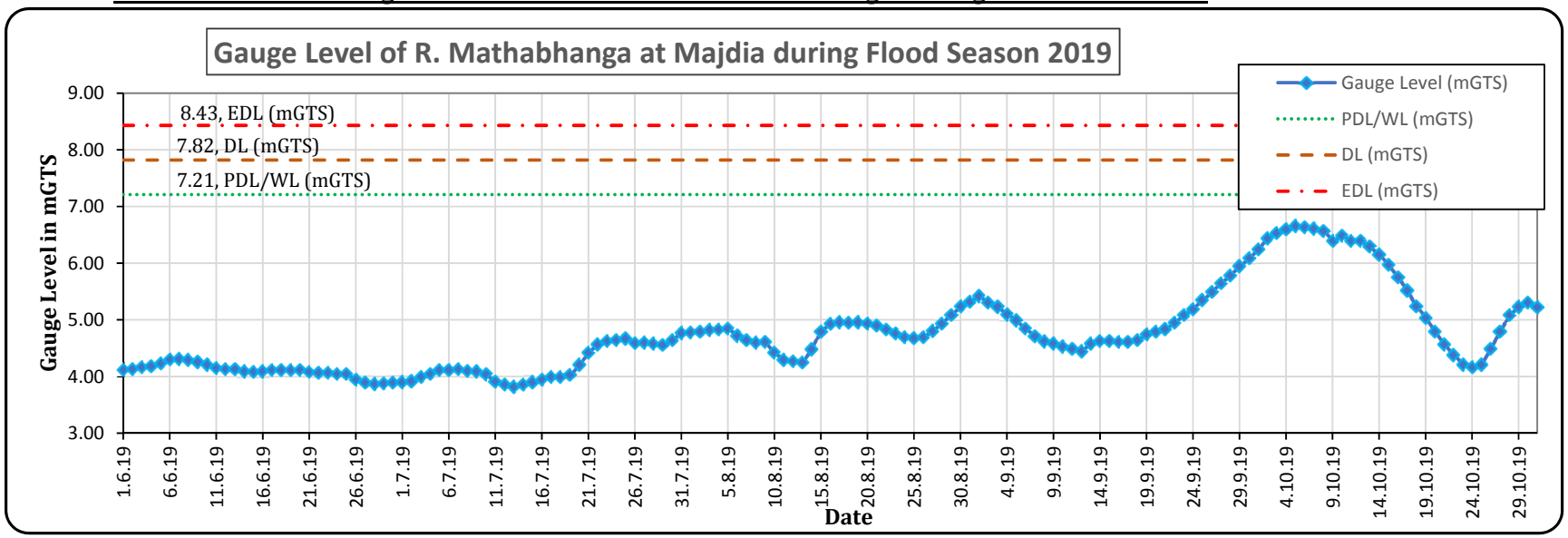


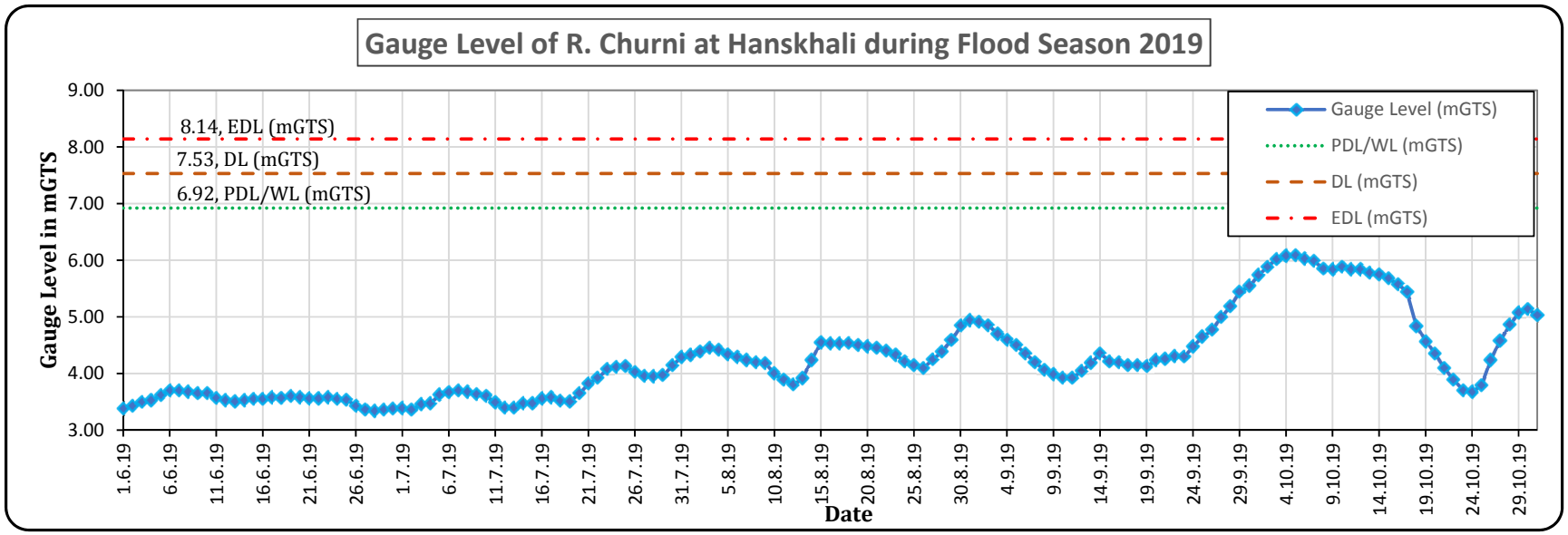
Annexure VIII-B: Gauge Levels of different Rivers of South Bengal during Flood Season 2019



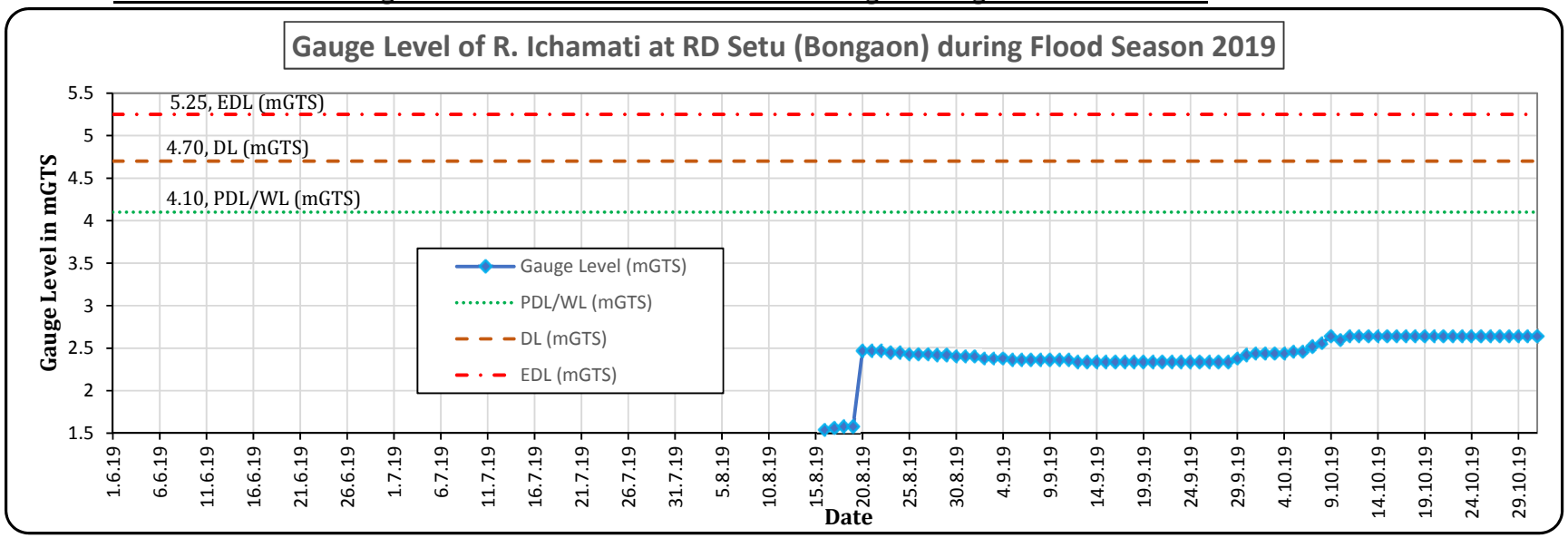


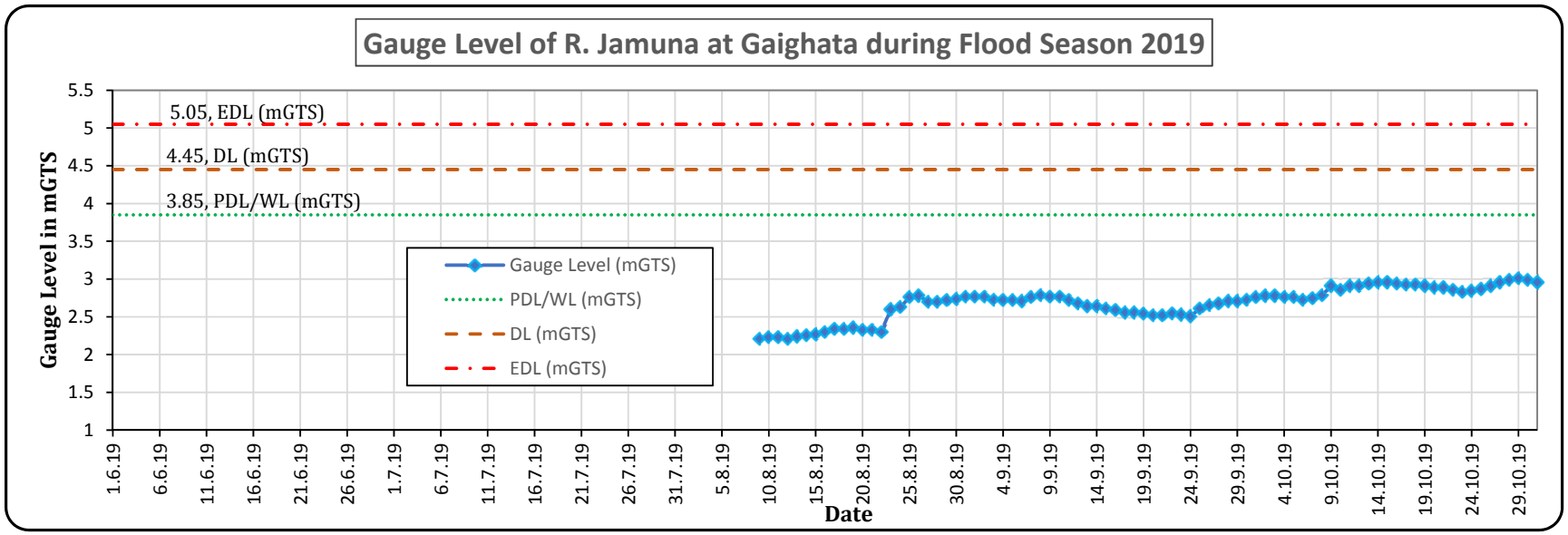
Annexure VIII-B: Gauge Levels of different Rivers of South Bengal during Flood Season 2019



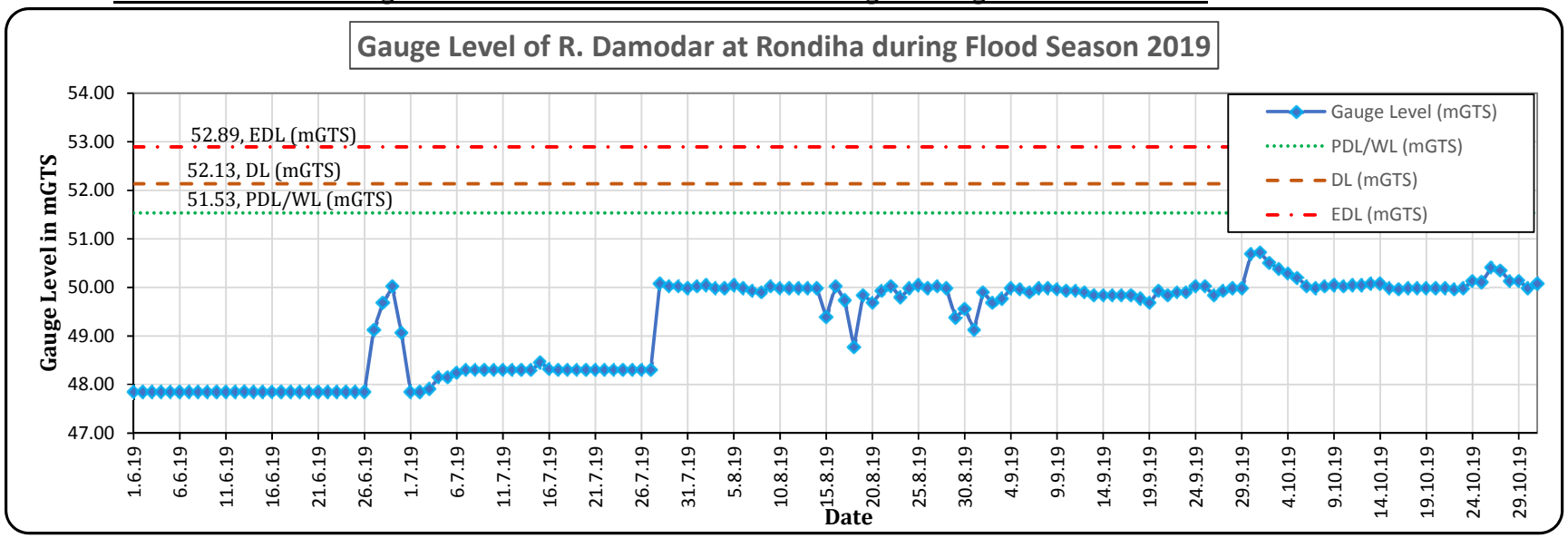


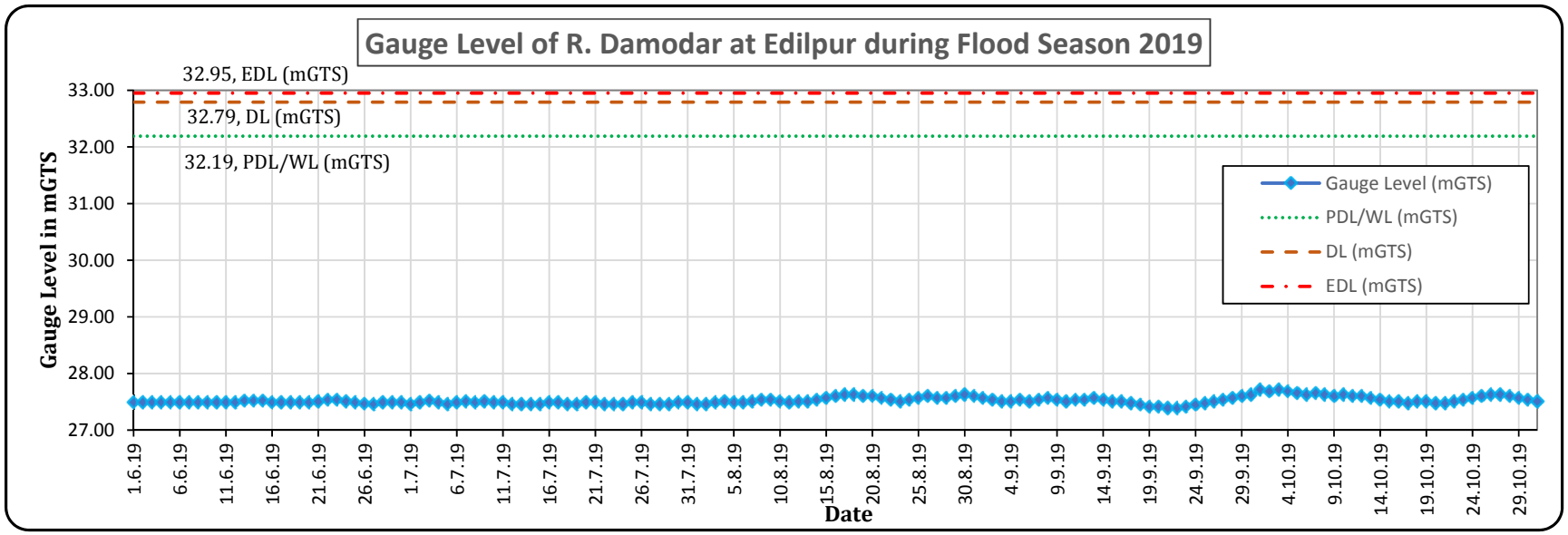
Annexure VIII-B: Gauge Levels of different Rivers of South Bengal during Flood Season 2019



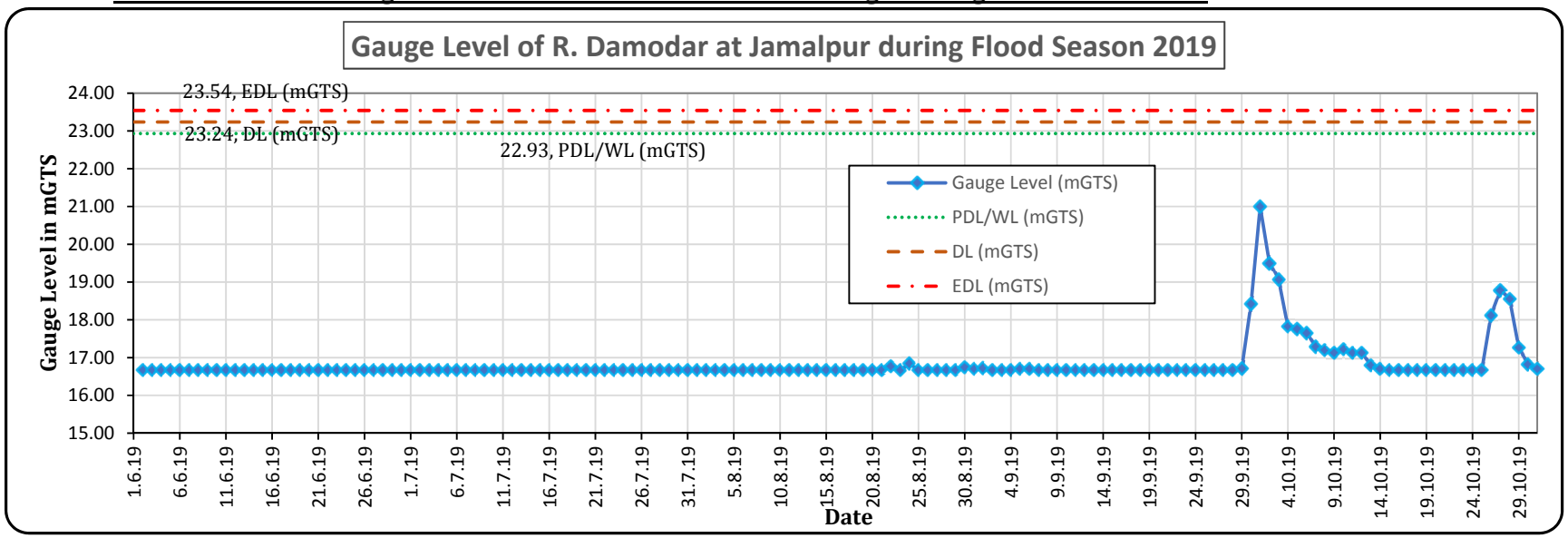


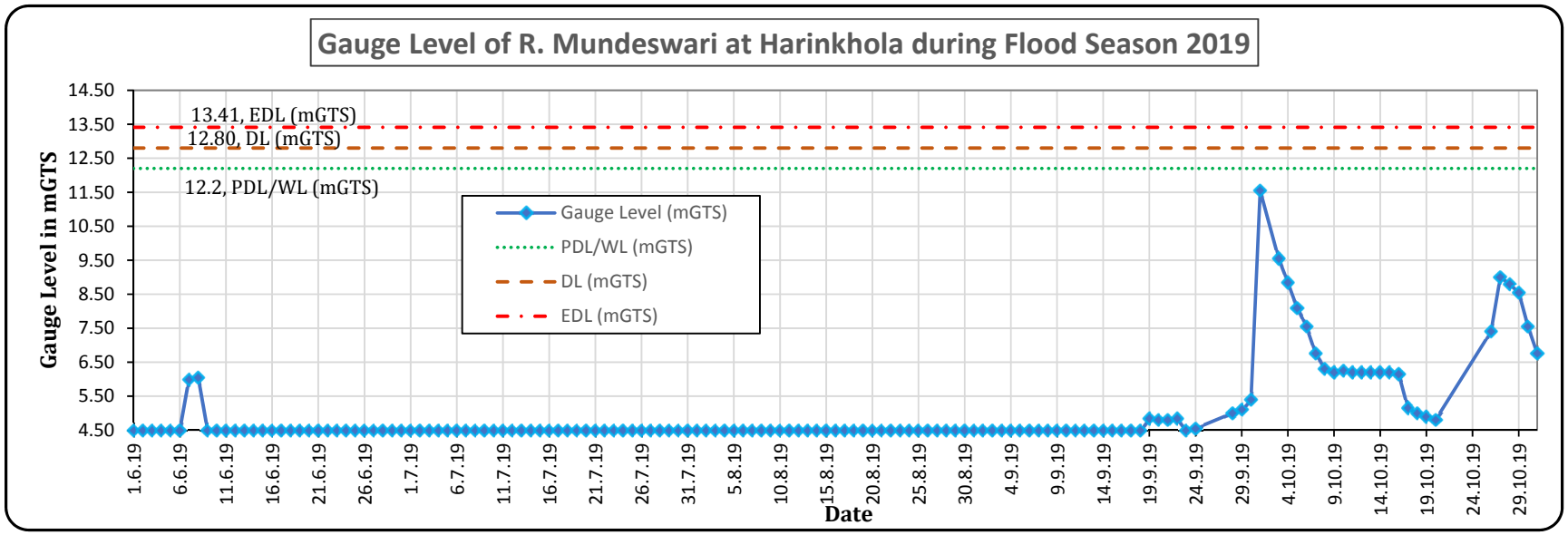
Annexure VIII-B: Gauge Levels of different Rivers of South Bengal during Flood Season 2019



