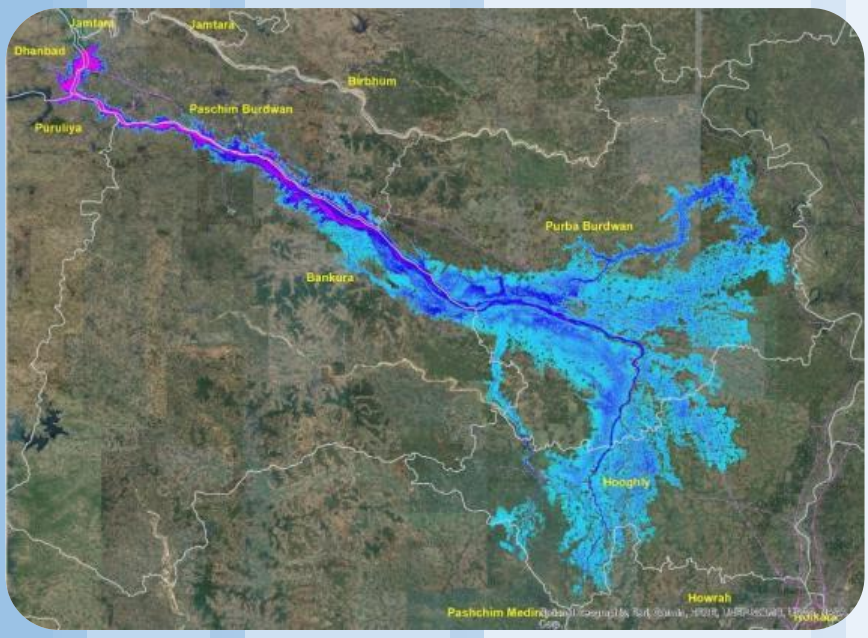
MAITHON DAM



Tier I - Emergency Action Plan for Maithon Dam, JH05HH0008

Doc. No. EAP-I/DVC/Maithon/1.3

Prepared by:
Dam Safety, DVC, Maithon

DAMODAR VALLEY CORPORATION
May - 2024

~~~ MAITHON DAM ~~~

Project ID Code: JH05HH0008
Dhanbad, Jharkhand

This is the 2nd revised publication of the Emergency Action Plan for Maithon Dam.

DISCLAIMER

This is a Tier I EAP document of Maithon Dam prepared based on Dam Break Analysis carried out using the Digital Elevation Model (DEM) with a horizontal resolution of approximately 30 meters (1 arc-sec). Every effort has been taken to estimate the severity of flooding and inundation areas likely to be affected by the Maithon Dam in emergency conditions. These estimates are based on available primary and secondary GIS data. Efforts have been made to foresee various emergency possibilities and develop appropriate notification procedures for timely rescue and relief operations. Because of the methods, procedures, assumptions used to determine the flooded areas, the limits of flooding shown, and the flood wave travel times are approximate and should be used only as a guideline for establishing evacuation zones. Areas inundated in an actual event will depend on actual failure conditions and may differ from areas shown on the maps.

For any information, please contact:

Shri Anjani Kumar Dubey

Executive Director (Civil) & HoP, DVC, Maithon
Damodar Valley Corporation (DVC),
P.O.: Maithon - 828 207, Distt: Dhanbad (Jharkhand)
Mob: +91-9431122635, Off. No.: 06540-27-9402
E-mail: anjani.dubey@dvc.gov.in

Emergency Action Plan
Maithon Dam
JH05HH0008
Damodar Valley Corporation

TABLE OF CONTENTS

List of Annexures

List of Notifications

Maithon Dam

Project ID Code: JH05HH0008

EAP Distribution List

A copy of the EAP has been distributed to the following people.

Authority	Name, Title, Phone	Address
Dam Owner(s)	Shri A. K. Dubey Executive Director (Civil), Maithon Mob: 9431122635, 06540-27-9402 anjani.dubey@dvc.gov.in, akdubey1965@gmail.com	Office of the Executive Director (Civil), DVC Maithon.