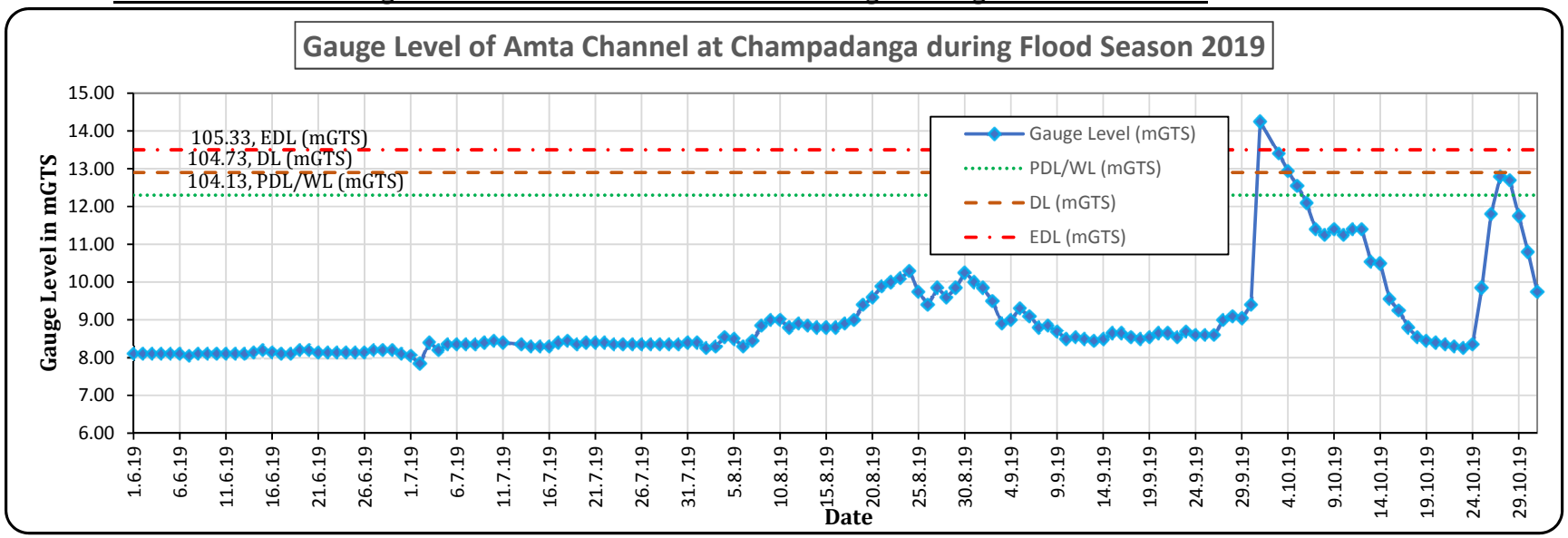


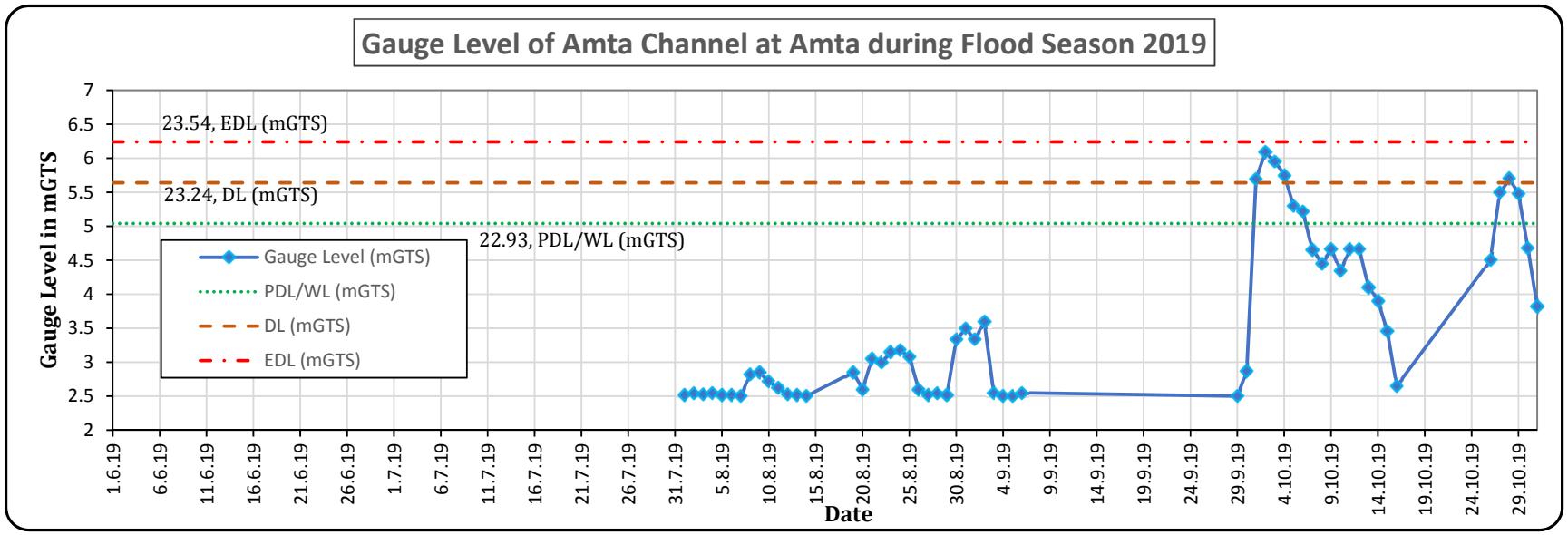
Annexure VIII-B: Gauge Levels of different Rivers of South Bengal during Flood Season 2019



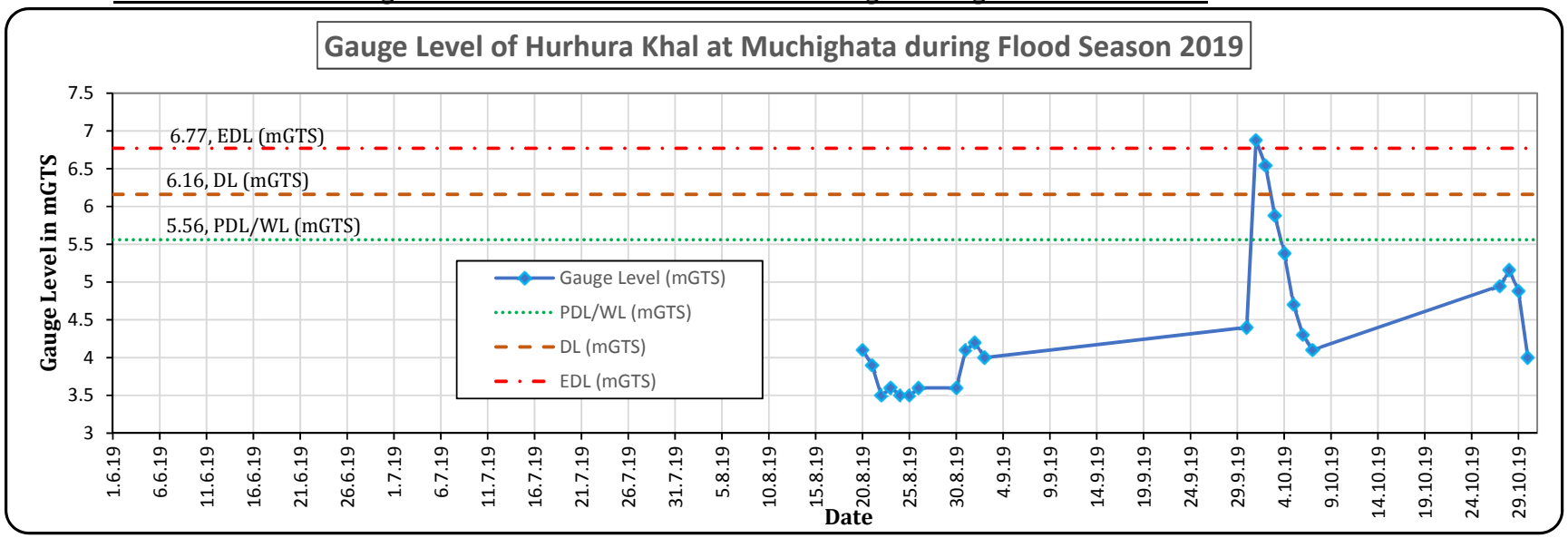


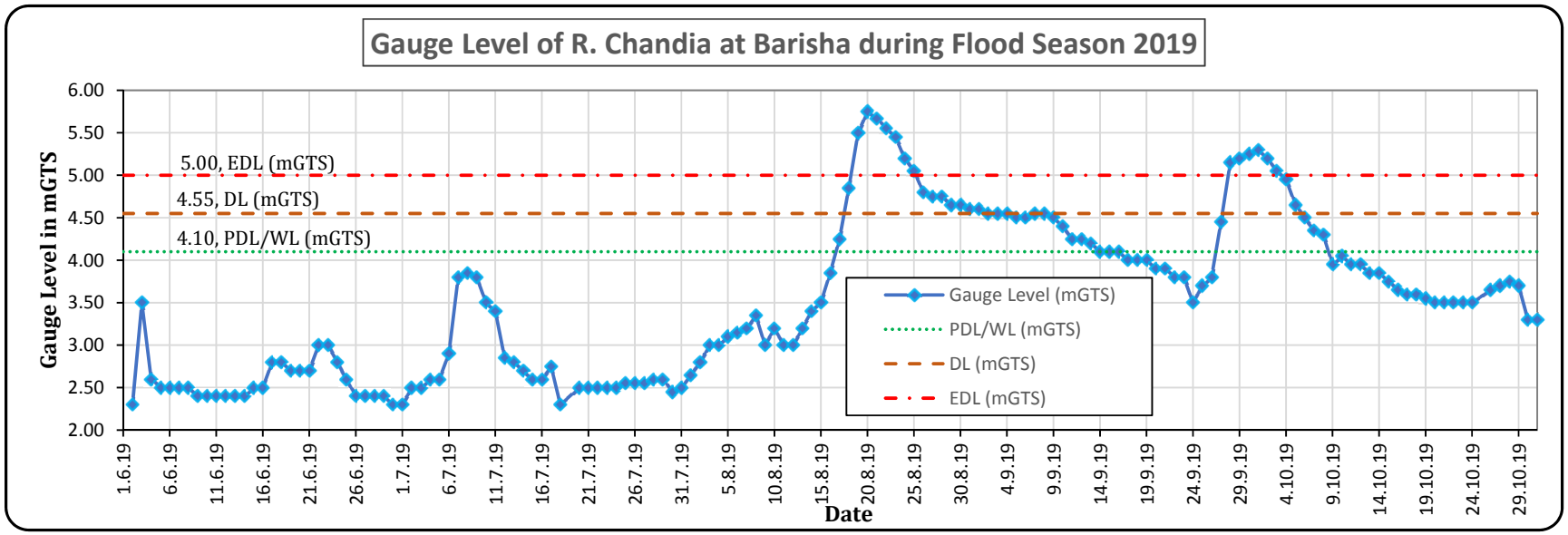
Annexure VIII-B: Gauge Levels of different Rivers of South Bengal during Flood Season 2019



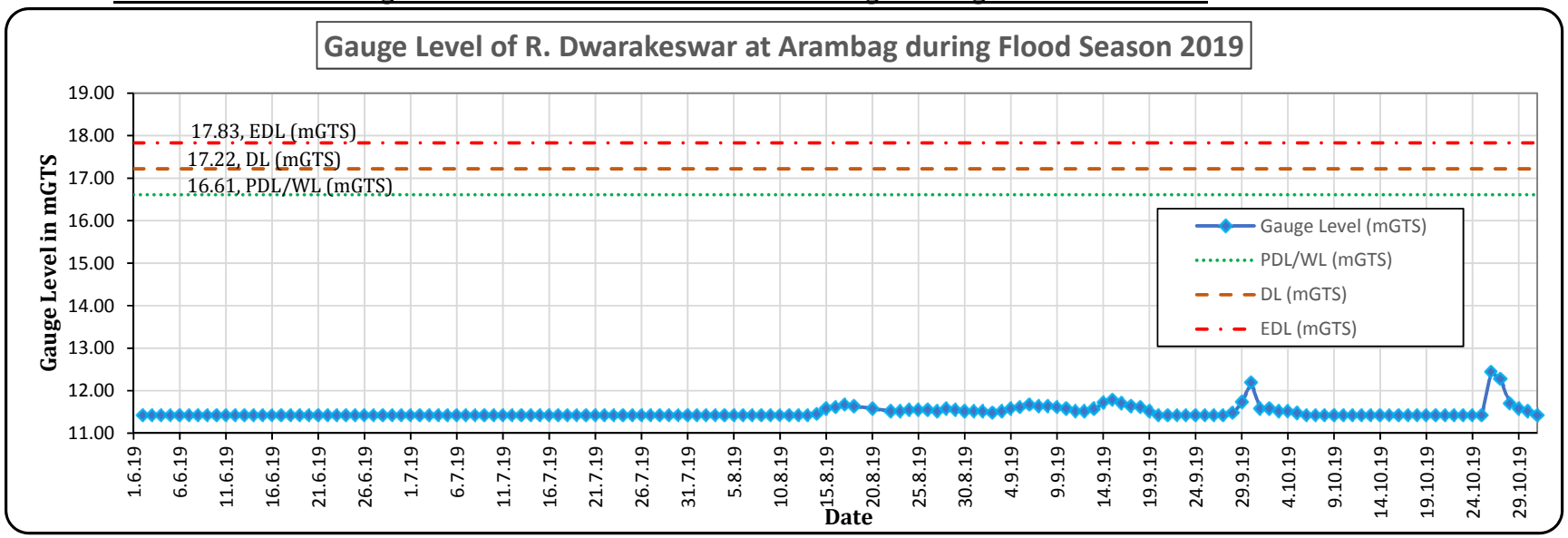


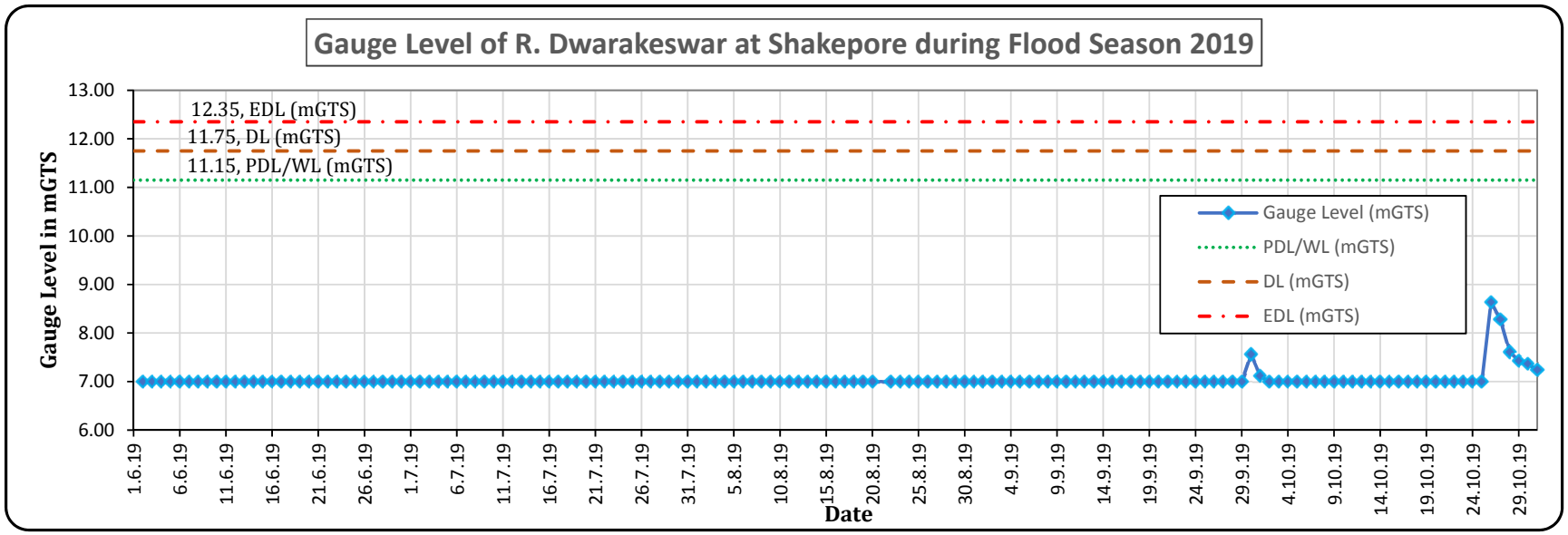
Annexure VIII-B: Gauge Levels of different Rivers of South Bengal during Flood Season 2019



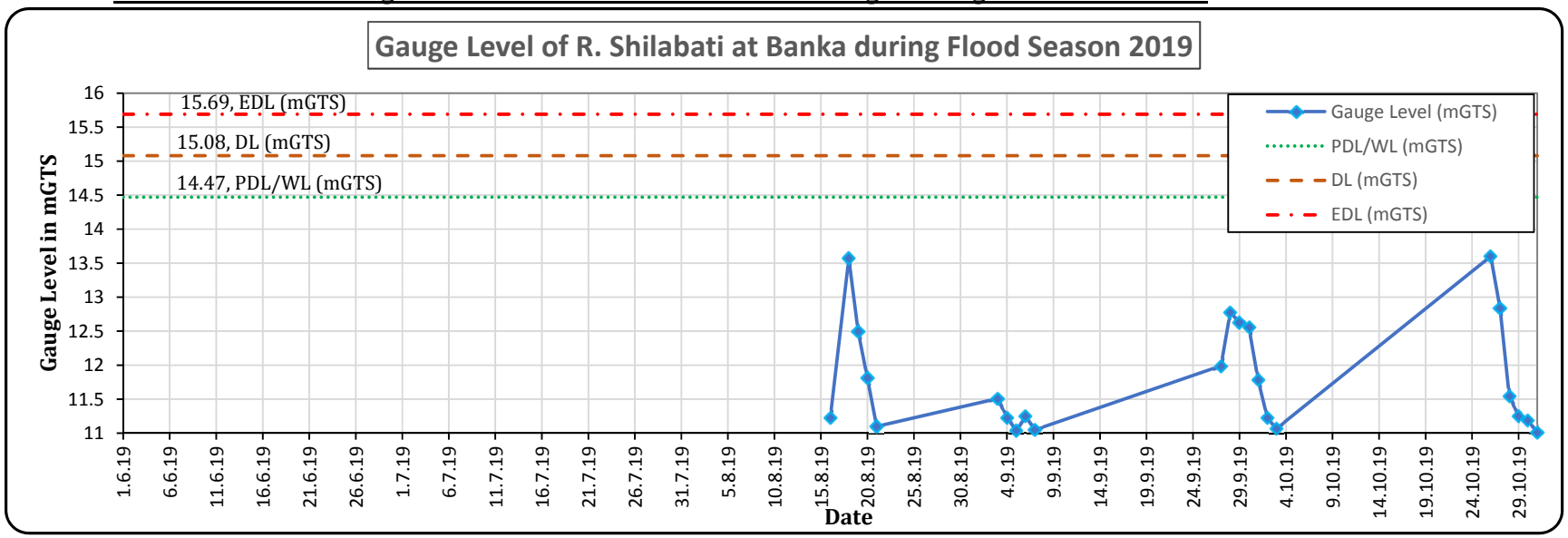


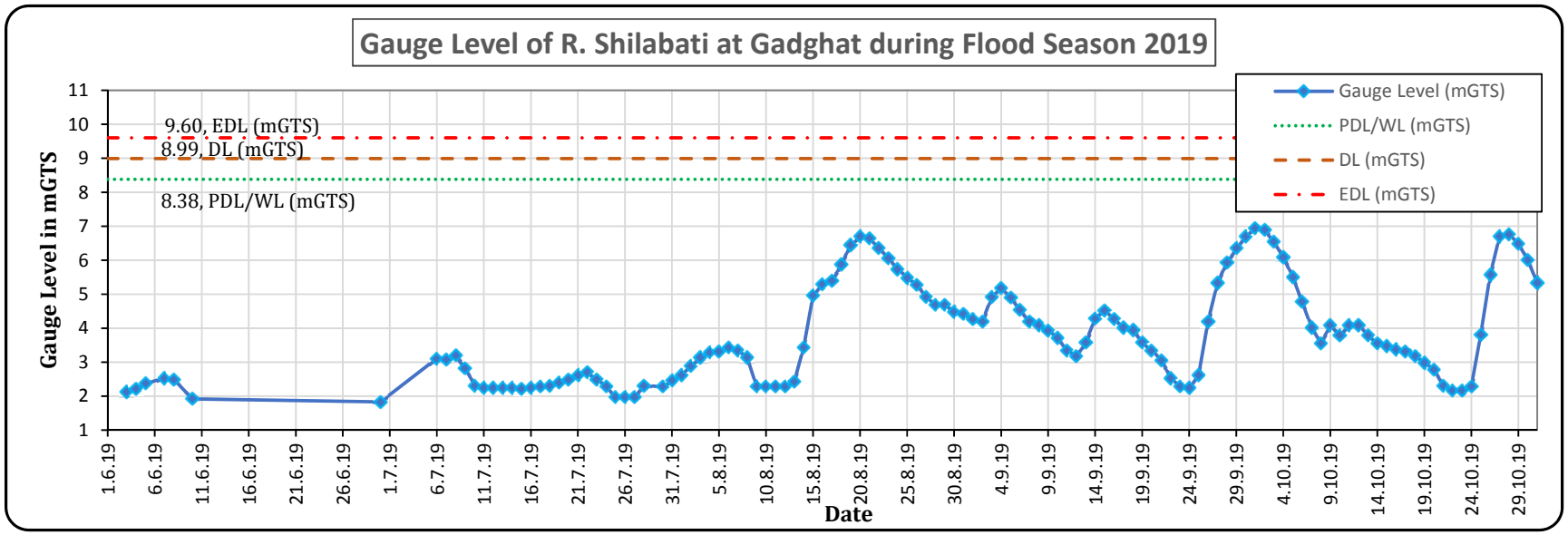
Annexure VIII-B: Gauge Levels of different Rivers of South Bengal during Flood Season 2019



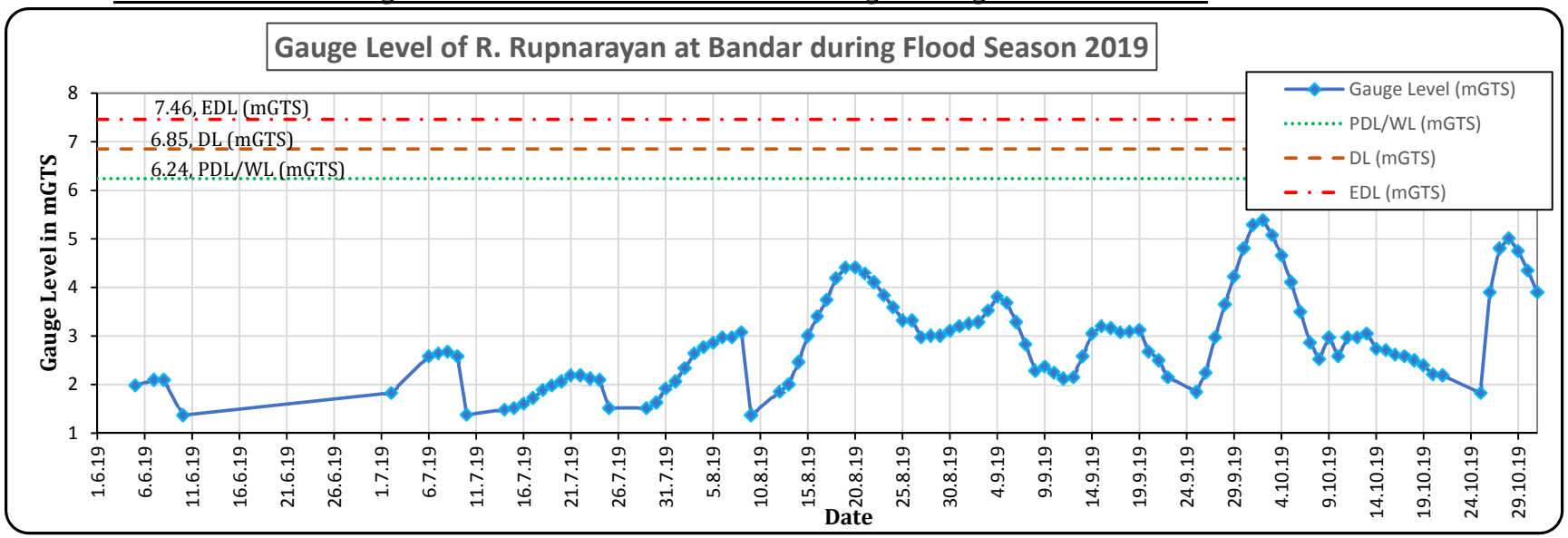


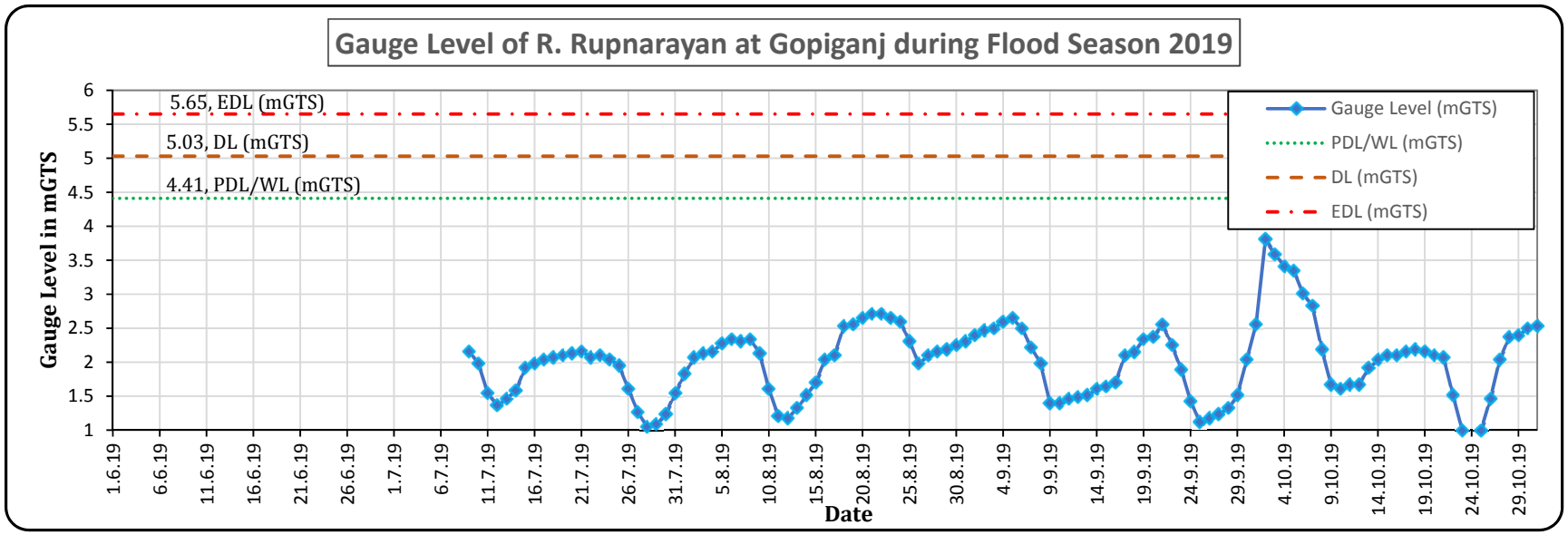
Annexure VIII-B: Gauge Levels of different Rivers of South Bengal during Flood Season 2019



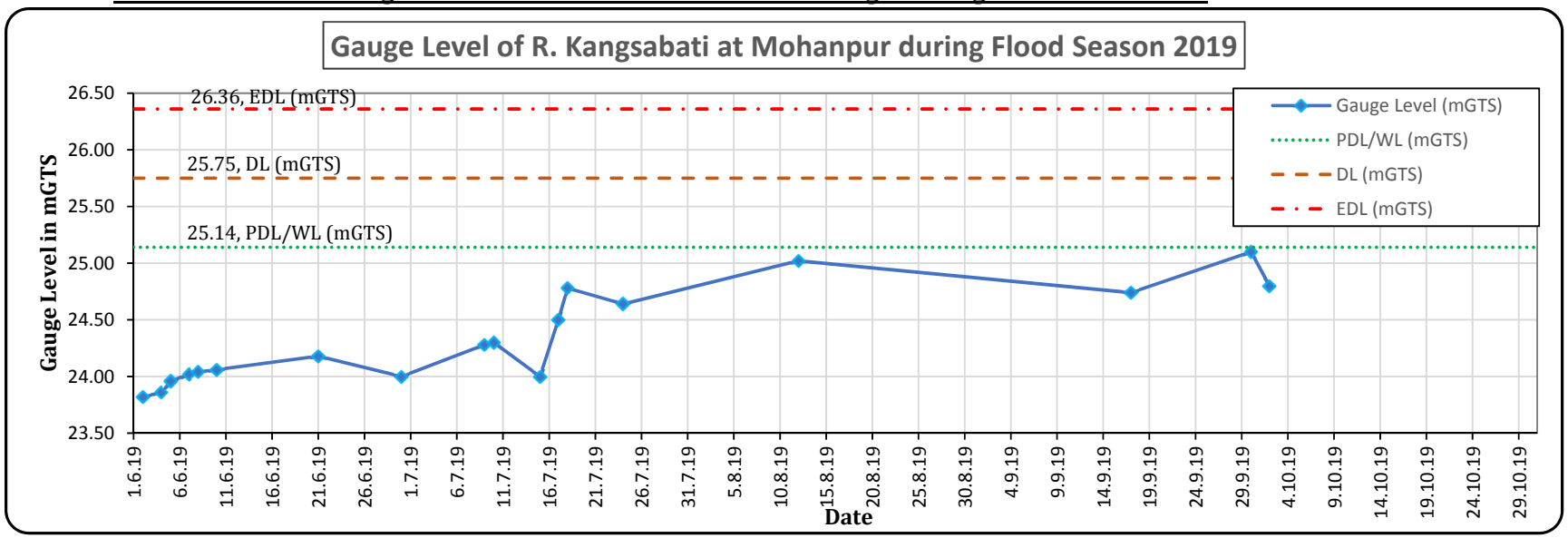


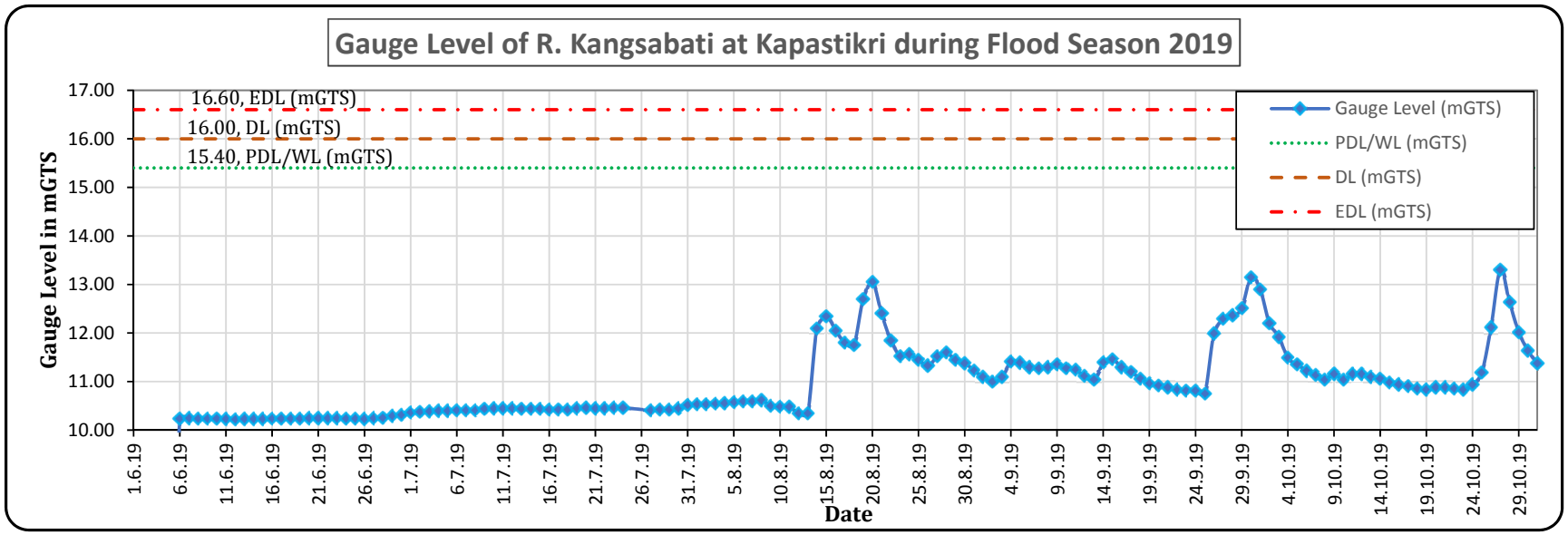
Annexure VIII-B: Gauge Levels of different Rivers of South Bengal during Flood Season 2019



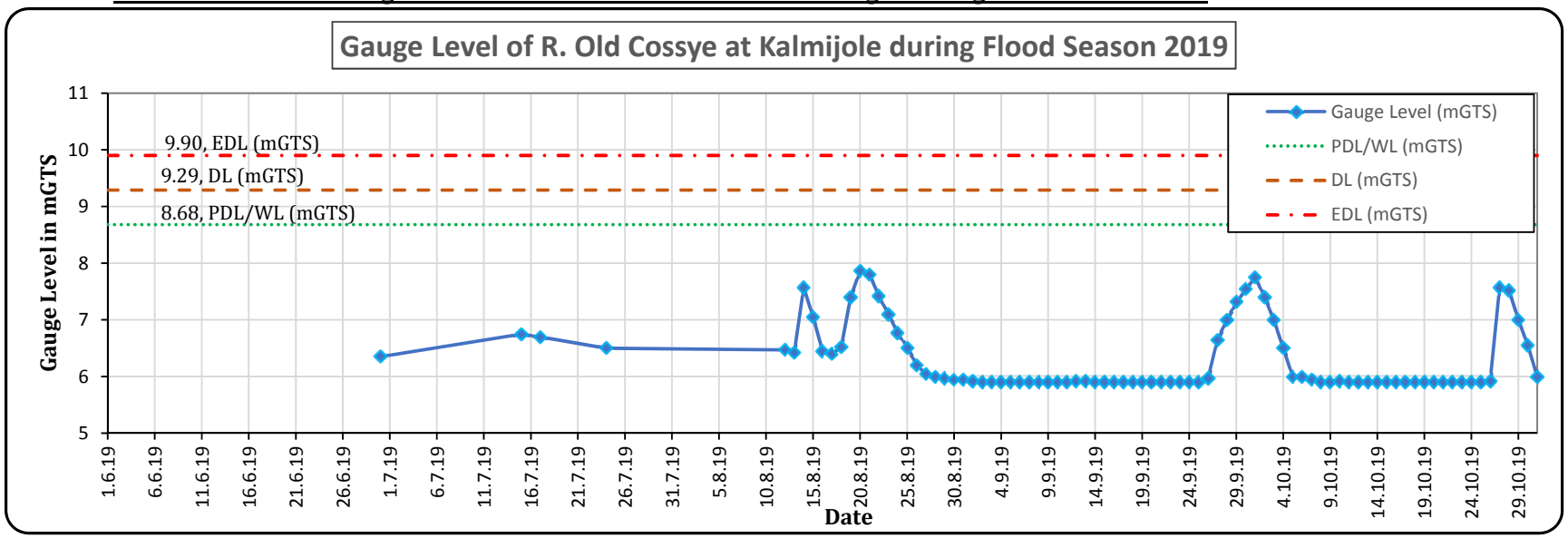


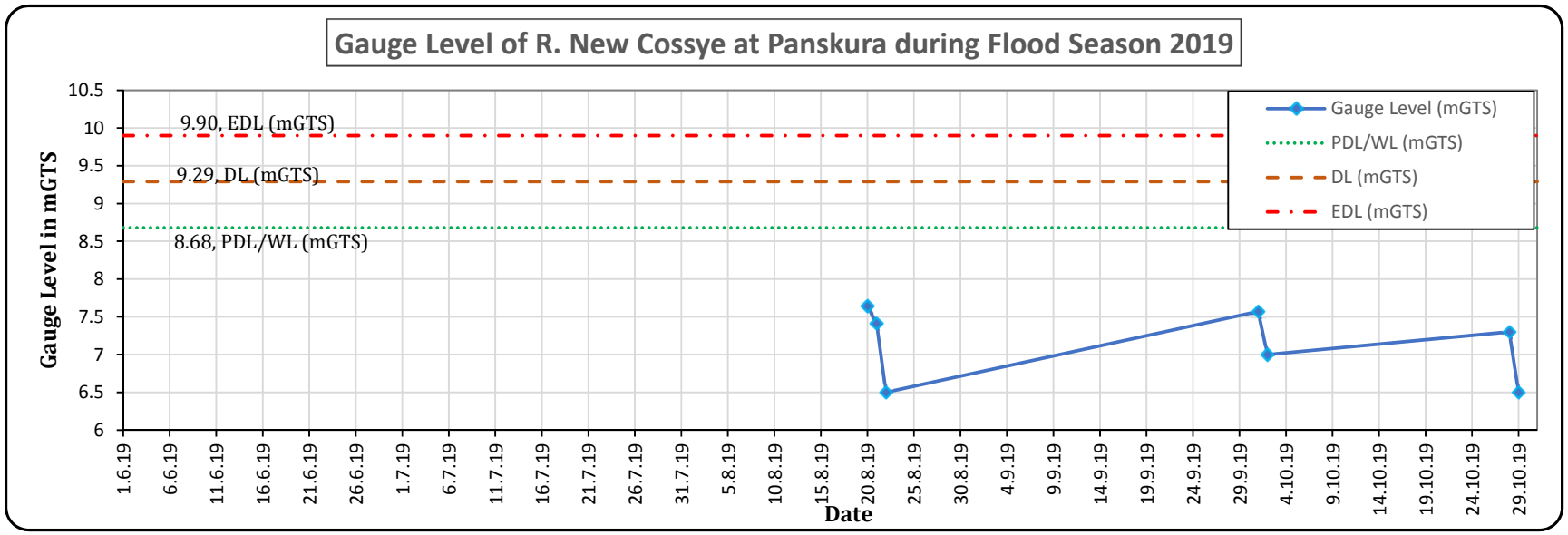
Annexure VIII-B: Gauge Levels of different Rivers of South Bengal during Flood Season 2019



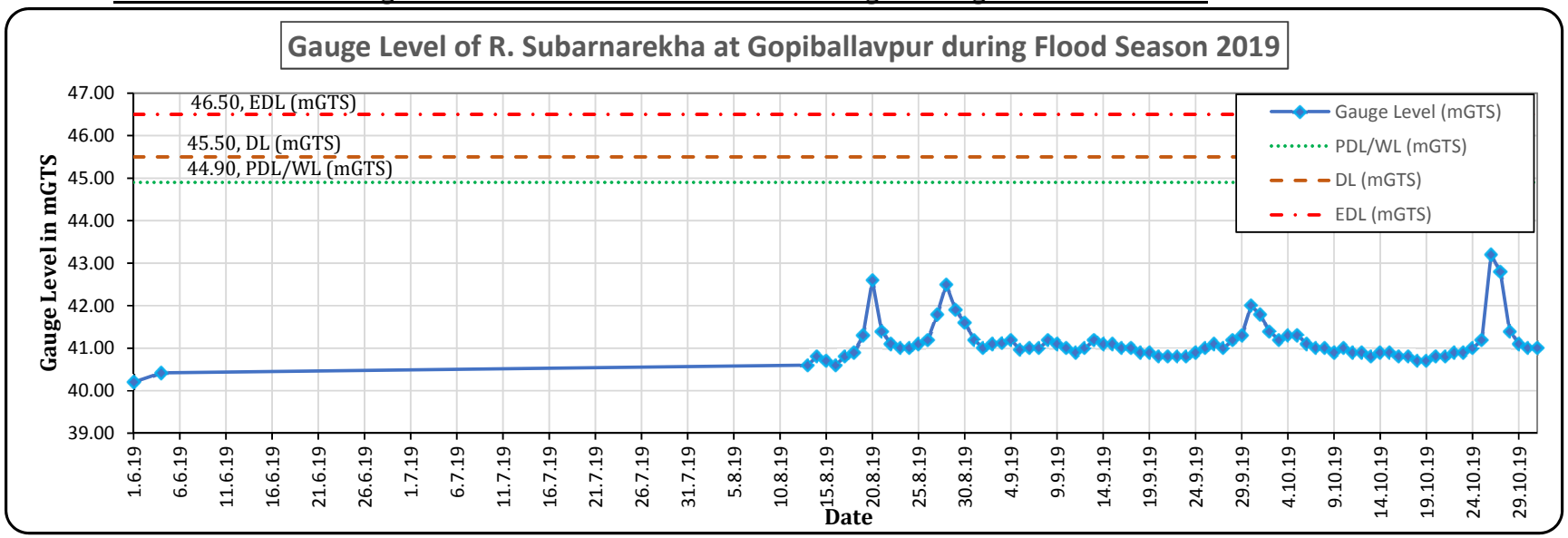


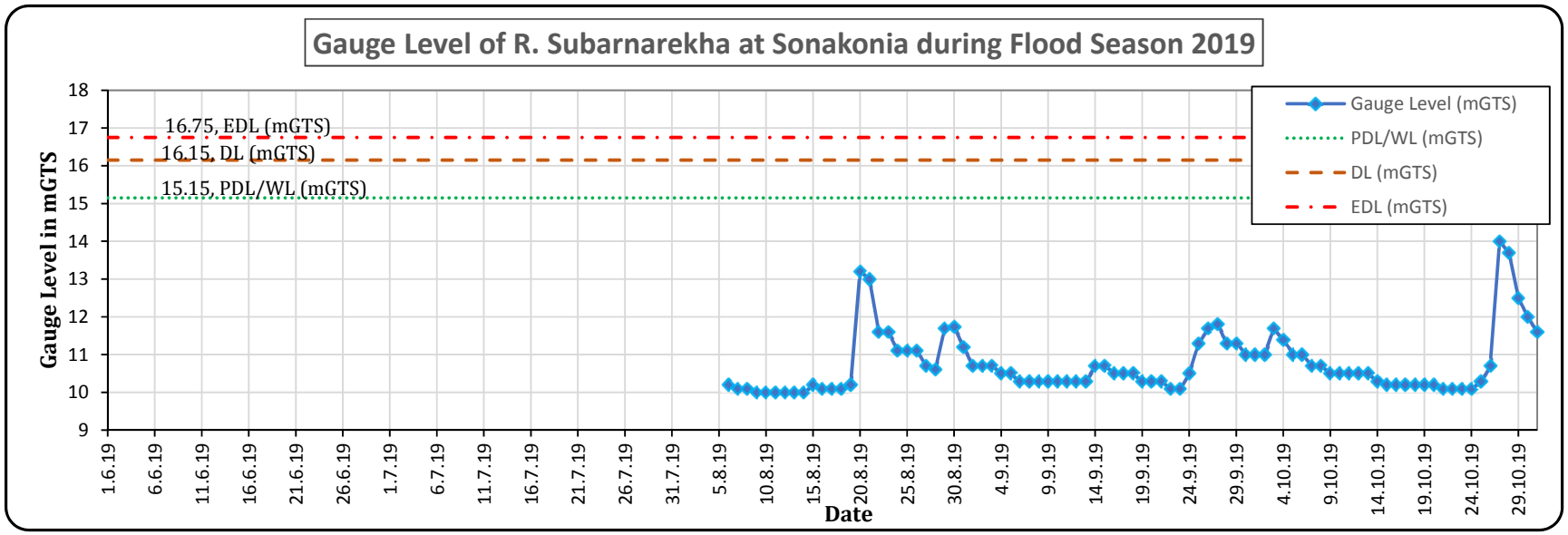
Annexure VIII-B: Gauge Levels of different Rivers of South Bengal during Flood Season 2019