	Shri Sanjeet Kumar Sinha Sr. General Manager (C), Water Resources Mob: 9431034049 / 8877499956 sanjeet.sinha@dvc.gov.in	Office of the Executive Director (Civil), DVC Maithon.
	Shri R R Sharma Sr.General Manager (Hydel) & HOP, Panchet Mob: 8918528839, rabiranjan.sharma@dvc.gov.in	Office of the Sr. Manager (Hydel), DVC, Panchet
	Shri Sanjay Kumar DGM (Mech), Maithon Hydel Station, Mob:9748975012 Sanjay.kumar@dvc.gov.in	O/o the General Manager (Hydel), DVC, Maithon
	Shri Roshan Lakra DGM C), Dam & Colony Mob: 8016219334 roshan.lakra@dvc.gov.in	Office of the Executive Director (Civil), DVC Maithon.
	Shri Lomas Kumar, Sr. Manager (Civil) & I/c Circle II, Maithon 7004705508, lomas.kumar@dvc.gov.in,	O/o the Circle II, DVC, Maithon
	Shri Prakash Kumar Manager (Civil) Mob: 6200165884, prakashkumar@dvc.gov.in, prakashbitdbg@gmail.com	Office of the Maithon Dam Division, DVC, Maithon
	Shri Rabindra Kumar Nayak Manager (M), Maithon Hydel Station Mob: 9905712902 rabindra.nayak @dvc.gov.in	O/o the General Manager (Hydel), DVC, Maithon
Dam Owner(s) Representatives	Shri Manik Pandey Dy. GM (C), Water Resources & E&P Mob: 7980727394 manik.panday@dvc.gov.in	Office of the General Manager (Civil), DVC, Maithon.
	Name: Smt. Nag Sudha Kumari Sr. Manager (Civil) & MRO Mob: 8002614342 nag.kumari@dvc.ggov.in	
Dam Safety Organization	Shri Sanjeet Kumar Sinha Sr General Manager (C), Water Management Mob: 9431034049 / 8877499956 sanjeet.sinha@dvc.gov.in	Office of the Sr. General Manager (Civil), DVC, Maithon

Authority	Name, Title, Phone	Address
	Shri Ram Krishna Sr. Manager (C), Dam Safety Mob: 9430511155 ram.krishn@dvc.gov.in	
	Shri. Abhishek Shukla Manager (C), Dam Safety Mob: 8986663966 Email: abhishek.shukla@dvc.gov.in	
	Shri Aloke Banerjee Dy. Manager (C), Dam Safety Mob:9002533400 aloke.banerjee@dvc.gov.in	
	Shri Dipak Kumar, Manager (Civil), Konar Dam Safety, DVC, Konar Mob. No. – 9835872020 E-mail -dipak.kumar@dvc.gov.in	
	Md Akbar Ali Azam (Civil), Asst. Manager, DVC, Panchet Mob. No. – 8210312107 E-mail -dipak.kumar@dvc.gov.in	
Central Water Commission, Dam Safety Organization	Shri Rakesh Kashyap Chief Engineer, CDSO Mob 8826612840 Off.No.: 011-26106848 cedams@nic.in	8th Floor(N), Sewa Bhavan, RK Puram, New Delhi - 110066
	Shri Rakesh Kashyap Chief Engineer, CDSO Mob 8826612840 Off.No.: 011-26106848 cedams@nic.in	
DVRRC	Shri P. M. Scott Member (RM), CWC, & Chairman, DVRRC Phone 9436165176 / 6001096942 / +91-11-2086 1749, mrm@nic.in	2nd Floor (South), Sewa Bhawan, R K Puram, New Delhi 110066
	Shri Sashi Rakesh Director, CWC, & Member Secretary, DVRRC Contact: 9711999234 / 8368738494 / 06540-279812, sehocmaithon-cwc@nic.in	CWC Office, Maithon, Dhanbad – 828207
Downstream & Adjacent Projects	Shri Ravi Ranjan Sharma Sr. GM (M) & HOP, DVC, Panchet Mob: 9064350228 Email ;- rabiranjan.sharma@dvc.gov.in	Office of the HoP, Panchet Hydel Power Station, DVC, Panchet, Dhanbad - 828206
	Shri Nasim Ansari, Sr.Manager (Civil) & I/c Circle-I, Panchet. 9572824249, 7004926076 nasim.ansari@dvc.gov.in	Circle-I, Administrative Building, DVC, Panchet, Dhanbad - 828206
	Shri Sanjoy Majumdar, Dy. Manager, Damodar Headworks Division, Durgapur Barrage Contact: 9083973938, damodarheadworksdivision@gmail.com	Irrigation & Waterways Directorate, Govt. of West Bengal, DVC New Colony, Durgapur, Paschim Bardhaman – 713202.