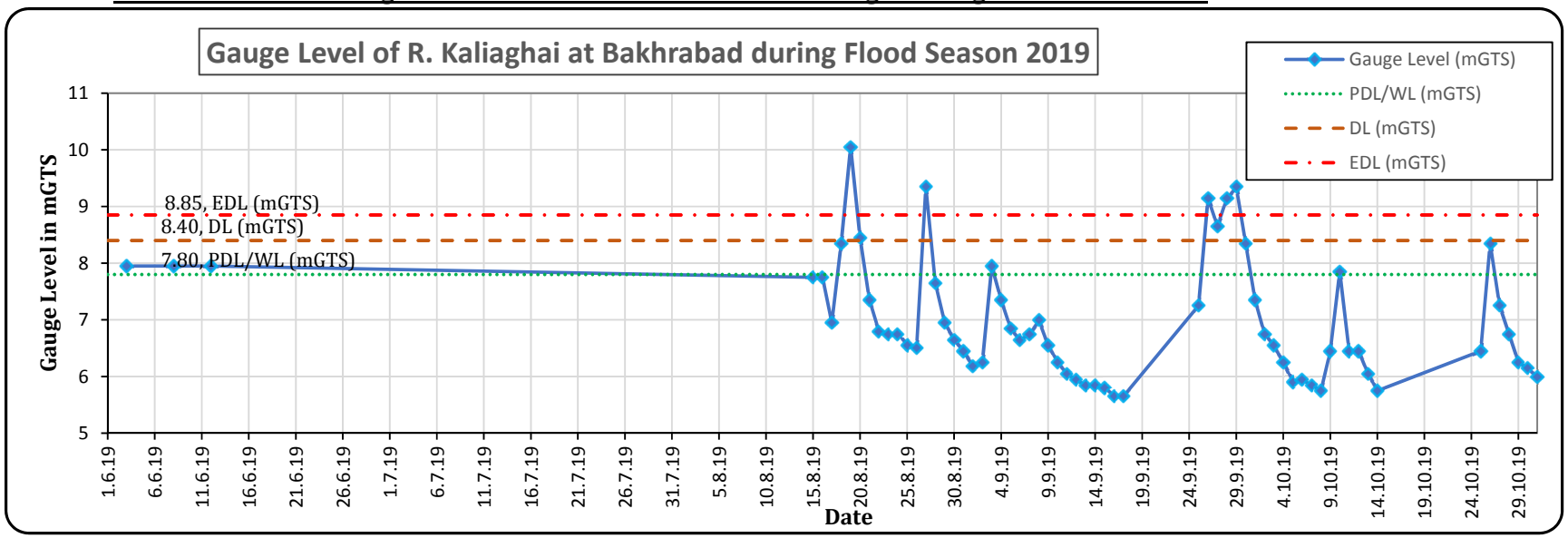


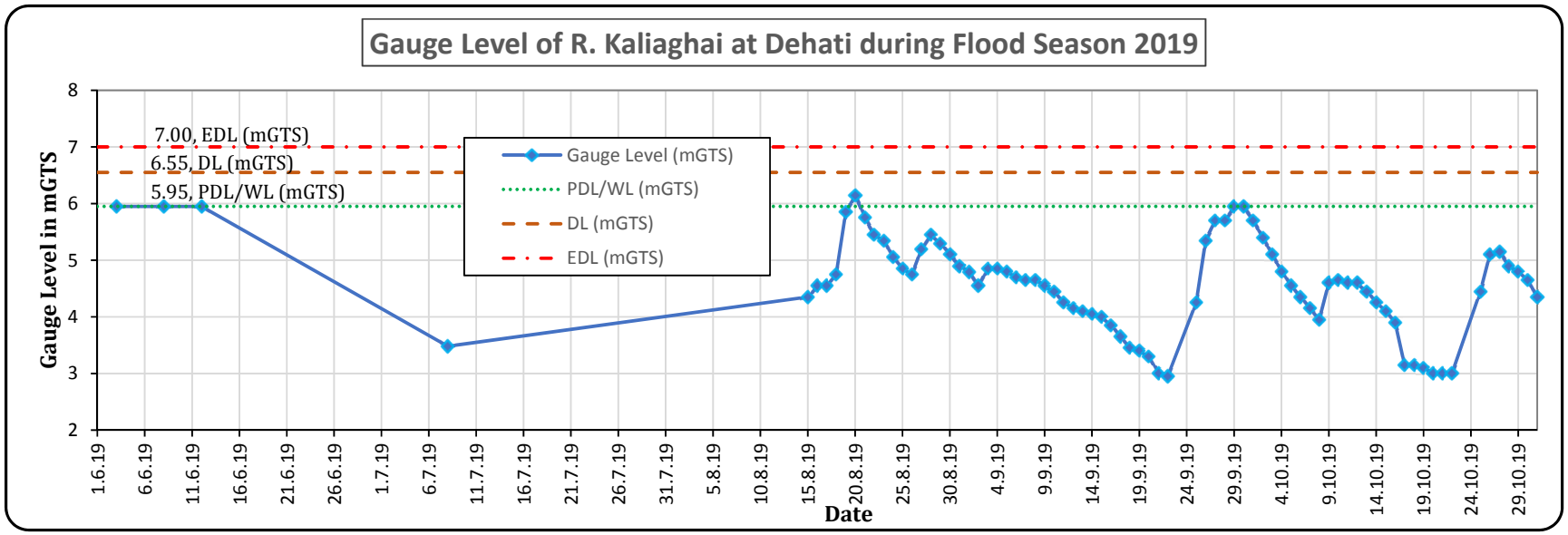
Annexure VIII-B: Gauge Levels of different Rivers of South Bengal during Flood Season 2019



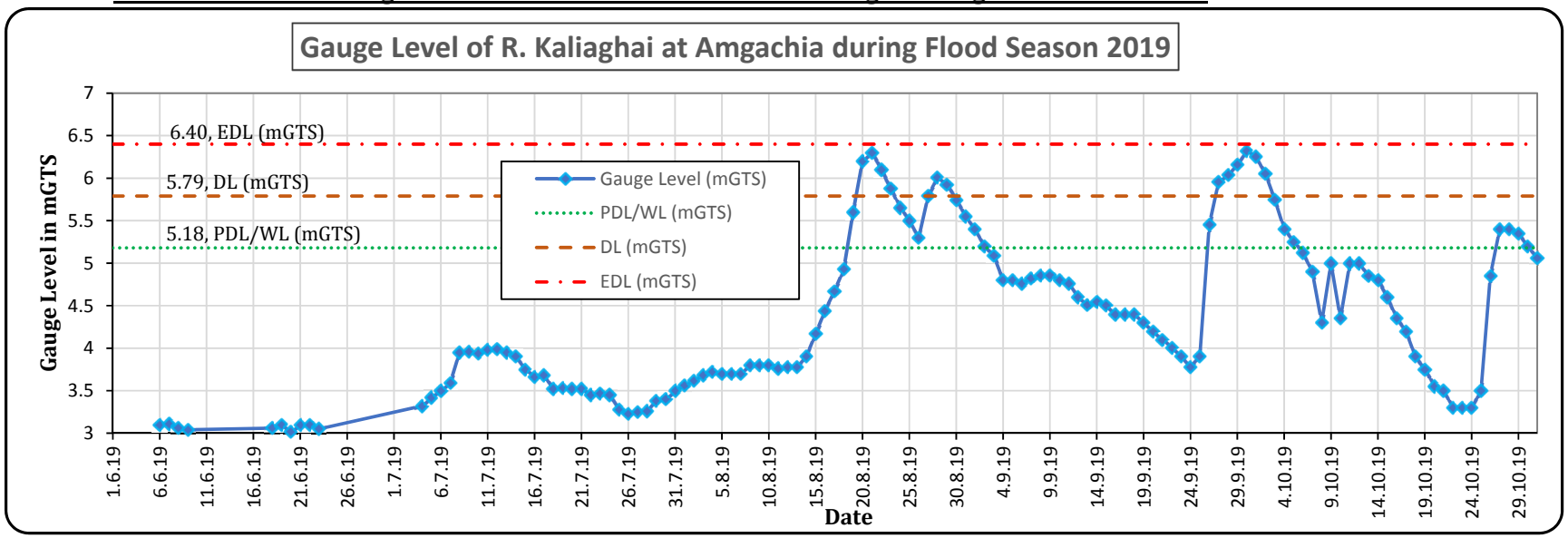


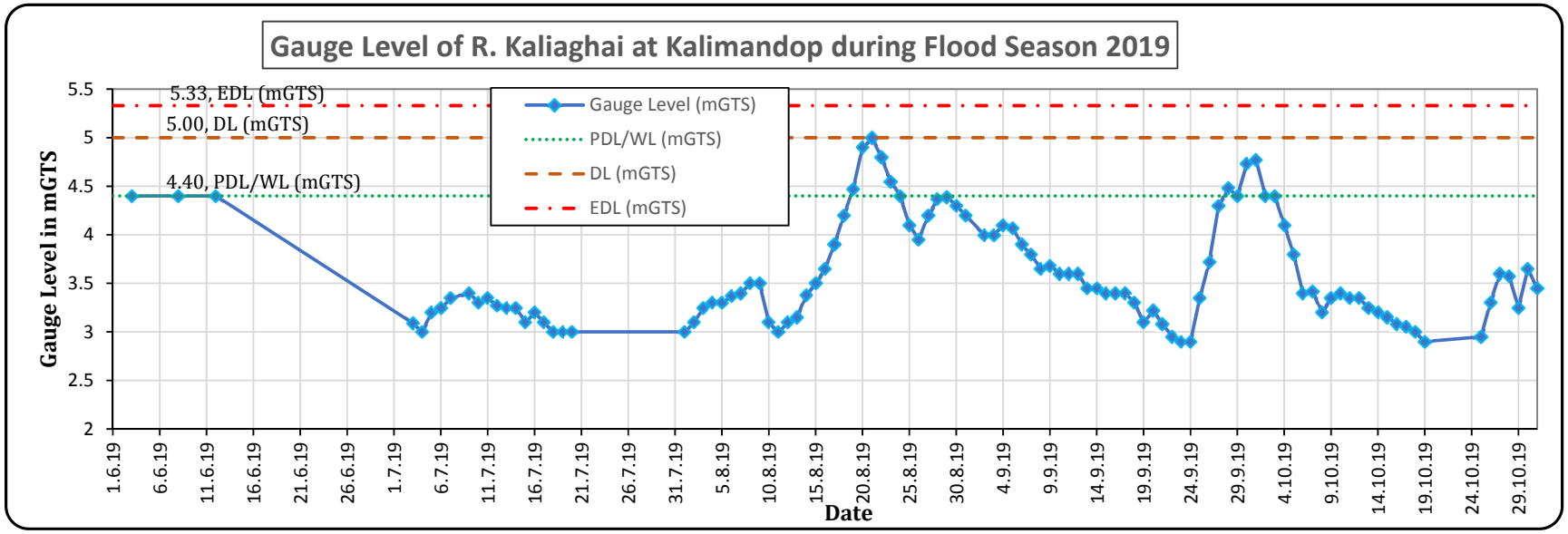
Annexure VIII-B: Gauge Levels of different Rivers of South Bengal during Flood Season 2019



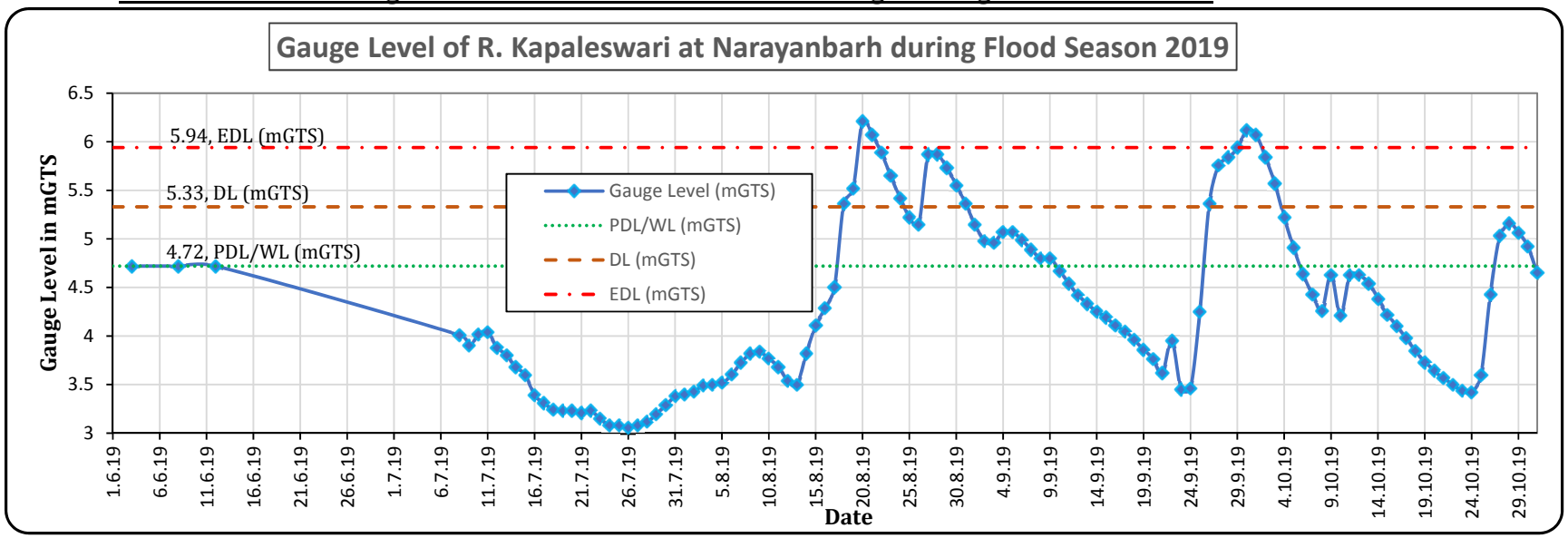


Annexure VIII-B: Gauge Levels of different Rivers of South Bengal during Flood Season 2019





Annexure VIII-B: Gauge Levels of different Rivers of South Bengal during Flood Season 2019



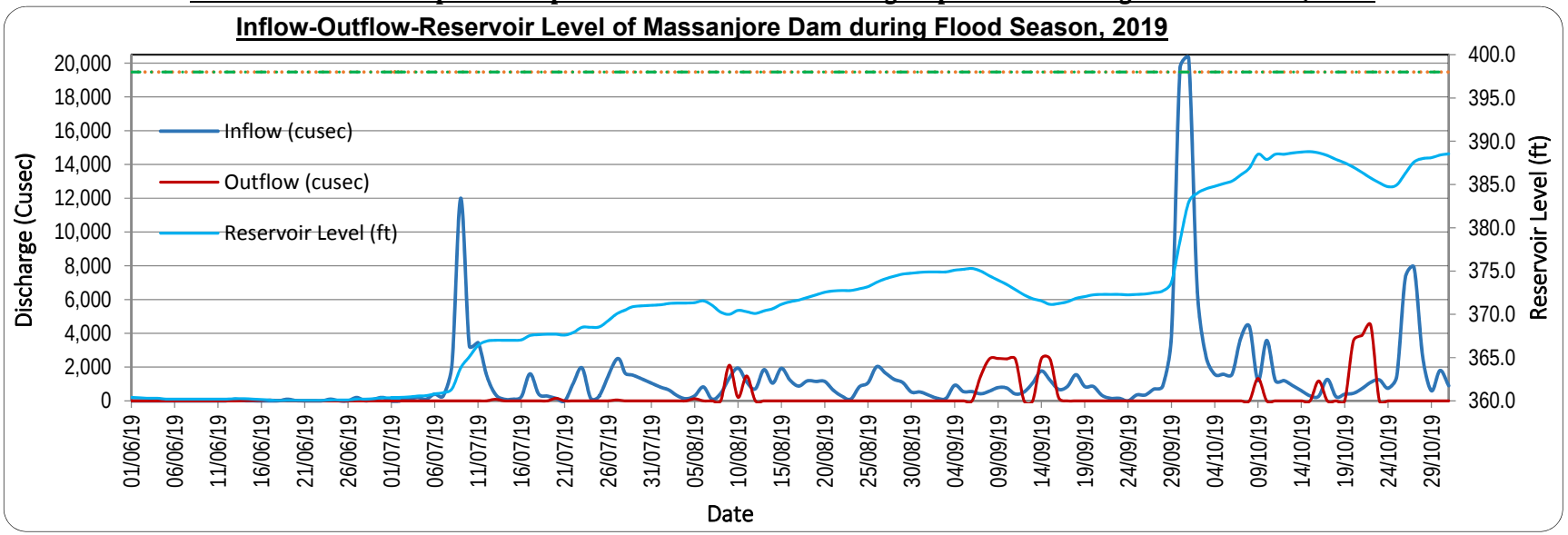
Annexure IX-A: Monthly Statistics of Dam-Barrage Operation during Flood Season, 2019

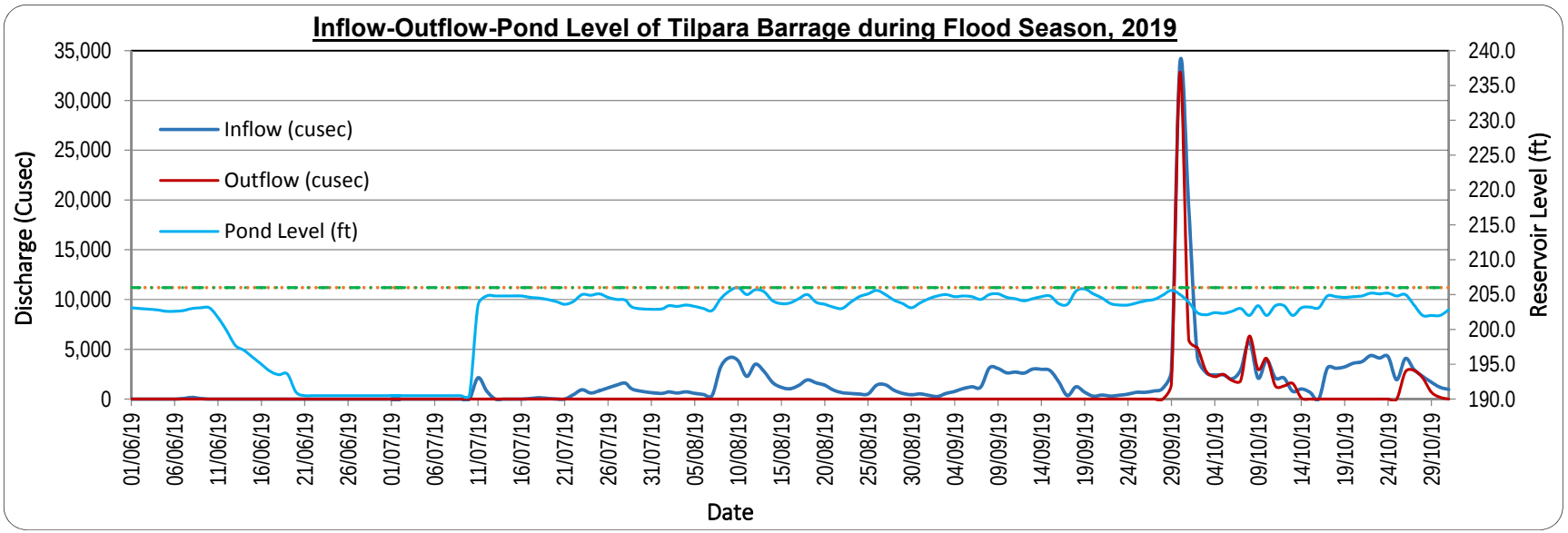
Sl.	River Basin	Name of Reservoir	Conservation / Pond Level (ft)	Max. Flood Level (ft)	Monthly Avgeage Reservoir Level (ft)					Max. Res. Level (ft)	Min. Res. Level (ft)
					Jun-19	Jul-19	Aug-19	Sep-19	Oct-19		
1	Teesta	Teesta Barrage	375.00	378.30	374.99	375.33	376.01	376.40	376.44	377.36	373.92
2	Mayurakshi	Massanjore Dam	398.00	398.00	360.18	365.45	372.03	373.23	386.86	388.80	360.05
3		Tilpara Barrage	206.00	206.00	196.44	200.18	204.13	204.55	203.40	240.80	190.50
4	Ajay	Sikatia Barrage	558.00	559.70	555.41	555.22	555.94	554.78	555.60	557.60	526.24
5		Hinglow Dam	321.00	324.00	309.33	316.22	318.92	319.04	316.71	319.40	308.50
6	Damodar	Maithon Dam	480.00	495.00	449.44	454.99	469.68	479.27	490.95	492.02	448.09
7		Panchet Dam	410.00	425.00	397.58	401.39	406.25	412.95	420.79	423.76	395.76
8		Tenughat Dam	852.00	864.00	841.68	845.47	849.21	852.03	853.28	855.97	841.03
9		Durgapur Barrage	211.50	211.50	211.48	211.50	211.50	211.50	211.50	211.50	211.00
10	Kangsabati	Mukutmanipur Dam	434.00	440.00	412.31	412.64	414.16	422.24	426.77	430.00	411.80
11	Subarnarekha	Chandil Dam	630.00	630.00	576.61	574.47	578.22	591.89	593.55	594.81	571.84
12		Galudi Barrage	310.00	332.00	280.16	285.98	303.13	301.83	299.88	321.51	279.68

Annexure IX-A: Monthly Statistics of Dam-Barrage Operation during Flood Season,2019

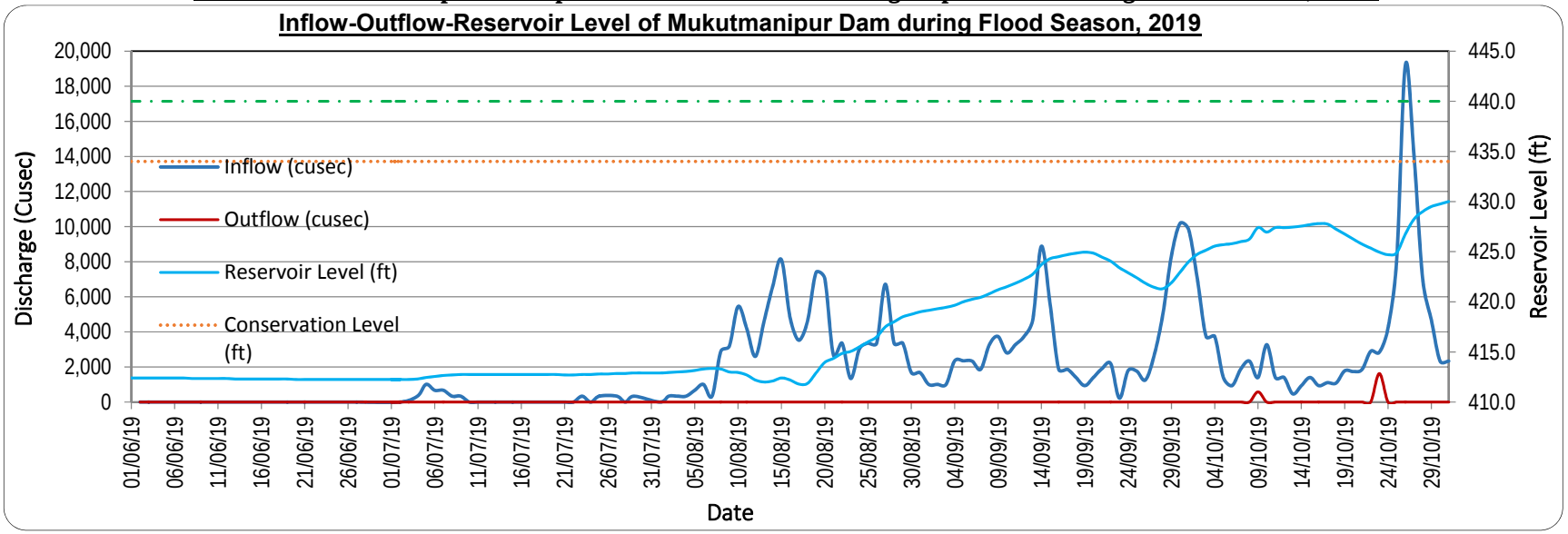
Sl.	River Basin	Name of Reservoir	Monthly Avgerage Inflow (cusec)					Max. Inflow (cusec)	Min. Inflow (cusec)
			Jun-19	Jul-19	Aug-19	Sep-19	Oct-19		
1	Teesta	Teesta Barrage	27153	68594	48873	42053	25395	163905	4626
2	Mayurakshi	Massanjore Dam	28	1197	939	1379	2586	20288	0
3		Tilpara Barrage	9	333	1370	2478	3203	33820	0
4	Ajay	Sikatia Barrage	0	N.A.	N.A.	N.A.	2971	5942	0
5		Hinglow Dam	0	10	0	139	0	3883	0
6	Damodar	Maithon Dam	56	1668	3264	5224	5923	93925	0
7		Panchet Dam	293	1756	6249	6537	8093	59684	0
8		Tenughat Dam	338	1683	4084	4335	4689	26211	0
9		Durgapur Barrage	1071	1994	8606	9388	21363	96875	550
10	Kangsabati	Mukutmanipur Dam	0	204	3288	3020	3783	19219	0
Sl.	River Basin	Name of Reservoir	Monthly Avgerage Outflow (cusec)					Max. Outflow (cusec)	Min. Outflow (cusec)
			Jun-19	Jul-19	Aug-19	Sep-19	Oct-19		
1	Teesta	Teesta Barrage	24935	66873	45036	38430	16530	161329	0
2	Mayurakshi	Massanjore Dam	4	9	126	552	465	4481	0
3		Tilpara Barrage	0	0	0	1145	1576	32820	0
4	Ajay	Sikatia Barrage	100	1267	1657	4304	2928	40000	0
5		Hinglow Dam	0	135	0	134	323	6017	0
6	Damodar	Maithon Dam	11	100	832	2004	6752	37282	0
7		Panchet Dam	22	533	5185	3810	8303	20473	0
8		Tenughat Dam	143	854	3528	3079	4623	29350	0
9		Durgapur Barrage	588	845	2648	4543	16074	96375	0
10	Kangsabati	Mukutmanipur Dam	0	0	0	0	88	1623	0
11	Subarnarekha	Chandil Dam	595	578	488	3214	6358	27242	350
12		Galudi Barrage	1775	1533	22361	15118	13790	190711	104

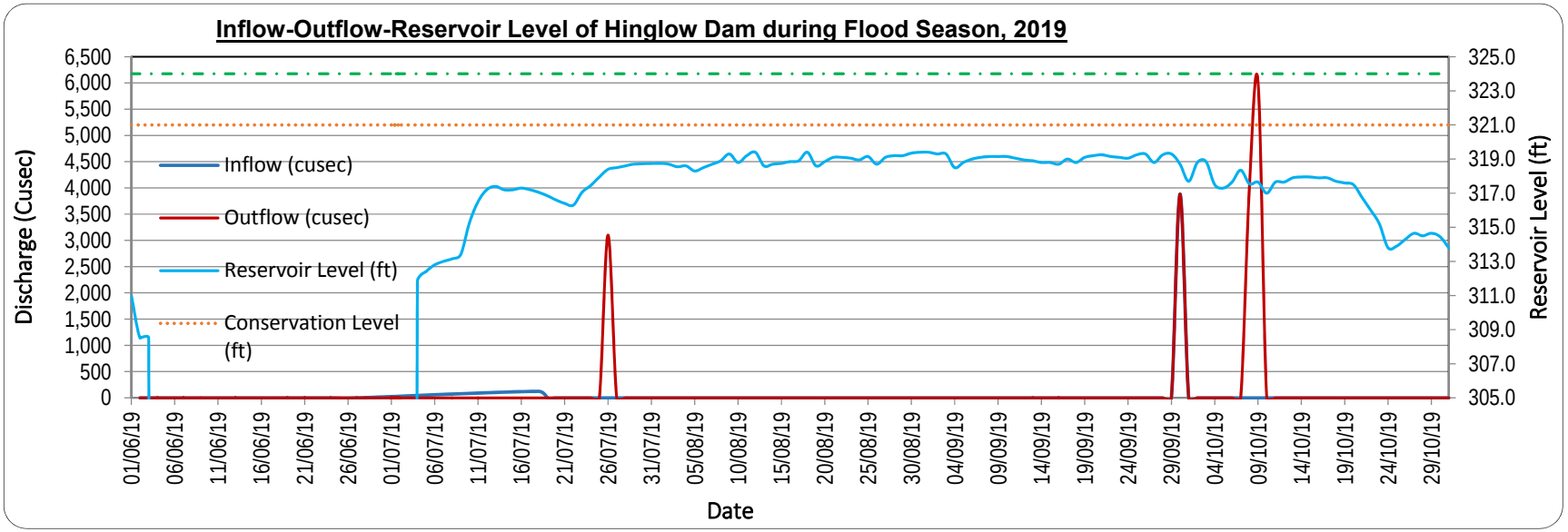
Annexure IX-B: Graphical Representation of Dam-Barrage Operation during Flood Season, 2019



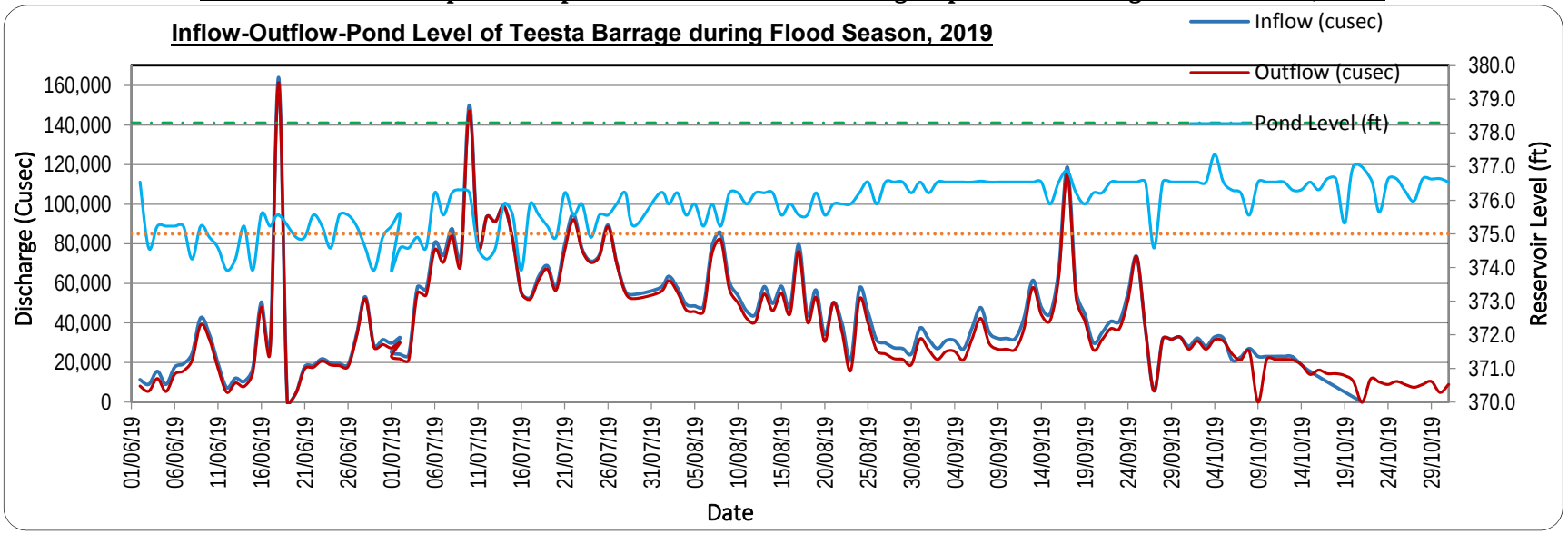


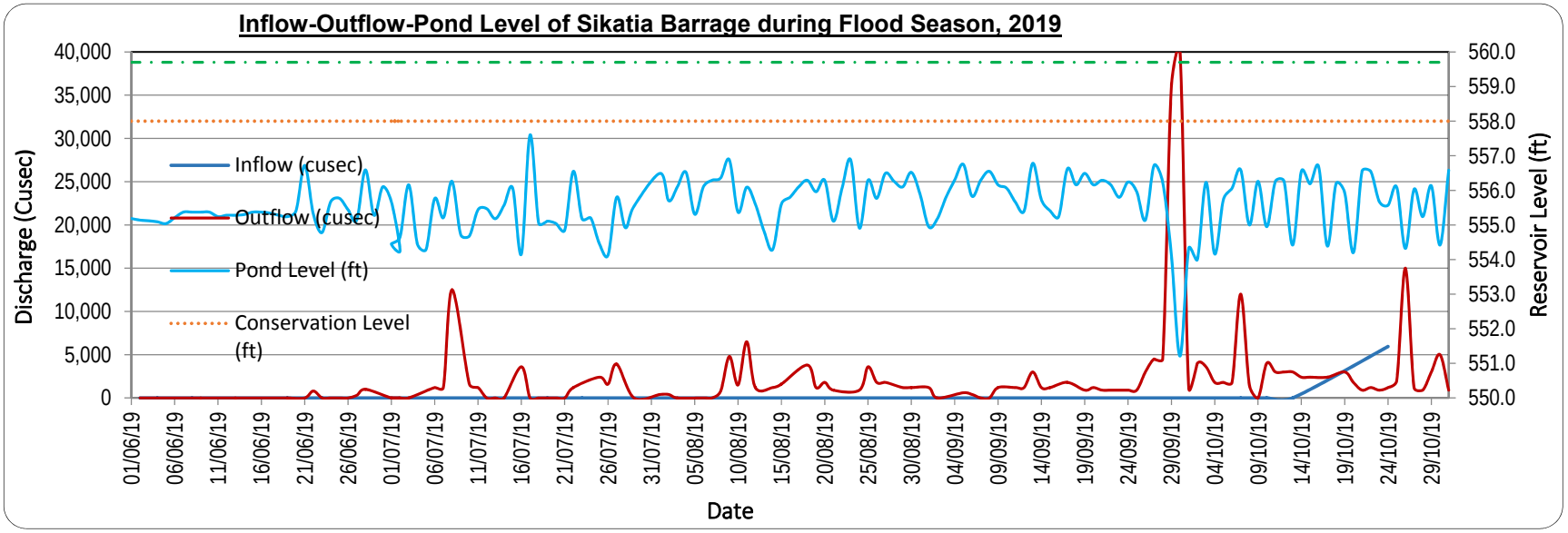
Annexure IX-B: Graphical Representation of Dam-Barrage Operation during Flood Season, 2019





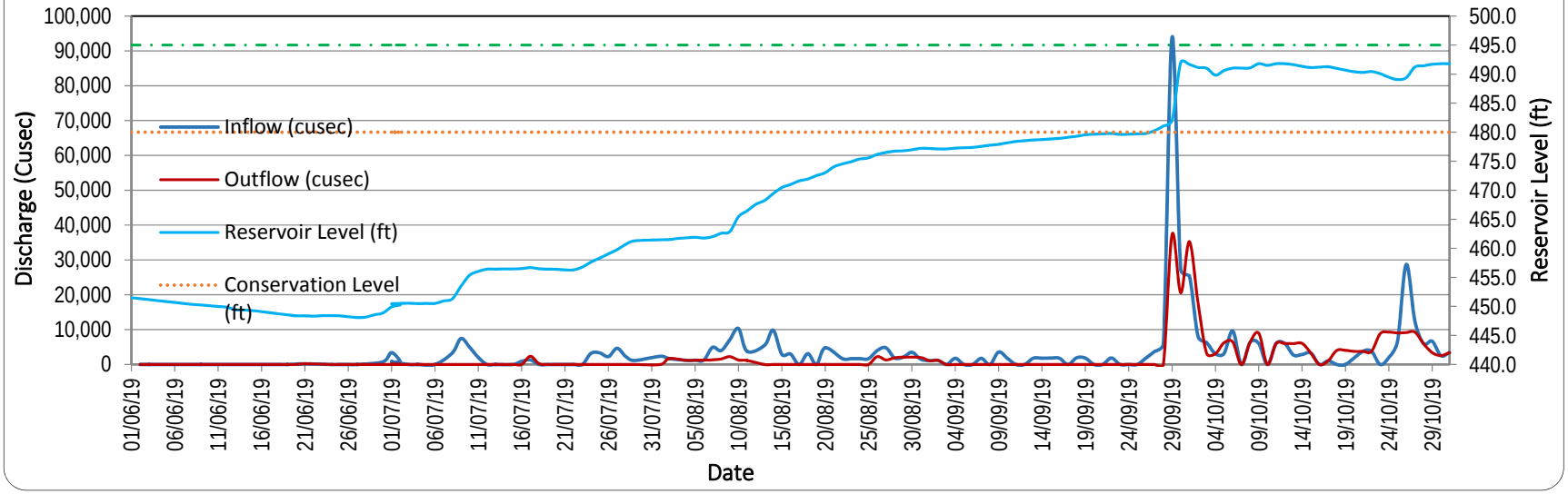
Annexure IX-B: Graphical Representation of Dam-Barrage Operation during Flood Season, 2019



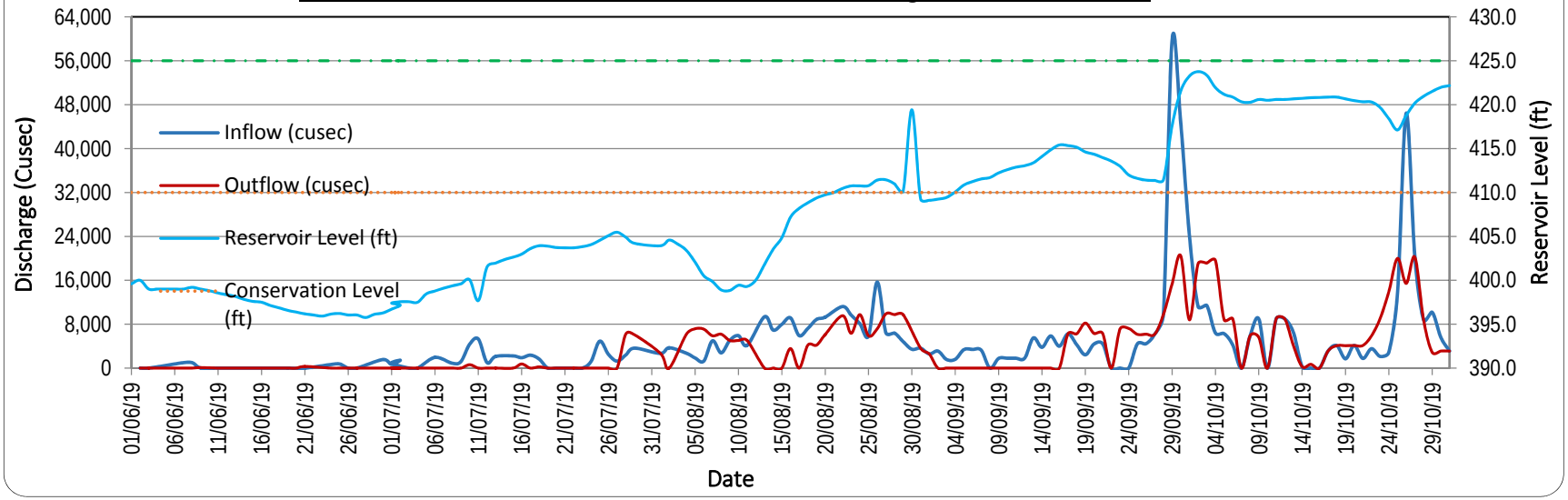


Annexure IX-B: Graphical Representation of Dam-Barrage Operation during Flood Season, 2019

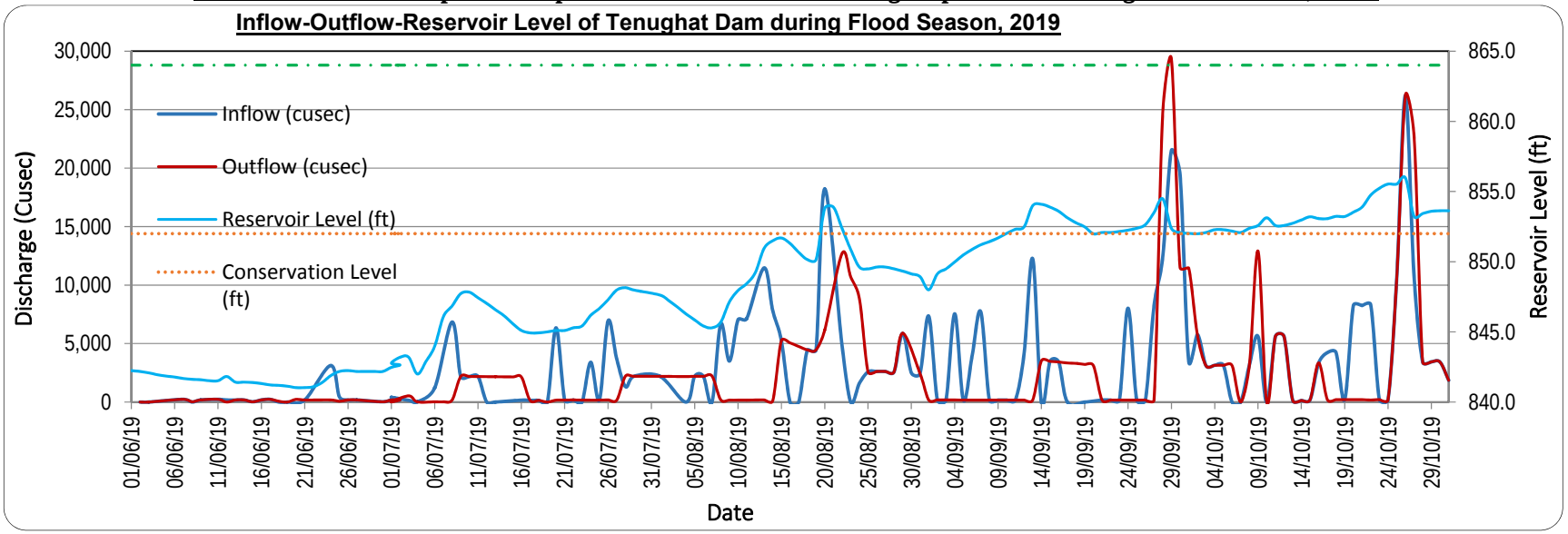
Inflow-Outflow-Reservoir Level of Maithon Dam during Flood Season, 2019