Authority	Name, Title, Phone	Address
National Disaster Management Authority	Shri Kamal Kishore Member Secretary Contact: +91-11-26701701,704, 740 Control Room: - 9868891801/ 9868101885, 011-26701728, 011-1078, secretary@ndma.gov.in kkishore@ndma.gov.in	NDMA Bhawan, A-1, Safdarjung Enclave, New Delhi – 110 029
National Disaster Response Force	Shri Atul Karwal, IPS Director General, NDRF Contact: 011-23438020 011-23438119 dg.ndrf@nic.in , hq.ndrf@nic.in	Directorate General, NDRF6th Floor, NDCC-II Building, Jai Singh Road, New Delhi-110001
	Shri Gurminder Singh, Commandant 2nd BN NDRF Contact: 033-25875032, 09474061104, 09474116775 wb02-ndrf@nic.in	2nd BN NDRF, Near RRI Camp. Haringhata, Mohanpur, Nadia, (West Bengal) Pin - 741246
Jharkhand State Disaster Management Authority	Shri. Sukhdev Singh Chief Secretary Govt. of Jharkhand Contact: 0651-2400240 sec-home-jhr@nic.in	TA Division Building Near Dhurwa, Ranchi-834004
	Shri Amitabh Kaushal Secretary, Department of Home, Jail & Disaster Management, Jharkhand Contact: 0651-2400218, cs-jharkhand@nic.in	
West Bengal State Disaster Management Authority	Shri Dushyant Nariala, IAS Principal Secretary 033-2214 3674 (Nabanna), 033-2334 2226 (Bikash Bhawan) secrelief@wb.gov.in, ps.dmd-wb@nic.in	Nabanna, HRBC Building, Room No. 202, 2nd Floor, 325 Sarat Chatterjee Road, Howrah - 711102
	Smt.Priyanka Singla,IAS, Special Secretary 033-2214-1938/033-2250-1004 ssen9441@gmail.com	Nabanna, HRBC Room No. 204, 2nd Floor, 325 S C Road, Howrah -711102
	Shri Sanjib Chaki Director of Disaster Management 033-2227 5820/2264-2296 /2265-0765 /0795, directordmwb@yahoo.com	Tran Bhawan,87 A, S. N. Banerjee Road, Kolkata, West Bengal 700014
District Authority, Dhanbad	Shri Varun Ranjan Deputy Commissioner, Dhanbad mob no;- **947119160**1 Residence Phone 0326-2312601 Office Phone 0326-2312401 Fax 0326-2312602 Email ;- dc-dha[at]nic[dot]in	Station Road, Pandey Muhalla, Dhanbad, Jharkhand-826001
	Shri Hardeep P Janardhana Senior Superintendent of Police, Dhanbad 9431120900, sp-dhanbad@jhpolice.gov.in	NH 32, near General Post Office, Kasturba Nagar, Dhanbad, Jharkhand 826001
	Shri Sanjay Kumar Jha, DDMO, Dhanbad 9312156998, ddmadhanbad@gmail.com	Office of the Deputy Commissioner, Dhanbad Jharkhand-826001
District Authority, Purulia	Shri Rajat Nanda District Magistrate, Purulia 03252 222302(O) / 03252 222301, 9434001122 (R) / 8373068601(M) dm-pur-wb@nic.in, dmpuruliawb @gmail.com	District Magistrate & Collector, Purulia., Purulia, West Bengal 723101

Authority	Name, Title, Phone	Address
	Shri Avijit Banerjee Superintendent of Police, Purulia 03252 222304 /9147888744 sppla7@gmail.com, puruliasp@gmail.com	Office of The Superintendent of Police, Purulia, Police Office More, West Bengal, 723101
	Shri Manoj Bandopadhyay, DDMO, Purulia 9432579742 / 7003165648 / 7872488802, ddmopurulia@gmail.com	O/o the District Magistrate & Collector, Purulia., Purulia, West Bengal 723101