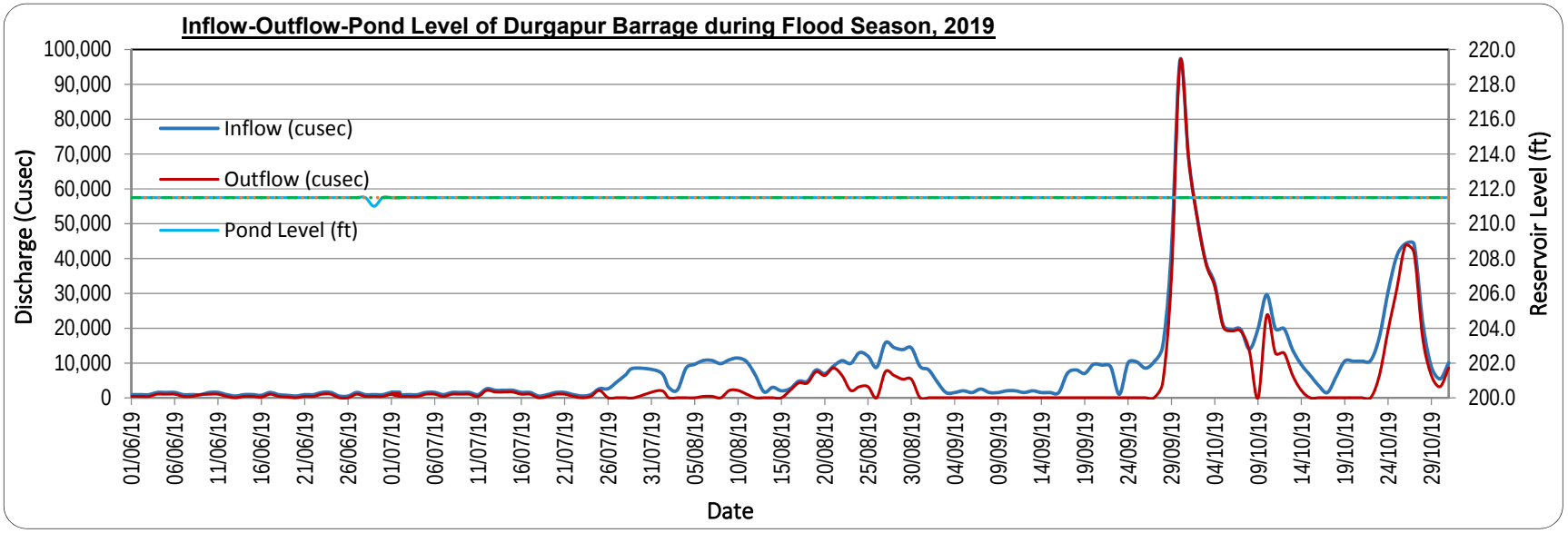


Inflow-Outflow-Reservoir Level of Panchet Dam during Flood Season, 2019

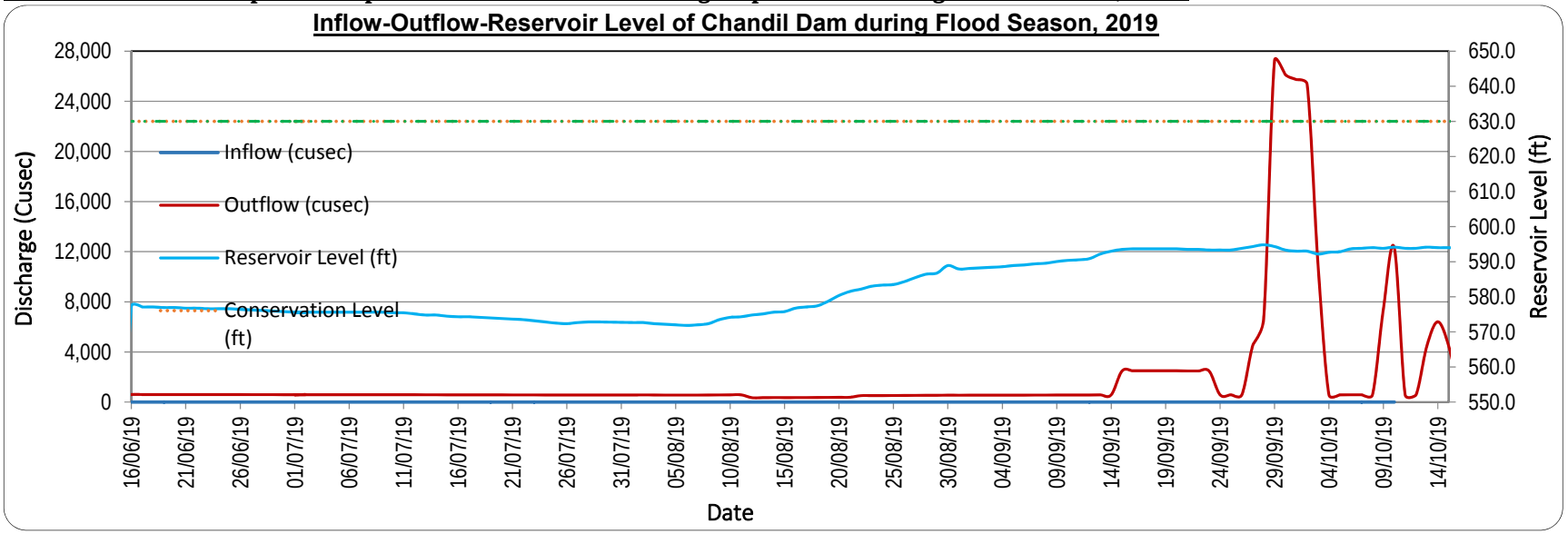


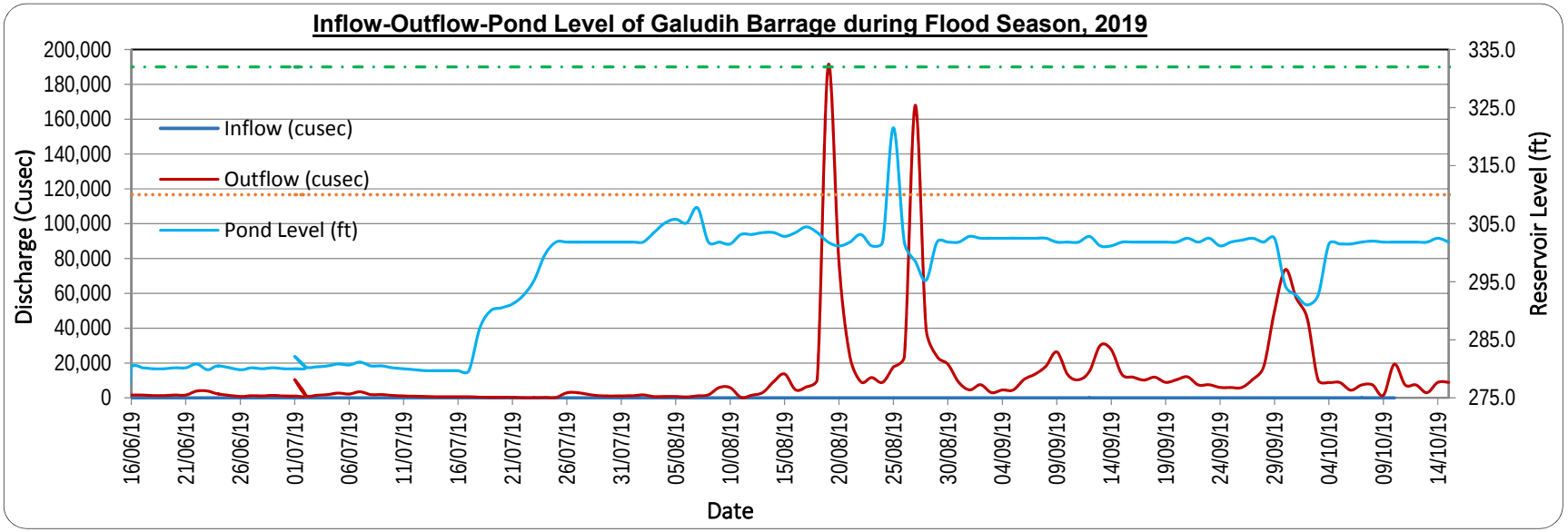
Annexure IX-B: Graphical Representation of Dam-Barrage Operation during Flood Season, 2019





Annexure IX-B: Graphical Representation of Dam-Barrage Operation during Flood Season, 2019





Annexure – X: Flood Warning Signals in North Bengal Rivers during Monsoon 2019

Sl. No.	Name of River	Location / Area	Date of Signal Imposed	Time of Signal Imposed	Type of Signal	Date of Signal Withdrawn	Time of Signal Withdrawn
1	Teesta	Unprotected area of both banks from Domohoni to Bangladesh border	18.06.2019	7:15	Yellow	18.06.2019	15:20
2	Diana	Chengmari of Jalpaiguri Dist.	25.06.2019	6:30	Yellow	25.06.2019	15:15
3	Torsa	Hasimara of Alipurduar Dist.	25.06.2019	7:00	Yellow	25.06.2019	14:00
4	Kaljani	PWD Road Bridge at Alipurduar	25.06.2019	12:00	Yellow	25.06.2019	14:00
5	Kaljani	PWD Road Bridge at Alipurduar/ Protected areas of Alipurduar	26.06.2019	8:00	Yellow	27.06.2019	3:00
6	Kaljani	Protected areas of Alipurduar	26.06.2019	11:30	Red	26.06.2019	22:00
7	Teesta	Unprotected area of both banks from Domohoni to Bangladesh border	08.07.2019	11:30	Yellow	08.07.2019	16:15
8	Teesta	Unprotected area of both banks from Domohoni to Bangladesh border	10.07.2019	7:30	Yellow	10.07.2019	17:10
9	Teesta	Unprotected area of both banks from Domohoni to Bangladesh border	11.07.2019	6:15	Yellow	14.07.2019	20:30
10	Teesta	Unprotected area of both banks from Domohoni to Bangladesh border	12.07.2019	10:20	Red	13.07.2019	6:30
11	Teesta	Protected area of both banks from Domohoni to Bangladesh border	12.07.2019	10:20	Yellow	13.07.2019	6:30
12	Jaldhaka	Unprotected area of both banks from NH-31 Road Bridge crossing to Mathabhanga	12.07.2019	9:20	Yellow	14.07.2019	18:30
13	Jaldhaka	Protected area of both banks from NH-31 Road Bridge crossing to Mathabhanga	12.07.2019	11:20	Yellow	12.07.2019	19:25
14	Mansai	*Unprotected areas of both banks from Mathabhanga to Bangladesh border*	12.07.2019	*17:00*	Yellow	16.07.2019	*10:00*
15	Mansai	Protected areas of both banks from Mathabhanga to Bangladesh border	12.07.2019	20:00	Yellow	16.07.2019	10:00
16	Teesta	Unprotected area of both banks from Domohoni to Bangladesh border	14.07.2019	1:20	Red	14.07.2019	7:30
17	Teesta	Protected area of both banks from Domohoni to Bangladesh border	14.07.2019	1:20	Yellow	14.07.2019	7:30
18	Teesta	Unprotected area of both banks from Domohoni to Bangladesh border	15.07.2019	6:30	Yellow	17.07.2019	6:25
19	Raidak- I	Protected and unprotected area of both banks from Tufanganj to Bangladesh border	14.07.2019	21:00	Yellow	26.07.2019	10:00
20	Jaldhaka	Unprotected area of both banks from NH-31 to Mathabhanga	16.07.2019	9:30	Yellow	16.07.2019	17:15
21	Teesta	Unprotected area of both banks from Domohoni to Bangladesh border	20.07.2019	10:15	Yellow	20.07.2019	19:15
22	Teesta	Unprotected area of both banks from Domohoni to Bangladesh border	21.07.2019	12:15	Yellow	21.07.2019	17:15
23	Teesta	Unprotected area of both banks from Domohoni to Bangladesh border	23.07.2019	9:30	Yellow	25.07.2019	19:10
24	Diana	Chengmari of Jalpaiguri Dist.	23.07.2019	9:45	Yellow	23.07.2019	18:00
25	Raidak- I	Protected and unprotected area of both banks from Tufanganj to Bangladesh border	23.07.2019	23:00	Yellow	25.07.2019	9:00
26	Diana	Chengmari of Jalpaiguri Dist.	23.07.2019	23:00	Yellow	24.07.2019	17:10
27	Mansai	Unprotected areas of both banks from Mathabhanga to Bangladesh border	24.07.2019	0:00	Yellow	25.07.2019	18:00
28	Kaljani	Protected and unprotected areas of Alipurduar	24.07.2019	6:30	Yellow	24.07.2019	13:00
29	Jaldhaka	Unprotected area of both banks from NH-31 to Mathabhanga	24.07.2019	7:20	Yellow	25.07.2019	19:10
30	Mansai	Unprotected areas of both banks from Mathabhanga to Bangladesh border	24.07.2019	14:00	Red	24.07.2019	19:00
31	Teesta	Unprotected areas of both banks from Domohini to Bangladesh Border	17.09.2019	10:20	Yellow	18.09.2019	6:15

Annexure XI-A: Damege Statement of cyclonic storm "Fani" on 04.05.2019

Sl. No.	*District*	*Block*	*Affected Mouza*	*River / Sea*	*No. of spots affected*	*Length of damaged embankment (Km)*	*Nature of damages (Subsidence due to wave action / failure due to over topping)*
1	North 24 Pgs	Hingalganj	Dharamberia, Bhanderkhli, Bansatala, Pergumti, Kumirmari, Chotosahebkhali	Goureswar, Dansa, Kalindi.	6	0.38	Subsidence due to wave action
2	North 24 Pgs	Sandeshkhali -I	Bouniabad, Hatgachi,	Ghatihara, Bidhyadhari, Dansa	2	0.15	Subsidence due to wave action
3	North 24 Pgs	Sandeshkhali -II	Bauthakurani, Gabberia,	Dansa, Choto Kalagachi,Boro Kala Gachi	5	0.13	Subsidence due to wave action
4	North 24 Pgs	Hasnabad.	Sulkuniabad, Ghosalti	Dansa	2	0.18	Subsidence due to wave action
5	North 24 Pgs	Haroa	Munshigheri	Buri	1	0.05	Subsidence due to wave action
6	North 24 Pgs	Basirhat-I	Amarkathi, Chowrah, Akharpur.	Ichamati	3	0.15	Subsidence due to wave action
				District Sub Total:	***19***	***1.04***	***KM***
1	South 24 Parganas.	Kultali	Deulbari, Debipur	Chitur	2	0.02	Ghoge
			Shyamnagar	Petkulchand			
			Deulbari, Debipur	Matla	2	0.42	Subsidance due to wave action
			Kishorimohanpur	Thakuran	4		
2	South 24 Parganas.	Mathurapur-II	Purbajata	Thakuran	2	0.28	
			Kankandighi	Raidighi			
3	South 24 Parganas.	Patharpratima	Purba Sripatinagar	Thakuran	2	0.35	
			Shridharnagar	Jagaddal			
4	South 24 Parganas.	Basanti	Birinchibari	Bidya	1	0.15	Partial subsidence of embankment due to wave action
			6 no. Sonakhali	Hogol	1	0.03	
5	South 24 Parganas.	Gosaba	Dayapur	Sazna	1	0.13	
			Sonaga	Gomor	1		
			Rangabelia	Gomor	1		
6	South 24 Pgs.	Kakdwip	Kalinagar	Muriganga	1	0.02	Breach of Embankment (already restored)
7	South 24 Pgs.	Namkhana	Frezerganj	Bay of Bengal	1	0.10	
8	South 24 Pgs.	Sagar	Dhablat, Shibpur	Bay of Bengal	1	0.64	Over topping
				District Sub Total:	***20***	***2.14***	***KM***
1	Purba Medinipur	Mahisadal	Mayachar, Bar Amritberia	Rupnarayan	4	0.16	Subsidance due to Wave Action
2	Purba Medinipur	Nandakumar	Muirikpur	Rupnarayan	3	0.04	Subsidance due to Wave Action
3	Purba Medinipur	Haldia	Banskhana, Jalpai	Haldi	1	0.05	Subsidance due to Wave Action
4	Purba Medinipur	Sutahata	Aearkhali	Hooghly	7	0.20	Subsidance due to Wave Action
5	Purba Medinipur	Ramnagar-1	Jamra Shyampur, Chandpur, Jalda	Bay of Bengal	4	2.80	Displacement of Sea-side slope protection
				District Sub Total:	***19***	***3.25***	***KM***
Total length of Damages on account of Cyclone 'Fani' in three districts:						***6.43***	***KM***

Annexure XI-B: Damege Statement of cyclonic storm "BULBUL" during 09-11-2019 (AN) to 10-11-2019 (noon)

Sl. No.	*District*	*Block*	*Affected Mouza*	*River / Sea*	*No. of spots affected*	*Length of damaged embankment (Km)*	*Nature of damages (Subsidence due to wave action / failure due to over topping)*
1	South 24 Pgs	Gosaba	Rangabalia	Gomor	2	0.15	Failure due to over topping
2	South 24 Pgs		Bagbagan (Ranipur)	Bidya	1	0.10	Subsidence due to wave action
3	South 24 Pgs		Dayapur (Near Suranjana Lodge)	Gomor	1	0.20	Subsidence due to wave action
4	South 24 Pgs		Amlamethi (1. Bali 5 No.)	Bidya	1	0.12	Subsidence due to wave action
5	South 24 Pgs		Amlamethi (2. Pancher Kona)	Bidya	1	0.10	
6	South 24 Pgs		Amlamethi (1. Sater Kona)	Gomor	1	0.15	Subsidence due to wave action
7	South 24 Pgs		Bipradaspur	Pathankhali	1	0.20	Subsidence due to wave action
8	South 24 Pgs		Birajnagar	Durgaduani	1	0.20	Subsidence due to wave action
9	South 24 Pgs	Gosaba	Kumirmari	Roymangal, Bagna, Sarsa & Puinjali	7	0.68	Subsidence due to wave action
10	South 24 Pgs		Puinjali	Roymangal	1	0.15	Subsidence due to wave action
11	South 24 Pgs		Chotomollakhali	Sarsa & Bidya	2	0.23	Subsidence due to wave action
12	South 24 Pgs		Kalidaspur	Sarsa & Kapura	3	0.35	Subsidence due to wave action
13	South 24 Pgs		Pakhirala	Gomor	2	0.28	Subsidence due to wave action
14	South 24 Pgs		Manmathanagar	Bidya	2	0.28	Subsidence due to wave action
15	South 24 Pgs	Gosaba	Chandipur	Kartal	1	0.15	Subsidence due to wave action
16	South 24 Pgs		Lahiripur	Rangabalia Gang	2	0.27	Subsidence due to wave action
17	South 24 Pgs		Luxbagan	Dutta	1	0.13	Subsidence due to wave action
18	South 24 Pgs		Kachukhali	Bidya	3	0.40	Subsidence due to wave action
19	South 24 Pgs		Radhanagar	Bidya	1	0.25	Subsidence due to wave action
20	South 24 Pgs		Shambhunagar	Hana	1	0.30	Subsidence due to wave action
21	South 24 Pgs		Taranagar	Bidya	1	0.08	Subsidence due to wave action
22	South 24 Pgs	Basanti	Parbotipur	Bidya	1	0 .350	Subsidence due to wave action
23	South 24 Pgs		Birinchibari	Bidya	3	0.20	Subsidence due to wave action
24	South 24 Pgs		Tridipnagar	Bidya	1	0.10	Subsidence due to wave action
25	South 24 Pgs		Masjitbati	Kartal	1	0.12	Subsidence due to wave action
26	South 24 Pgs		Radhaballavpur	Hogal	1	0.20	Subsidence due to wave action
27	South 24 Pgs		Mondalghari	Matla	1	0.08	Subsidence due to wave action
28	South 24 Pgs		Jharkhali-III	Bidya	1	0.05	Over topping
29	South 24 Pgs		Jharkhali-IV	Matla	1	0.10	Over topping
30	South 24 Pgs		Kalahajra	Hogal	1	0.15	Subsidence due to wave action
31	South 24 Pgs		Sacheakhali	Hana	1	0.30	Subsidence due to wave action
32	South 24 Pgs		Begulakhali	Hana	1	0.15	Subsidence due to wave action
33	South 24 Pgs		Begulakhali	Hana	***Wooden Bridge***	0.06	Wooden Bridge, Tweisted & Broken

Sl. No.	District	Block	Affected Mouza	River / Sea	No. of spots affected	Length of damaged embankment (Km)	Nature of damages (Subsidence due to wave action / failure due to over topping)
34	South 24 Pgs	Basanti	Chunakhali	Hana	3	0.25	Subsidence due to wave action
35	South 24 Pgs		Kumrakhalikhali	Banibolia	1	0.10	Subsidence due to wave action
36	South 24 Pgs		Purandar	Matla	2	0.13	Subsidence due to wave action
37	South 24 Pgs	Kultali	Katamari	Nabipukur	3	0.20	Erosion & Subsidence
38	South 24 Pgs		Bhubaneswari	Thakuran	1	0.10	Erosion & Subsidence
39	South 24 Pgs		Binodpur	Olian	1	0.05	Erosion & Over topping
40	South 24 Pgs		Deulbari Debipur	Nabipukur	3	0.09	Erosion
41	South 24 Pgs			Matla	1	0.33	Erosion
42	South 24 Pgs		Kailashnagar	Beledona	1	0.05	Slip & Subsidence
43	South 24 Pgs		Dongajhora	Piyali	1	0.04	Slip & Subsidence
44	South 24 Pgs			Matla	1	0.40	Erosion
45	South 24 Pgs	Mathurapur -II	Nandakumarpur	Mridangabhanga	2	0.16	Erosion
46	South 24 Pgs		Mahabatnagar	Nakchara	1	0.06	Slip & Subsidence
47	South 24 Pgs		Kumrapara	Raidighi	1	0.04	Erosion
48	South 24 Pgs		Purbajatardeul	Thakuran	1	0.10	Erosion
49	South 24 Pgs		Narayanpur	Chatua	1	0.03	Erosion
50	South 24 Pgs		Mahabatnagar	Mridangabhanga	1	0.03	Erosion
51	South 24 Pgs		Joykrishnapur	Sutarbag	1	0.05	Erosion
52	South 24 Pgs		Nagendrapur	Raidighi	1	0.07	Erosion
53	South 24 Pgs		Domkal	Raidighi	1	0.05	Erosion
54	South 24 Pgs		Kankandighi	Raidighi	1	0.10	Erosion
55	South 24 Pgs		Domkal	Thakuran	1	0.07	Erosion
56	South 24 Pgs		Patharpratima	Sutarbag	1	0.07	Subsidence due to wave Action
57	South 24 Pgs	Patharpratima	Ramganga(Bharatala)	Barchara	3	0.10	Subsidence due to wave Action
58	South 24 Pgs		Sridharnagar	Jagaddal	5	0.10	Subsidence due to wave Action
59	South 24 Pgs		Purba Sripatinagar(K-Plot)	Thakuran	2	0.15	Due to overtopping
60	South 24 Pgs		Purbo Dwarikapur	Nakchara	3	0.02	Subsidence due to wave Action
61	South 24 Pgs		Gobardhanpur	Bay of Bengal	4	0.55	Overtopping due to wave action
62	South 24 Pgs		Satyadaspur	Jagaddal	2	0.25	Overtopping due to wave action
63	South 24 Pgs		Dakshin Surendraganj	Jagaddal	1	0.15	Slip and subsidence due to erosion and wave action
64	South 24 Pgs		Uttar Gopalnagar	Gobadia	2	0.46	Slip and subsidence due to erosion and wave action
65	South 24 Pgs		Gangapur	Chaltabonia	1	0.08	Slip and subsidence due to erosion and wave action
66	South 24 Pgs		Sitarampur	Jagaddal	1	0.22	Slip and subsidence due to erosion and wave action
67	South 24 Pgs		Krishnadaspur	Curzon Creek	3	0.27	Slip and subsidence due to erosion and wave action
68	South 24 Pgs		Uttar Narayanganj	Muriganga	1	0.12	Slip and subsidence due to erosion and wave action

Sl. No.	District	Block	Affected Mouza	River / Sea	No. of spots affected	Length of damaged embankment (Km)	Nature of damages (Subsidence due to wave action / failure due to over topping)
69	South 24 Pgs	Namkhana	Namkhana	Hatania-Doania	1	0.05	Slip and subsidence due to erosion and wave action
70	South 24 Pgs		Dwariknagar	Hatania-Doania	3	0.08	Overtopping due to wave action
71	South 24 Pgs		Dakshin Chandanpiri	Sundarika	1	0.04	Damage of Sluice Structure
72	South 24 Pgs		Mousuni (E)	Chenergang	7	0.35	Slip and subsidence due to erosion and wave action
73	South 24 Pgs		Baliara (E)	Chenergang	7	0.35	Slip and subsidence due to erosion and wave action
74	South 24 Pgs		Patibunia	Chenergang	3	0.25	Slip and subsidence due to erosion and wave action
75	South 24 Pgs		Rajnagar	Chenergang	2	0.13	Slip and subsidence due to erosion and wave action
76	South 24 Pgs	Kakdwip	Govindarampur	Banstala	1	0.03	Damage of Sluice Structure
77	South 24 Pgs		Kalinagar	Muriganga	1	0.03	Slip and subsidence due to erroson and wave action
78	South 24 Pgs		Ramtanunagar	Muriganga	2	0.27	Toe sausage exposed by toe erosion and subsidence.
79	South 24 Pgs		Madhusudanpur	Muriganga	1	0.10	Slip and subsidence due to erosion and wave action
80	South 24 Pgs		Iswaripur	Saptamukhi	1	0.12	Slip and subsidence due to erosion and wave action
81	South 24 Pgs	Sagar	Chemaguri (Shaugheri)	Confluence of Muriganga and Bay of Bengal	1	0.04	Overtopping due to wave action
82	South 24 Pgs		Gangasagar	_	1	0.05	Boundary wall of Sagar Bunglow adjacent to Metre Khal overturned during cyclone 'BULBUL'
83	South 24 Pgs		Bankimnagar	Muriganga	1	0.07	Overtopping due to wave action
84	South 24 Pgs		Mritunjaynagar	Muriganga	1	0.04	Slip and subsidence due to erosion and wave action
85	South 24 Pgs		Chemaguri	Satbanki Khal	2	_	***Damage of Sluice Structure***
86	South 24 Pgs		Ghoramara	Hooghly	2	0.85	Slip and subsidence due to erosion and wave action
87	South 24 Pgs		Ghoramara	Muriganga	1	0.30	Slip and subsidence due to erosion and wave action
88	South 24 Pgs		Spkhali	Hooghly	1	0.20	Slip and subsidence due to erosion and wave action
89	South 24 Pgs	Patharpratima	Dakshin Surendraganj	Jagaddal	1	0.12	Slips and subsidence
90	South 24 Pgs		Sitarampur	Jagaddal	1	0.49	Slips and subsidence
91	South 24 Pgs	Namkhana	Mousuni (E)	Chenergang	3	0.15	Slips and subsidence
92	South 24 Pgs		Patibunia	Chenergang	3	0.25	Slips and subsidence
93	South 24 Pgs		Dwariknagar	Hatania-Doania	3	0.17	Overtopping due to wave action
94	South 24 Pgs		Haripur	Saptamukhi	1	0.10	Damage of Sluice Structure
95	South 24 Pgs		Laxmipurabad	Bay of Bengal	1	0.03	Slip and subsidence

Sl. No.	District	Block	Affected Mouza	River / Sea	No. of spots affected	Length of damaged embankment (Km)	Nature of damages (Subsidence due to wave action / failure due to over topping)
96	South 24 Pgs		Namkhana	Hatania Dowania	2	_	***Damage of Sluice Structure***
				District Sub Total:	***163***	***15.90***	***KM***
1	North 24 Pgs	Haroa	Khatra under Gopalpur II G.P	Sealdah Gong Main Channel	4	0.20	Subsidence due to wave action
2	North 24 Pgs	Minakhan	Chapali Charpara	KK1 (Branch Canal of SMC)	1	0.03	Subsidence due to wave action
3	North 24 Pgs	Minakhan	Chapali Adibasipara	Sealdah Gong Main Channel	1	0.05	Subsidence due to wave action
4	North 24 Pgs		Tehata -Chalpur	Nonagong	6	0.30	Subsidence due to wave action
5	North 24 Pgs		Kalikapur -Chalpur	Nonagong	2	0.70	Subsidence due to wave action
6	North 24 Pgs		Tehata	Nonagong	1	0.05	Subsidence due to wave action
7	North 24 Pgs	Deganga	Ghosalabad	Nonagong	2	0.20	Subsidence due to wave action
8	North 24 Pgs	Hingalgaunj	Samsernagar, Malekanghumti, Charalkhali, Jogesganj, Kumirmari, Bainara, Kakaria, Mamudpur, Dakshin Bispur, Dharamberia, Chhoto Sahebkhali, Sahebkhali	Dansa, Goureshwar, Kalindi, Ray Mongal	12	0.71	Slip & Subsidence
9	North 24 Pgs	Sandeshkhali - 1	Nityaberia, Kalinagar, Ghoshpur, Ghatihata, Bouniabad	Ghatihara, Benti, Dansa, Bidyadhari	5	0.86	Slip & Subsidence
10	North 24 Pgs	Sandeshkhali - 2	Sitilia, Tangtala, Atapur, Monipur, Tushkhali, Gabberia, Jotishpur, Sukhduani, Jeliakhali, Korakati	Sahebkhali, Dansa, Baro Kalagachhi, Roy Mongal, Chhoto Kalagachhi, Bani Boalia, Bidya, Bali, Hatakhali, Tushkhali	10	1.61	Slip & Subsidence
11	North 24 Pgs	Hansnabad	Chak Patli , Laskarnagar , Parbhabanipur , Surkuniabad , Abad Mohanpur	Dansa , Katakhali	5	0.32	Slip & Subsidence
12	North 24 Pgs	Minakha	Kokilapur	Buri	1	0.20	Slip & Subsidence
13	North 24 Pgs	Basirhat - I	Basirhat Dockghat , taparchar , Balirghat Chowro , Akherpur Primary School , Dhamdhami More , Itinda Old Burning Ghat	Ichamati	6	0.71	Slip & Subsidence
14	North 24 Pgs	Basirhat - II	Deepmedia	Ichamati	1	0.09	Slip & Subsidence
15	North 24 Pgs	Taki Municipality	Taki Dangatala, Taki Jhawtala, Taki Kalitala, Taki Sahidpur	Ichamati	4	0.30	Slip & Subsidence

Sl. No.	District	Block	Affected Mouza	River / Sea	No. of spots affected	Length of damaged embankment (Km)	Nature of damages (Subsidence due to wave action / failure due to over topping)
16	North 24 Pgs	Baduria	Kulia , Puro , Fatullapur	Ichamati	3	0.25	Slip & Subsidence
17	North 24 Pgs	Swarupnagar	Banglani	Ichamati	1	0.14	Slip & Subsidence
				District Sub Total:	***65***	***6.71***	***KM***
1	Purba Medinipur	Moyna	Haridaspur, Paramanandapur, Chandipur, Jaigirchak, Chak Chandi, Purusattampur,Narangadighi, Manuakhali, Bhuina khali	Chandia, New Cossye	16	0.67	Subsidence
2	Purba Medinipur	Panskura	Gotpota, Aror, Zardoi, Garhpurusattampur, Radhaballavchak	New Cossye, Kherai, Buxi	13	2.46	Subsidence, Damage of inspection path
3	Purba Medinipur	Kolaghat	Paikpari, Amalhanda	Rupnarayan, Kharichak Khal	4	0.13	Subsidence
4	Purba Medinipur	Sahid Matangini	Gobra, Jamitya	Gobra Khal	3	0.08	Subsidence
5	Purba Medinipur	Nandakumar	Mirpur	Rupnarayan	1	0.05	Subsidence
6	Purba Medinipur	Mahishadal	Bar Amritberia, Amritberia, Terapara Jalpai, Natsal	Rupnarayan, Garughata Khal, Bholsora Khal, Madhyaduniya	5	0.17	Subsidence
7	Purba Medinipur	Ramnagar-I	Chandpur, Digha Township	Sea (Bay of Bengal)	5	1.67	Subsidence due to wave action
8	Purba Medinipur	Deshapran	Dariapur	Sea (Bay of Bengal)	1	0.10	Subsidence & displacement of boulder
9	Purba Medinipur	Khejuri-II	Boga	Rasulpur River	1	0.40	Bank failure due to sever wave action
10	Purba Medinipur	Khejuri-II	Panchuria	Hoogly River	1	1.00	Bank failure due to sever wave action. Main embankment in danger.
				District Sub Total	***50***	***6.72***	***KM***
Total length of Damages on account of Cyclone 'Bulbul' in three districts:						***29.32***	***KM***

Annexure XI-C: Flood Damege Report during Flood Season 2019

SL. No.	*Name of River*	*District / Block / PS*	*Location of Damage (GP / Village / Mouza)*	*Nature and extent of Damages*					*Inundated / Water logged Area (Sq. Km.)*
				Breach (m)	*Slip / Subsidence / Erosion (m)*	*Protective works (m)*	*Sluices / Bridge / Culverts etc. (Nos.)*	*Cost of Damages (Lakhs)*	
			PURBA BARDHAMAN						
1	Ajoy River	Purba Bardhaman Block & P.S.- Mongalkote	Paligram/Kathal bagan/Majkhara	N.A	160.00	N.A	N.A	25.00	N.A
2	River Bhagirathi	Dist.- Purba Bardhaman / Block- Katwa-II / P.S.- Katwa	Char Kobirajpur, G.P.-Agradwip, Mouza- Kobirajpur	N.A	400.00	N.A	N.A	60.00	N.A
3			Agradwip D/S of Ghoshpara, G.P.-Agradwip, Village & Mouza-Agradwip	N.A	100.00	N.A	N.A	45.00	N.A
4	River Bhagirathi	Dist.- Purba Bardhaman / Block-Purbasthali-II / P.S.- Purbasthali	Jhaudanga Bhramandipara, G.P.- Jhaudanga, Mouza- Jhaudanga	N.A	200.00	N.A	N.A	40.00	N.A
5			Patuli Mahajanpatti & Jhaudanga ferryghat Patuli	N.A	200.00	N.A	N.A	45.00	N.A
6			Dakshin Jhoudanga, G.P.- Jhaudanga, Mouza- Jhaudanga	N.A	200.00	N.A	N.A	40.00	N.A
7			Dampal, G.P.- Patuli, Village & Mouza- Dampal	N.A	150.00	N.A	N.A	35.00	N.A
8			Chatni, G.P.- Nimdoho, Mouza- Chatni	N.A	150.00	N.A	N.A	25.00	N.A
9			Tamaghata Burning Ghat, G.P.-Majida, Village & Mouza-Tamaghata	N.A	100.00	N.A	N.A	25.00	N.A
10			Tamaghata D/S of Primary School, G.P.-Majida, Village & Mouza-Tamaghata	N.A	100.00	N.A	N.A	25.00	N.A
11			Tamaghata Village, G.P.-Majida, Village & Mouza-Tamaghata	N.A	150.00	N.A	N.A	35.00	N.A
12			Char Kamalnagar U/S of Roypara, G.P.-Majida, Village & Mouza-Kamalnagar	N.A	100.00	N.A	N.A	15.00	N.A
13			Char Kamalnagar near school, G.P.-Majida, Village & Mouza-Kamalnagar	N.A	100.00	N.A	N.A	10.00	N.A
14			Kuturia near Padmabil, G.P.-Mertala, Mouza- Kuturia	N.A	100.00	N.A	N.A	25.00	N.A
15		Dist.- Purba Bardhaman / Block-Purbasthali-I / P.S.- Nadanghat	Dangapara, G.P.- Nasaratpur, Mouza- Nasaratpur	N.A	300.00	N.A	N.A	50.00	N.A
			BANKURA						
1	Damodar	Dist. Bankura, Block & P.s. Barjora	G.P. Barjora, Vill Pallyshree Mouza Paharpur	N.A	300.00	N.A	N.A	60.00	N.A

SL. No.	Name of River	District / Block / PS	Location of Damage (GP / Village / Mouza)	Nature and extent of Damages					Inundated / Water logged Area (Sq. Km.)
				Breach (m)	Slip / Subsidence / Erosion (m)	Protective works (m)	Sluices / Bridge / Culverts etc. (Nos.)	Cost of Damages (Lakhs)	
				HOOGHLY					
1	Damodar River	Hooghly / Tarakeswar / Tarakeswar	Binogram / Binogram South Durga Temple / Binogram	Nil	85.00	Nil	Nil	4.85	0.05
2		Hooghly / Jangipara / Jangipara	Rajbalhat-I/Rahimpur Trinoyoni Ashram / Rahimpur /Rahimpur	Nil	78.00	Nil	Nil	4.72	0.05
3	Mundeswari River	Hooghly / Pursurah / Pursurah	Kadipur Grave / Srirampur / Kadipur / Kadipur	Nil	Nil	18.00	Nil	44.65	0.02
4	Damodar River	Hooghly / Dhaniakhali / Dhaniakhali	Gopinathpur/Chaitanyabati, Nishindapur and Habibpur / Chaitanyabati, Nishindapur and Habibpur.	Nil	1600.00	Nil	Nil	4.82	0.06
5		Hooghly / Tarakeswar / Tarakeswar	Santoshpur/Santoshpur and Teghori / Santoshpur and Teghori.	Nil	1550.00	Nil	Nil	4.78	0.06
6		Hooghly / Jangipara / Jangipara	Rajbalhat-I/Jhanda Janapara / Jhanda	Nil	30.00	Nil	Nil	4.63	0.03
7		Hooghly / Tarakeswar / Tarakeswar	Champadanga/ Sahachowk and Shibchowk / Sahachowk and Shibchowk.	Nil	1500.00	Nil	Nil	4.76	0.06
8		Hooghly / Pursurah / Pursurah	Pursurah-I/ Baikunthapur and Alti/ Baikunthapur and Alti.	Nil	1600.00	Nil	Nil	4.93	0.05
				MURSHIDABAD					
1	Bhagirathi	Murshidabad / Bhawagobangola	Orahar				1	19.00	
2			Mahamadpur Pirtala		22.50			20.00	
3		Murshidabad / Lalgola	Basumati		70.00			45.00	
4			Basumati Burning Ghat		210.00			98.00	
5		Murshidabad / M-J	Jiaganj Hattpara		100.00			87.00	
6			Mathor prar		130.00			39.00	
7			Tikiya para		16.50			20.80	
8			Bhimaswar		21.40			20.80	

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				Breach (m)	Slip / Subsidence / Erosion (m)	Protective works (m)	Sluices / Bridge / Culverts etc. (Nos.)	Cost of Damages (Lakhs)	
9		Murshidabad /Beldanga-I	Kumarpur		24.60			20.90	
10		Murshidabad / Berhampore	Prot truss		22.70			20.80	
11		Murshidabad / Beldanga-II	Ramanagar Ferry Ghat		25.00			23.00	
12			Katain Kana		25.00			22.00	
13			Gouripur		36.00			22.90	
14	Babla	Murshidabad /Beldanga-II	Mia banhd		31.00			20.80	
15	Uttrason	Murshidabad /Beldanga-II	Majlishpur		16.00			20.90	
16	Babla	Murshidabad /Beldanga-II	Nabagarm		76.00			22.80	
17	Bhagirathi	Murshidabad /Beldanga-II	Alikpur		28.00			22.90	
18			ChrerDanga		100.00			85.00	
19	Brahmani	Murshidabad/ Khargram /Khagram	Jhilli/Titidanga, Jadavpur, Bhuskul	100	175.00			188.00	5.00
20	Mayurakshi	Murshidabad/ Bharatpur-I /Bharatpur	Guandaria / Jakhni		170.00			21.00	4.00
21			Jajan / Harischandrapur, Bindarpur		60.00			26.00	
22	Kuya	Murshidabad/ Kandi/Kandi	Hizole / Orashergher, Sabitrinagar		50.00			35.00	
23	Bele	Murshidabad/ Kandi/Kandi	Hizole / Uttar Bundh		60.00			31.00	
24	Brahamani	MSD/ Nabagram/ Nabagram	GP- Hazbibidanga, Rasulpur/ Mouza- Kutubpur, Rasulpur			150.00		95.00	
25	Dwarka	MSD/ Nabagram/ Nabagram	GP- Raulpur /Mouza- Sodhpur, Jhulanpur, Kumarsanda, Gabarhati			100.00		65.00	
26	Bhairab	MSD / Block- Berhampore, M-J, Domkol, Hariharpara	GP- Dangapara, Chaighuri, Madanpur, Dharampur, Bhagirathpur /Mouza- Dangapara, Kaladanga, Madanpur, Dharampur, Sarsabad, Berhampur, Shibnagar			220.00		90.00	

SL. No.	Name of River	District / Block / PS	Location of Damage (GP / Village / Mouza)	Nature and extent of Damages					Inundated / Water logged Area (Sq. Km.)
				Breach (m)	Slip / Subsidence / Erosion (m)	Protective works (m)	Sluices / Bridge / Culverts etc. (Nos.)	Cost of Damages (Lakhs)	
27	Jalangi	MSD/ Nawda	GP- Bali-1,Jitpur/ Mouza- Jitpur, Shyamnagar			290.00		25.00	
28	Suti	MSD/ Nawda	GP- Bali-II,Bali-I/Mouza- Shyamnagar			110.00		10.00	
29	Ganga	Murshidabad/ Farakka /Farakka	Parsujapur		100.00	0.00		150.00	2.50
30			Brahmangram		50.00	0.00		75.00	
31			Porapara		250.00	0.00		325.00	
32			Arjunpur-Khodabandapur		0.00	100.00		130.00	
33			Sankopara		0.00	200.00		295.00	
34			Mahespur		0.00	150.00		220.00	
35			Narayan Mondal Para-Sayedalipara		200.00	0.00		300.00	
36			Meghnathmondalpara		0.00	400.00		475.00	
37			Khaspara		100.00	0.00		140.00	
38		Murshidabad/ Dhuliyan Municipality/ Samserganj	Downstream of S1 Spur		50.00	0.00		75.00	0.00
39			Downstream of N2 Spur (Mahaldarpara)		50.00	0.00		130.00	
40			Dhuliyan Ghat		0.00	250.00		380.00	
41		Murshidabad/ Samserganj/ Samserganj	Dhusuripara		0.00	110.00		162.00	0.00
42			Kamalpur		0.00	400.00		510.00	
43			Nimtita		0.00	160.00		240.00	

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				Breach (m)	Slip / Subsidence / Erosion (m)	Protective works (m)	Sluices / Bridge / Culverts etc. (Nos.)	Cost of Damages (Lakhs)	
44	Ganga	Murshidabad/ Suti-I/Suti	Nurpur		210.00	0.00		305.00	0.00
45		Murshidabad/ Suti-II/Suti	Bajitpur		0.00	125.00		185.00	0.00
46			Shyampur-Hasanpur MSK		0.00	170.00		235.00	
47		Murshidabad/ Lalgola/ Lalgola	Sekhalipur		0.00	200.00		295.00	0.20
48			Kantakhali		0.00	450.00		475.00	
49		Murshidabad/ Raghunathganj-II/ Raghunathganj	Chandpur		0.00	250.00		275.00	0.00
50			Narukhaki		310.00	0.00		368.00	
51			Boltala		150.00	0.00		125.00	
52		Murshidabad /Bhagwangola-II	Krishnapur						5.00
53			Majhchar						
54			Mahishmara						
55			Munsarpur						
56			Paikmara						
57		Murshidabad /Raninagar-II	Bamnabad		150.00			225.00	5.50
58			Char Rajanagar		100.00			150.00	
59			Char Munsipara						
60			Borderpara		275.00			550.00	
61			Sarkarpara						

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				Breach (m)	Slip / Subsidence / Erosion (m)	Protective works (m)	Sluices / Bridge / Culverts etc. (Nos.)	Cost of Damages (Lakhs)	
62	Ganga/ Padma	Murshidabad / Jalangi	Arazipara						24.50
63			Muradpur		70.00			105.00	
64			Ghoshpara		80.00			140.00	
65			Farazipara						
66			Taltali						
67			Raipara						
68			Jalangi						
69			Jaykrishnapur						
70			Debnathpara						
71			Dayarampur						
72			Suryanagar						
73			Singhapara						
74			Sahebagar						
75			Char Kakmari		250.00			500.00	
76			Khasmahal		195.00			390.00	
NADIA									
1	Bhagirathi	Nadia/Kaliganj/ Kaliganj	Juranpur		150.00			90.00	
2		Nadia/Kalyani/ Chakdaha	Sarati		150.00			85.00	

SL. No.	Name of River	District / Block / PS	Location of Damage (GP / Village / Mouza)	Nature and extent of Damages					Inundated / Water logged Area (Sq. Km.)
				Breach (m)	Slip / Subsidence / Erosion (m)	Protective works (m)	Sluices / Bridge / Culverts etc. (Nos.)	Cost of Damages (Lakhs)	
3		Nadia/Nabadwip/ Nabadwip	Mahisura		180.00			90.00	
4	Bhagirathi	Nadia/Santipur/ Santipur	24 No. Ward Santipur Municipality		150.00			95.00	
5		Nadia/Santipur/ Santipur	Belgoria II		70.00			105.00	
6		Nadia/ Nakashipara/ Nakashipara	Dharmada		120.00			180.00	
7		Nadia/Santipur/ Santipur	Haripur		200.00			300.00	
8		Nadia/ Chakdaha / Chakdaha	Chanduria-I			100.00		300.00	

MALDA

1	Fulahar	Malda/H.C. Pur-II/H.C.Pur	Bhaluka	NIL	600.00	NIL	NIL	173.00	NIL
2			Bhaluka/Fatepur	NIL	127.00	NIL	NIL	40.00	NII
3			Daulatnagar/Ramayanpur/ Miaghat	NIL	975.00	NIL	NIL	400.00	NII
4			Daulatnagar/Khidirpur/ Daulatnagar	NIL	NIL	80.00	NIL	30.00	NII
5		Malda/Ratua-I/ Ratua	Baharal,Kahala	NIL	2000.00	NIL	NIL	200.00	NIL
6			Kahala,Debipur/Surjapur	330.00	950.00	NIL	NIL	2500.00	10.00
7			Debipur/Bazitpur	NIL	600.00	NIL	NIL	48.00	NII
8		Malda/H.C. Pur-II/H.C.Pur	Bhaluka/Parbhaluka/ Bhaluka	NIL	1500.00	NIL	NIL	600.00	NII
9		Malda/Ratua-I/ Ratua	Debipur/Bazitpur	NIL	NIL	500.00	NIL	400.00	NII
10	Mora Mahananda	Malda/Ratua-II/Pukuria	Maharajpur/ Sultanganj	NIL	750.00	NIL	NIL	300.00	Nil
11	Mahananda	Malda/Ratua-II/ Pukuria	Chator/Sripur-II/	NIL	500.00	NIL	NIL	230.00	NII
12			Uttar Maharajpur/Maharajpur	NIL	350.00	NIL	NIL	150.00	NII