District Authority, Bankura	Shri Siyad N, IAS District Magistrate, Bankura Contact No: 03242-250304(O) / 03242-250303 (R) / 9475900047 (M), dm-bank@nic.in	Administrative Building, Bankura Collectorate, Bankura, West Bengal 722101
	Shri Vaibhav Tiwari Superintendent of Police, Bankura 03242 250305/ 250306, spbankura@gmail.com	Office of the Superintendent of Police, Bankura, West Bengal 722101
	Shri Prasenjit Sengupta DDMO, Bankura 9475900087, dmd.bankura@gmail.com	Administrative Building, Bankura Collectorate, Bankura, West Bengal 722101
District Authority, Paschim Bardhaman	Shri Ponnambalam S. , IAS District Magistrate, Paschim Bardhaman 0341-2554545(O) dmpaschimbardhaman@gmail.com	District Magistrate Office, Kanyapur, Asansol, West Bengal 713305
	Shri Laxmi Narayan Meena Superintendent of Police, Paschim Bardhaman (Asansol Durgapur Police Commissionerate), 0341-2257260, cp@asansoldurgapurpolice.in	Asansol Durgapur Police Commissionerate, 5, Evelyn Lodge, GT Rd, Kumarpur, Asansol, West Bengal 713304
	Shri Abhijit Sarkar DDMO, Paschim Bardhaman Contact: 9830077994, ddmopashimbdn@gmail.com	O/o the District Magistrate, Kanyapur, Asansol, West Bengal - 713305
District Authority, Purba Bardhaman	Shri PURNENDU KUMAR MAJI, WBCS (Exe) District Magistrate, Purba Bardhaman Contact: 0342-2662428(O), 0342-2625700/2625702(R) / 9734750500 (M) Email: dm-burd@nic.in	Office of the District Magistrate, Collectorate Building, Burdwan, Pin-713101
	Shri Kamanasish Sen Superintendent of Police, Purba Bardhaman 0342 26 62956 (O) / 24400 (R), crbbwm@gmail.com	Kachahris Road, Badamtala, Kalibazar, Bardhaman, West Bengal 713101
	Shri Bamapada Kundu, DDMO, Purba Bardhaman Contact: 9434005678 / 9073936749 / 7980911141, ddmo.burdwan@gmail.com	Office of the District Magistrate, Collectorate Building, Burdwan, Pin-713101
District Authority, Howrah	Dr. (Ms.) P. Deepap Priya , IAS District Magistrate, Howrah 033 -26412961(O), dm-how-wb@nic.in	District Magistrate Office New Collectorate Building, Howrah, West Bengal -711101
	Ms Swati Bhangalia Superintendent of Police, Howrah 033 2661 6210 / 033 2653 8088 dcrbrural@gmail.com	Superintendent of Police. Howrah Rural District. Paniarah, NH-6, PO-Biki Hakola. PS-Panchla, PIN-711322
	Shri Bandana Guha, DDMO, Howrah 9830193381, ddmo.howrah@gmail.com	District Magistrate Office New Collectorate Building, Howrah, West Bengal -711101

Authority	Name, Title, Phone	Address
District Authority, Hooghly	Smt Mukta Arya , IAS District Magistrate, Hooghly Contact No: 033-26802044(O) / 033-2680 2040 (R) / 9831992000 (M) dm-hoog@nic.in, deohooghly2021@ gmail.com	District Magistrate Office, Hooghly, Chinsurah, West Bengal 712101
	Shri Kamanasish Sen, IPS Superintendent of Police, Hooghly 033 2661 6210 (O) / 033 2653 8088 (R) sphooghly-wb@nic.in	Netaji Subhash Rd, Ghatakpara, Chinsurah R S, Chinsurah, West Bengal 712101
	Shri Amiya Ranjan Mandal, DDMO, Hooghly Contact: 7439778596, ddmo.hooghly@gmail.com	District Magistrate Office Hooghly, Chinsurah, West Bengal 712101
District Authority, Paschim Medinipur	**Sri Khursheed Ali Qadri**, IAS District Magistrate, Paschim Medinipur, Contact No: 03222-275571(O) / 03222-275570(R) /9434750400 (M), Email: dmpmid@gmail.com	Office Of the District Magistrate Midnapore, West Bengal 721101
	Shri Dhritiman Sarkar, IPS Superintendent of Police, Paschim Medinipur 03222-275609, sppaschimmedinipur@gmail.com	Office of the Superintendent of Police, Paschim Medinipur, PO-Midnapore, Pin No. 721101
	Shri Sandip Biswas, DDMO, Paschim Medinipur, Contact: 9163460173 / 9073936736 / 8348691717 dmdpaschimmedinipur@gmail.com	Office Of the District Magistrate Midnapore, West Bengal 721101

Maithon Dam

Project ID Code: JH05HH0008

Log Sheet of Changes

The following changes have been made in the EAP, and revisions have been provided to the personnel(s) shown in the EAP distribution list:

Date	Change made	Signature
June' 2020	Revision in documentation based on input of CPMU, received in May 2020.	
Dec' 2022	Revision in Inundation Area owing to new information on Cross-sectional data of river downstream of Durgapur barrage. Revision in the distribution list and notification flow-chart. Incorporation of revised flood operation procedures.	
May-2024	Updation of distribution list, notification flowchart. Corrected contact addresses mentioned in the emergency action plan	

Maithon Dam

Project ID Code: JH05HH0008

Approval and Implementation

This Emergency Action Plan for Maithon Dam is hereby approved. This plan is effective immediately.

Signature

A K Dubey, Executive Director (Civil), DVC

_____ _____

Date

I have received a copy of this Emergency Action Plan. I will concur with the notification procedures.

Signature

_____ _____

[Name and Title of Person(s) in charge of Emergency Response] Date

Emergency Action Plan
MAITHON DAM
Project ID Code: JH05HH0008

1. Purpose

The purpose of this Emergency Action Plan (EAP) is to identify emergencies that can threaten the Maithon Dam, warn downstream residents of impending danger, and plan for an effective response to prevent dam failure. This plan defines the notification procedures to be followed in the event of a potentially hazardous situation. The procedures are intended to protect lives and prevent property damage from an excessive release of water from the dam spillways or an uncontrolled outflow of water from the breached portion of the dam.

2. Dam Description

2.1. General

Maithon Dam is owned and operated by Damodar Valley Corporation (DVC). It is located across the river Barakar, a tributary of river Damodar in Dhanbad District of Jharkhand State, approximately 25 km from Asansol and 40 km from Dhanbad. The nearest railhead is at Kumardhubi, and the nearest airport is Durgapur (at about 60 km). Construction of the dam was completed in the year 1957. The reservoir was constructed mainly for flood control in the downstream area and to reap the multi-purpose benefits.