SL. No.	Name of River	District / Block / PS	Location of Damage (GP / Village / Mouza)	Nature and extent of Damages					Inundated / Water logged Area (Sq. Km.)
				Breach (m)	Slip / Subsidence / Erosion (m)	Protective works (m)	Sluices / Bridge / Culverts etc. (Nos.)	Cost of Damages (Lakhs)	
			JALPAIGURI						
1	Teesta	Jalpaiguri/Sadar	Boalmari-Nandanpur, Kadobari, Mandalghat, Gorikone, Balapara, Sukanta Nagar, Vivekananda Pally		Apron launched, severe rain cuts occurred and sausage work damaged	900.00		174.00	
2	Panga		Raninagar BSF Camp, Pradhanpara, Malkani		Apron launched, pitching damaged	150.00		12.00	
3	Jamuna		Haruadanga, Kharija Berubari-II, Nagar berubari, Dhologram, Sarkarpara		Apron launched, pitching damaged	75.00		15.00	
4	Karala		Jelepara, Jalpaiguri Town		Severe rain cuts, Apron & pitching damaged	150.00		32.00	
5	Karatowa	Jalpaiguri/ Rajganj	9 no colony, Sahebpara, Sitaguri		Sausage apron damaged	100.00		10.00	
6	Teesta		Milanpally, Chumukdanga, Takimari,		Apron & pitching damaged	300.00		55.00	
7	Jaldhaka	Jalpaiguri/ Maynaguri	Dharaikuri, Baxidanga, Amguri		Apron & pitching damaged	250.00		54.00	
8	Jarda		Maynaguri town, Mahakalpara		Severe rain cuts, Apron & pitching damaged	80.00		34.00	
9	Teesta		Dharampur, Bakali, Padamoti-I, Basusuba, Barnish,		Apron & pitching damaged	250.00		155.00	
10	Dharala		Charerpar		Bank erosion	30.00		10.00	
11	Jaldhaka	Jalpaiguri/ Dhupguri	Godheyarkuthi, Dambari, Betgara		Apron launched, pitching damaged	450.00		40.00	
12	Diana		Kalabari, Chengmari		Apron launched, pitching & deflector damaged	150.00		20.00	
13	Reti Sukriti		Angrabhasa, Chamurchi forest line		Severe rain cuts, Apron & pitching damaged	30.00		15.00	
14	Gilandi		Betgara		Damage of embankment & deflector	30.00		10.00	
15	Dudua		Purba Mallik para, Balasundar		Apron launched, pitching damaged	200.00		20.00	
16	Umesh Khal (Hatinala)		Banarhat		Slip & subsidence	4000.00		35.00	8.00

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				Breach (m)	Slip / Subsidence / Erosion (m)	Protective works (m)	Sluices / Bridge / Culverts etc. (Nos.)	Cost of Damages (Lakhs)	
17	Jaldhaka	Jalpaiguri/ Nagrakata	Bamandanga, Majhiali,		Apron launched, pitching damaged	150.00		65.00	
18	Diana		Kherkata, Majhiali, sulkapara		Embankment erosion, deflector damage	800.00		65.00	
19	Kuchi Daina		Ghasmari		Embankment erosion, deflector damage	150.00		14.48	
20	Kurti Jhora		Nagrakata Market		Severe rain cuts, Apron & pitching damaged	180.00		13.42	
21	Gathiya		Chattandu,		Erosion of BP work	30.00		25.00	
22	Teesta	Jalpaiguri/ Malbazar	Chengmari, Premganj		Apron launched, pitching damaged	950.00		115.00	
23	Dharala		Uttar Matiali, Panditpara, Daburipara, Saripakuri		Apron launched, deflector damaged	60.00		20.00	
24	Gheesh		Oodlabari		Apron launched, deflector damaged	150.00		15.00	
25	Chel		Manabari, Khudirampally, Sailyjote, Mech basty		Apron launched, pitching & deflector damaged	150.00		25.00	
26	Leesh		Bagrakote, Doba basti		Apron launched, pitching & deflector damaged	170.00		35.00	
27	Layti		OOdlabari		Apron launched, pitching & deflector damaged	30.00		8.00	
28	Mal		Malbazar		Apron launched, pitching & deflector damaged	50.00		18.00	
29	Neora		Uttarjhar Matiali, Lataguri, Dakshin Kantadighi, Mathachulka, Boguladhura		Severe rain cuts, Apron & pitching damaged	150.00		45.00	
30	Khulnai		Uttar Khalpara,		Apron launched, pitching damaged	200.00		17.00	
COOCHBEHAR (under JID)									
1	Teesta		Ooran BSF camp, Hemant BSF camp, Drona BSF camp		Bank erosion, apron launched, bed bar damaged	600.00		44.00	

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				Breach (m)	Slip / Subsidence / Erosion (m)	Protective works (m)	Sluices / Bridge / Culverts etc. (Nos.)	Cost of Damages (Lakhs)	
2	Jaldhaka	Coochbehar/ Mekhliganj	Ranir hat, Basuniapara, Ucchalpukhuri		Severe rain cuts, Apron & pitching damaged	100.00		50.00	
3	Dharala		BSF camp Changrabandha		Bank erosion, apron launched, bed bar damaged	75.00		10.00	
4	Jaldhaka	Coochbehar/ Mathabhanga-I	Balsighat, Kedarhat		Severe rain cuts, Apron & pitching damaged	100.00		10.00	
5	Teesta	Coochbehar/ Haldibari	Bibiganj, Jharsingheswar, Barun BSF camp, Burigram		Apron launched, pitching & deflector damaged	650.00		51.00	
			COOCHBEHAR (under CID)						
1	Kaljani	Dist.-CoochBehar Block- CoochBehar-II P.S. Kotwali	G.P.- marichbari			100.00		5.00	...
2			G.P.- Ambari			200.00		5.25	...
3						150.00		4.90	...
4						100.00		8.00	...
5		Dist.-CoochBehar Block- Tufanganj P.S. Tufanganj	G.P.- Natabari			100.00		10.00	...
6						170.00		4.00	...
7			G.P.- Deocharai			150.00		4.50	...
8			G.P.- maruganj			150.00		4.40	...
9			G.P.- Salmara			120.00		5.50	...
10			G.P.- Balorampur-I			130.00		6.75	...
11	Baniadaha	Dist.-CoochBehar Block- Dinhata-I P.S. Dinhata-I	G.P.- Kismat Dasgra.			100.00		5.25	...
12		Dist.-CoochBehar Block- Dinhata-II P.S. Dinhata-II	G.P.- Gobrachara Nayarhat			900.00		3.75	...
13	Ghargharia	Dist.-CoochBehar Block- Tufanganj P.S. Tufanganj	G.P.-maruganj			200.00		5.00	...

SL. No.	Name of River	District / Block / PS	Location of Damage (GP / Village / Mouza)	Nature and extent of Damages					Inundated / Water logged Area (Sq. Km.)
				Breach (m)	Slip / Subsidence / Erosion (m)	Protective works (m)	Sluices / Bridge / Culverts etc. (Nos.)	Cost of Damages (Lakhs)	
14	Torsa	Dist.-CoochBehar Block-CoochBehar-I P.S. Kotwali	G.P.- Dwaraguri			600.00		7.50	...
15			G.P.- Guriahati			110.00		8.00	...
16			G.P.- Daraguri			500.00		15.00	...
17			G.P.- Daraguri			150.00		10.00	...
18	Ghargharia	Dist.-CoochBehar Block-CoochBehar-I P.S. Kotwali	G.P.- Daraguri			100.00		8.00	...
19			G.P.- Daraguri			100.00		5.00	...
20			G.P.- maruganj			150.00		5.00	...
21	Mara Torsa	Dist.-CoochBehar Block-CoochBehar-I P.S. Kotwali	G.P.- Guriahati			150.00		5.00	...
22	Mansai (R/B)	Sitai	Morebhanga B.P. work on R/B of river mansai, G.P. Adabari, Block & P.S.: Sitai			180.00		8.00	...
23			Baro Bangla B.P. work on R/B of river mansai, Block & P.S. Sitai			70.00		5.00	...
24		MTB-I	Armoured Tikonia e.bank.ent on the R/B of river mansai, Block : mtb-I, P.S. mathabhanga			250.00		9.51	...
25	Dharala (L/B)	MTB-I	Bochagari embank.ent on the L/B of river Dharala, Block : mtb-I, P.S. mathabhanga			70.00		4.75	...
26	Jaldhaka (R/B)		Joreshi.uli .agur.ari B.P. work on the R/B of river Jaldhaka, Block : .tb-I, P.S. Mathabhanga			150.00		8.00	...
27			Uttar Daibhangi B.P. work (old) on the R/B of river Jaldhaka, Block : .tb-I, P.S. Mathabhanga			50.00		8.50	...
28	Jaldhaka (L/B)	MTB-II	Supr No. 1 of Daribosh-Fulbari embankment on the L/B of river Jaldhaka, Block -mtb-II, P.S. Ghoksadanga			50.00		5.00	...
29	Sutunga (L/B)	MTB-I	U/S South Bhanga.ore B.P. work on the L/B of river Sutunga, Block : mtb-I, P.S. .athabhanga			250.00		11.50	...
30	Dudua (L/B)	MTB-II	Shingijani B.P. work on the L/B of river Dudua, Block-MTB-II, P.S. Ghoksadanga			150.00		10.00	...
31	Mujnai (R/B)		Paschi. .ukuldanga B.P. work on the R/B of river mujnai, Block-mtb-II, P.S.: Ghoksadanga			60.00		6.00	...

SL. No.	Name of River	District / Block / PS	Location of Damage (GP / Village / Mouza)	Nature and extent of Damages					Inundated / Water logged Area (Sq. Km.)
				Breach (m)	Slip / Subsidence / Erosion (m)	Protective works (m)	Sluices / Bridge / Culverts etc. (Nos.)	Cost of Damages (Lakhs)	
32	Mansai	Cooch Behar/ Cooch Behar-I/ Kotwali	Chhederjhar Sibpur B.P work			300.00		44.00	...
33	Torsa	Cooch Behar/ Cooch Behar-II/ Kotwali	Nose Portion of Spur No-4 of Ichamari Champaguri			70.00		18.43	...
34			Cooch Behar T.P E.bank.ent			593.00		29.17	...
35	Mansai	Cooch Behar/ Mathabhanga-II/ Nishiganj	Dewanboss Embankment			150.00		15.39	...
36		Cooch Behar/ Mathabhanga-II/ Goksadanga	Nyanadi E.bank.ent			65.00		4.97	...
37			Paradubi Spur			70.00		4.84	...
38		Cooch Behar/ Cooch Behar-I/ Kotwali	Bairati E.bank.ent			70.00		4.98	...
39			U/S of Bairati E.bank.ent			72.00		4.98	...
40	Torsa	Cooch Behar/ Cooch Behar-II/ Pundibari	Spur No 2 of Hanskhowa Embankment			70.00		15.00	...
41			Tritiyakhanda Sal.ara B.P work			200.00		11.67	...
42	Char Torsa	Cooch Behar/ .athabhanga-II/ Goksadanga	Velacopa B.P work			160.00		6.70	...
43	Singimari	Cooch Behar/ Dinhata-I/ Dinhata	Chat Barobangala B.P work			270.00		20.64	...
44	Kaljani	Dist-Cooch Behar, Block-Tufanganj-I, P.S-Tufanganj	Bhuchungamari E.bank.ent, G.P- Natabari-I, Village- Bhuchungamari.			175.00		47.70	...
45			NH-31 ROAD Bridge, G.P- Natabari-I, Village- Natabari.			183.00		47.10	...
46	Raidak-I	Dist-Cooch Behar, Block-Boxirhat, P.S-Tufanganj	Madhya Begarkhata, G.P- Nakkati Gachh-I, Village- Begarkhata.			150.00		25.73	...
47	Gadadhar	Dist-Cooch Behar, Block-Tufanganj-I, P.S-Tufanganj	.adhya Dhadial, G.P- Nakkati Gachh-I, Village- Dhadial.			120.00		15.00	...
48	Raidak-I	Dist-Cooch Behar, Block-Tufanganj-I, P.S-Tufanganj	Sarakerpar, G.P- Balabhut-I, Village- Sarakerpar.			220.00		18.30	...

SL. No.	Name of River	District / Block / PS	Location of Damage (GP / Village / Mouza)	Nature and extent of Damages					Inundated / Water logged Area (Sq. Km.)
				Breach (m)	Slip / Subsidence / Erosion (m)	Protective works (m)	Sluices / Bridge / Culverts etc. (Nos.)	Cost of Damages (Lakhs)	
49	Gadadhar	Dist-Cooch Behar, Block-Tufanganj-I, P.S-Tufanganj	Krishnapur B.P.work, G.P- Deocharai, Village- Krishnapur.			150.00		19.98	...
50			Saheb Bari ghat B.P.work, G.P-Natabari-II			150.00		16.98	...
51	Kaljani	Dist-Cooch Behar, Block-Natabari, P.S-Tufanganj	Jhaljhali B.P. work,G.P- Deocharai			700.00		35.00	...
52	Raidak-I	Dist-Cooch Behar, Block-Tufanganj-I, P.S-Tufanganj	Dwiperpar B.P. work, G.P- Nakkati Gachh			170.00		15.00	...
53	Kaljani	Dist-Cooch Behar, Block-Tufanganj-I, P.S-Tufanganj	Balabhut embankment			450.00		12.00	...
54	Raidak-I	Dist-Cooch Behar, Block-Tufanganj-I, P.S-Tufanganj	Begarkhata B.P. work			250.00		19.98	...
55			Tufanganj College Embankment, G.P- Andarranfulbari.			400.00		12.00	...
56			Guriarpar Embankment, G.P- Dholpol -I,			110.00		8.00	...
57			Chikliguri B.P.work, G.P-Dholpol-I			300.00		7.00	...
58	Gadadhar	Dist-Cooch Behar, Block-Tufanganj-I, P.S-Tufanganj	Gadadhar Embankment, G.P-Chilakhana-II,and Dholpol			300.00		10.00	...
59	Raidak-I	Dist-Cooch Behar, Block-Tufanganj-I, P.S-Tufanganj	Banshraja B.P.work, G.P- Salbari-I,			220.00		9.00	...
60			Dholpol embankment, G.P- Dholpol-I			130.00		10.00	...
61	Kaljani	Dist-Cooch Behar, Block-Tufanganj-I, P.S-Tufanganj	Jaigir Chilakhana B.P. work, G.P- Chilakhana-I,			100.00		12.00	...
62			Deocharai embankment, G.P-Deocharai			300.00		20.00	...
63			Dhopguri Ukilerchhara embankment, G.P- Natabari-I			250.00		12.00	...
64			Bhairabertary embankment, G.P- Deochari			120.00		15.00	...
65			Amlaguri Bhelapeta B.P. work, G.P- Chilakhana-i			150.00		20.00	...
66	Raidak-II	Dist-Cooch Behar, Block-Tufanganj-Ii, P.S-Tufanganj	Fershabari B.P.work, G.P-Mahiskuchi-I			200.00		14.00	...

SL. No.	Name of River	District / Block / PS	Location of Damage (GP / Village / Mouza)	Nature and extent of Damages					Inundated / Water logged Area (Sq. Km.)
				Breach (m)	Slip / Subsidence / Erosion (m)	Protective works (m)	Sluices / Bridge / Culverts etc. (Nos.)	Cost of Damages (Lakhs)	
			BIRBHUM						
1	Brahmani	District-Birbhum Block-Nalhati-I P.S.-Nalhati	Vill-Raninagar G.P.-Barala	50.00				30.00	20.00
2		District-Birbhum Block-Nalhati-II P.S.-Nalhati	Vill-Balarampur G.P.-Shitalgram	30.00				15.00	12.00
3		P.S. Nalhati Block-Nalhati-I District-Birbhum	G.P.- Kalitha Vill-Nischintapur Mouza-Barla		120.00			25.00	NIL
4		P.S. Nalhati Block-Nalhati-II District-Birbhum	G.P.- Shitalgram Vill-Raipur Mouza-Raipur		120.00			20.00	NIL
5			G.P.- Shitalgram Vill-Balarampur Mouza-Kundapara	30.00				14.26	12.00
6	Bansloi	P.S. Muraroi Block-Muraroi-I District-Birbhum	G.P.- Mohurapur Vill-Ratanpur Mouza-Ratanpur		400.00			50.00	NIL
7			G.P.- Palsha Vill-Kahinagar Mouza-Kahinagar		500.00			60.00	NIL
8			G.P.- Palsha Vill-Balia Mouza-Bade Balia	50.00				3.00	2.00
9			G.P.- Gorsha Vill-Notun Abdullahpur Mouza-Abdullahpur		75.00			8.00	NIL
10			G.P.- Paisa Vill-Palsa Kali Mondir Mouza-Palsa	180.00				5.00	5.00
11	Brahmani	P.S. Nalhati Block-Nalhati-1 District-Birbhum	G.P.- Barla Vill- Raninagar Mouza-Raninagar,Makrampur						
12			G.P.- Barala Vill- Kanupur Mouza-Kanupur		90.00			8.00	
13		P.S. Margram Block-Rampurhat-II District-Birbhum	G.P.- Dunigram Vill-Gopalpur Mouza-Purba Gopalpur		120.00			13.00	0.00
14			G.P.- Dunigram Vill-Titidanga Mouza-Purba Gopalpur		70.00			8.00	
15			G.P.- Dunigram Vill-Balsa Mouza-Balsa		50.00			6.00	0.00
			Total	***770.00***	***24229.70***	***29521.00***	***1.00***	***18518.50***	***116.07***

Annexure XII

CENTRAL FLOOD CONTROL ROOM & NODAL OFFICERS OF I. & W. DEPARTMENT

Sl. No.	DISTRICT	STATION / PLACE	CONTACT DETAILS OF NODAL / COORDINATING OFFICERS	TELEPHONE NUMBERS OFFICE
1	KOLKATA	Central Flood Control Room (CFCR), Gr. Floor, Jalasampad Bhawan, Salt Lake City, Kolkata	Director, Advance Planning, Project Evaluation & Monitoring Cell (APPEMC)	(033) 2337-0281 FAX: (033) 2337-0287
			24-Hours Toll Free Help Line : 1800-345-0117	
			Land Line No. : 033-2321-8341 FAX No. : 033-2321-5604	
			Cell Phone Number: 89008-90603 & 94325-84007	
			E-mail ID : cfcriwdwb@gmail.com Web Site : www.wbiwd.gov.in	
		Different Pumping Stations (Kolkata Municipal Areas)	Executive Engineer, Mechanical Electrical Division	(033) 2321 5609
			Executive Engineer, Metropolitan Drainage Mechanical Division	(033) 2334 5768

DISTRICT FLOOD CONTROL ROOMS & NODAL OFFICERS OF I. & W. DEPARTMENT

Sl. No.	DISTRICT	STATION / PLACE	CONTACT DETAILS OF NODAL / COORDINATING OFFICERS	TELEPHONE NUMBERS OFFICE
2	Jalpaiguri	Flood Control Cell, North Bengal, Jalpaiguri	Executive Engineer, Jalpaiguri Irrigation Division, Club Road, Jalpaiguri.	(03561) 230249 Control Room (03561) 230153 FAX: (03561) 230786 Toll Free Help Line (1800-345-3255)
3	North 24-Parganas	Basirhat	Executive Engineer, Basirhat Irrigation Division, Dhaltitha, Basirhat	(03217) 265-258
		Barasat	Executive Engineer, Bidyadhari Drainage Division, Taki Road, Barasat	(033) 2562-4520 FAX: 2562-4520
4	South 24-Paganas	Joynagar	Executive Engineer, Joynagar Irrigation Division, Joynagar	(033) 2433-2887
		Kakdwip	Executive Engineer, Kakdwip Irrigation Division, Kakdwip	(03210) 255122
5	Howrah	Uluberia	Executive Engineer I, Lower Damodar Construction Division	(033) 2661 0311
			Executive Engineer II, Lower Damodar Construction Division	(033) 2661 0090
6	Hooghly	Singur	Executive Engineer I, Lower Damodar Irrigation Division, Singur	(033) 2630-0170
			Executive Engineer II, Lower Damodar Irrigation Division, Singur	(033) 2630-2260
7	Purba Bardhaman	Burdwan	Executive Engineer I, Damodar Canal Division, Burdwan	(0342) 2662496 FAX: (0342) 2550166 Control Room (0342) 2645672)
			Executive Engineer II, Damodar Canal Division, Burdwan	
8	Paschim Bardhaman	Durgapur	Executive Engineer, Damodar Head Works Division, Durgapur	(0343) 2555640 (0343) 2002012 (Barrage)
		Asansol	Executive Engineer, Asansol Irrigation Division, Asansol	New Office
9	Bankura	Bankura	Executive Engineer, Bankura Irrigation Division, Bankura	(03242) 254934
		Khatra	Executive Engineer, Kangsabati Canal Divn.No.II, Khatra	(03243) 255236

Sl. No.	DISTRICT	STATION / PLACE	CONTACT DETAILS OF NODAL / COORDINATING OFFICERS	TELEPHONE NUMBERS
				OFFICE
10	Purulia	Purulia	Executive Engineer, Purulia Irrigation Division, Purulia	03252-222407
11	Jhargram	Jhargram	Executive Engineer, Jhargram Flood Management & Planning Division, Jhargram	New Office
12	Paschim Medinipur	Midnapore	Executive Engineer, West Medinipur Division, Midnapore	(03222) 275373
13	Purba Medinipur	Tamluk	Executive Engneer, East Medinipur Division, Tamluk	(03228) 266889
		Contai	Executive Engineer, Contai Irrigation Division, Contai	(03220) 255162 FAX: (03220) 256436
14	Birbhum	Suri	Executive Engineer, Mayurakshi Hd. Qtrs. Division, Suri	03462-255229
		Bolpur	Executive Engineer, Mayurakshi South Canals Division, Shyambati, Bolpur	03463-262256
		Rampurhat	Executive Engineer, Mayurakshi North Canals Division, Rampurhat	03461-255039
15	Nadia	Krishnanagar	Executive Engineer, Nadia Irrigation Division, Krishnanagar	03472-252451
16	Murshidabad	Berhampore	Executive Engineer, Berhampore Irrigation Division, Berhampore	03482-250645
17	Malda	Malda	Executive Engineeer, Malda Irrigation Division, Green Park, Malda.	03512-252395 FAX: 03512-254350 Control Room: (03512-253939)
18	Uttar Dinajpur	Raigunj	Executive Engineer, North Dinajpur Irrigation Division	03523-252008
19	Dakshin Dinajpur	Balurghat	Executive Engineer, South Dinajpur Irrigation Division	03522-255113
20	Darjeeling	Siliguri	Executive Engineer, Siliguri Irrigation Division, Mahanandapara, Siliguri	0353-2431842
21	Coochbehar	Coochbehar	Executive Engineer, Coochbehar Irrigation Division, Coochbehar	03582-228305 Control Room (03582) 229114
22	Alipurduar	Alipurduar	Executive Engineer, Alipurduar Irrigation Division, Alipurduar	03564-255305 Control Room (03564) 274198
23	Jalpaiguri (Teesta Barrage Project)	Gajoldoba	Teesta Barrage Control Room	9064161095
		Fulbari	Mahananda Barrage Control Room	(03532) 005612

INDEX MAP OF FLOOD AFFECTED AREAS (2000-2017) IN WEST BENGAL