A vicinity map showing the dam's location is presented in **Annexure - 1**. A general description of the dam, its spillways, and other features are outlined in the Dam Description in **Annexure - 2**. A general layout drawing and google earth image of the dam are shown below:

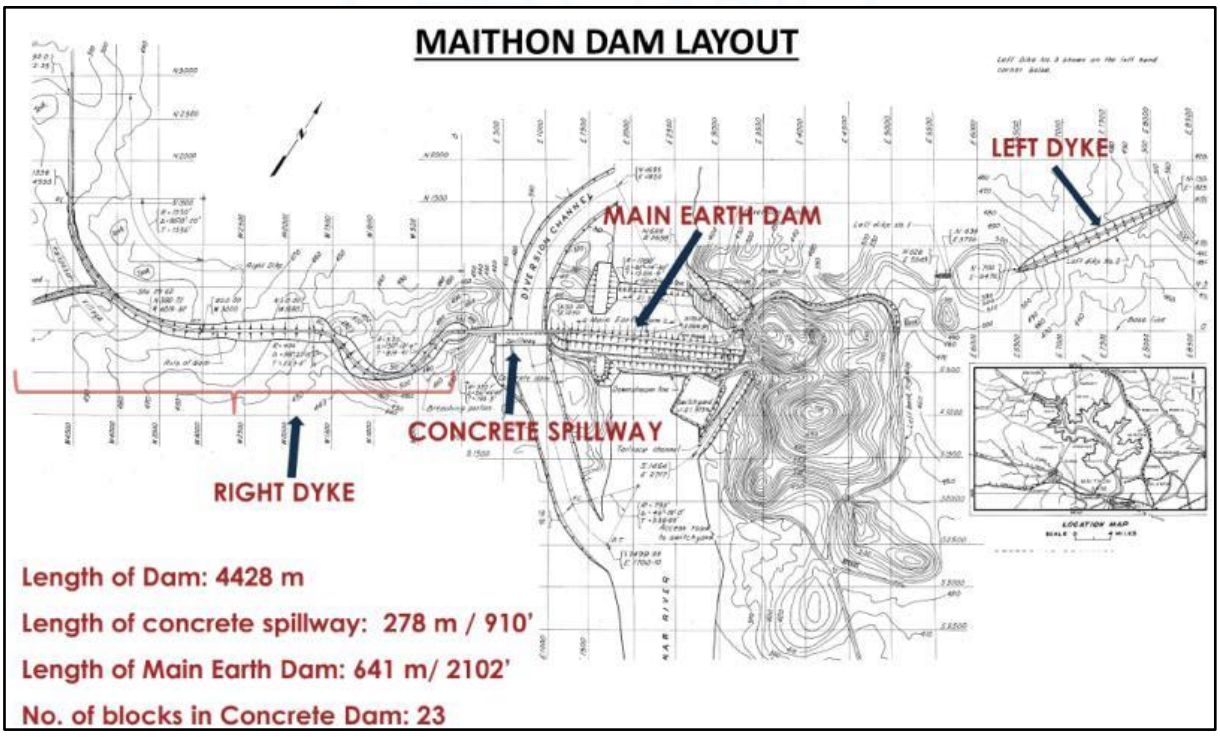


Fig. 1 General Layout of Maithon Dam

Fig. 2. Google Earth Image

2.2. Reservoir Operation

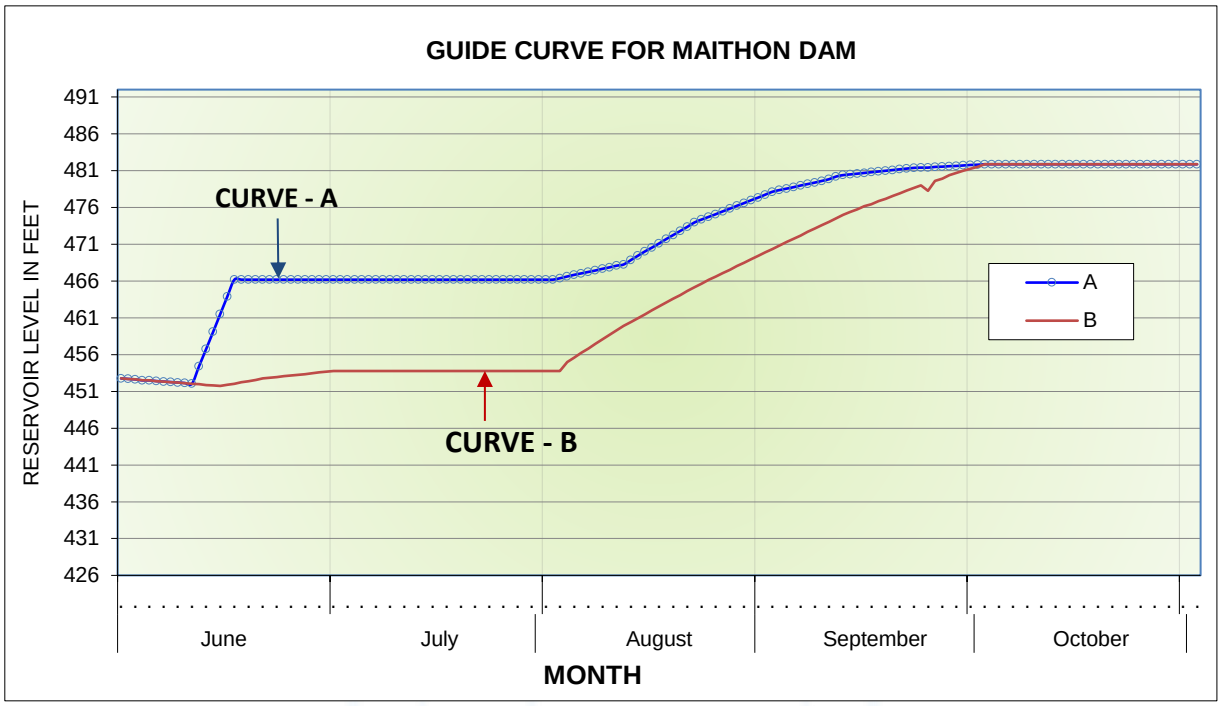
Reservoir Features:

Conservation level	=	R.L. 146.31 m (480.00 ft.)
Full Reservoir Level	=	R.L. 150.88 m (495.00 ft.)
Maximum Water Level	=	R.L. 152.4 m (500.00 ft.)
Revised Flood peak (PMF)	=	18,751 cumec (6.62 lac cusec)

For flood control in Maithon Dam, a pre-depletion plan is practised based on the likelihood probabilities of flood flows in the basin. This is achieved through a continuous rainfall data acquisition process from India Meteorological Department (IMD), DVC's & CWC's rain gauge network, and river gauge & discharge sites, for the entire monsoon period. The information leads to increased knowledge and accuracy during the decision-making process. The following inputs/information is used to support the reservoir operation**:**

a) A general weather bulletin over the Damodar Valley area issued by Regional Meteorological Centre, IMD, Kolkata, indicating monsoon trough, storm track, circulation etc., river sub-basin wise five days quantitative precipitation forecast, its intensity & distribution along with an outlook for subsequent two days. Also, the IMD issues a revised bulletin based on changed synoptic situations in the valley area.
b) Average rainfall calculated from daily/ 3-hourly rainfall records of several rain gauges and 3-hourly Runoff records from gauging stations in the upper catchment.
c) The releases from upstream reservoirs.
d) Guide Curves for the Maithon reservoir, shown in Fig 3, aim to create a cushion for flood absorption at the beginning of the monsoon season and fill up the reservoir by the end of the flood period.

Normal operation procedures for Maithon dam are well described in the **O&M manual of Maithon Dam**. As Maithon & Panchet dams have common downstream, combined operations of both reservoirs (normal as well as flood) are carried out. Flood management operations of the Maithon dam are provided in the below paragraph.



Where "Curve-A"** denotes the **Upper Operation Rule Curve** **and "Curve-B"** denotes the **Lower Operation Rule Curve

Fig. 3 Revised Guide Curve of Maithon Dam

2.3. Flood Management Operations

a) When the reservoir level rises or shows a tendency to rise above R.L. 481.857 ft (146.87 m) – as per the revised & approved guide curve (Fig .3), flood management operations shall commence and they may cease as soon as the reservoir level comes down to R.L. 481.857 ft (146.87 m).

b) From the past experience of reservoir operation, it has been gathered that on several occasions, when the reservoir level was well below the R.L. 481.857 ft (146.87 m), floods of varied magnitude had impinged in the reservoir. With the stipulations originally contained in the existing Regulation Manual, the flood releases could not be commenced until the reservoir level neared R.L. 481.857 ft (146.87 m), which at times led to higher flood releases as well as higher flood cushion occupation in the reservoirs. This is critical due to the restricted carrying capacity of the lower Damodar channel and the congestion in the lower valley. The following decision was taken to combat such situations in the 48th meeting of the Damodar Valley Reservoir Regulation Committee (DVRRC).

"*When the reservoir level rises or shows a tendency to rise above the permissible level of the upper Guide curve relevant to that date, flood control operations may be*

commenced. This shall cease as soon as the reservoir level falls to the relevant Guide curve elevation."

Keeping the spirit of the above decision in mind, the reservoirs, in such conditions, may be operated by the representative of CWC in consultation with the Members of DVRRC or their representatives. The prevailing and expected hydrometeorological conditions, congestion in the lower valley and the immediate requirement of water for various purposes shall be the critical factors to be considered while affecting the flood releases.

c) Prevailing and expected hydrometeorological conditions should also be considered while affecting flood control operations.

d) The operation of the Maithon reservoir shall always be made **in conjunction with the Panchet reservoir** and vice versa.

e) During flood management operations, **Manager(Hydel), Maithon, Manager(Hydel), Panchet and Dy. Manager (Reservoir Operation Control),** Maithon shall keep a very close watch on the situation and maintain close co-ordination amongst each other. The **MRO, DVC** shall keep close contact with the representative of the CWC.

f) When the reservoir level rises or shows a tendency to rise above R.L. 481.857 ft (146.87 m), the undersluices and/or crest gates should be opened to the required extent as considered necessary by the **Member-Secretary, DVRRC**, Maithon/ representative of CWC stationed at Maithon.

g) As prescribed in the **Memorandum on Flood Warning Services** (shared by DVC with all concerned officials and agencies before every Monsoon), necessary flood warnings shall be issued by the **General Manager (Hydel), DVC, Maithon,** before flood release.

h) Though no encroachment[1] is proposed into the un-acquired land at Maithon and Panchet reservoirs, in the event of a huge flood or the Emergency Schedule referred to in the Damodar Valley Reservoir Regulation Manual, encroachment into the un-acquired land will become unavoidable. **Member-Secretary, DVRRC, Maithon**/ representative of CWC stationed at Maithon will inform the **Chairman, DVC**, of the impending encroachment as soon as an emergency is foreseen. The **Chairman, DVC** will decide the extent of encroachment and arrange to intimate the State Government to issue flood warnings, etc. Suitable stations should be established on the periphery of the reservoirs for efficient transmission of flood warnings to the areas likely to be affected.

2.3.1. Emergency Level Determination

In view of the above points related to Flood Management Operations, emergency levels may be demarcated as follows and shall be followed in consultation with DVRRC:

[1] This is as per decision taken in the 20th meeting of DVRRC, vide para 3.0 of the summary records.

BLUE	Water level above the upper guide curve; High-intensity rainfall in the catchment area of reservoir; Forecast of heavy rain by IMD in next 3 days; possibility of large inflow to the reservoir; may need to open gates in an emergency
ORANGE	Water level is 1 m below FRL; Large inflow to reservoir; Controlled Release through Spillway
RED	Water level has crossed FRL; Large inflow to reservoir; Large Controlled Release through Spillway

3. Responsibilities

The dam owner, Damodar Valley Corporation, is responsible for all dam operations and maintenance. The responsibilities during emergency conditions are mentioned in the following section designating the person's roles & duties. However, this in no way restricts/limits other roles, responsibilities & duties of the concerned personnel.

3.1. Dam Owners' Responsibilities

Dam / Emergency Personnel	Responsibility (During Preparedness & Emergency Events)
Dam Site Engineers	**Preparedness Responsibilities:** - Monitoring & surveillance of dam and appurtenant structures, looking for evidence of distress as mentioned in Annexure - 4. - Conduct Pre and Post monsoon Inspections under the direction of the Emergency Planning Manager - Inform the Emergency Planning Manager about any irregular/unusual condition at the dam site and inform them about any progression/change. - Operate dam gates/undersluices under the express direction of the competent authority (General Manager / Dy. Chief Engi General Manager neer / Sr. Manager/ Dy. Manager). - Conduct routine dam maintenance. - Collect instrumentation measurements. - Ensure effective working conditions of the warning system (Sirens). - Participate in exercises for the test/improvement of this EAP. **During Emergency Responsibilities:** - Monitor the emergency event at the dam site and inform the Emergency Planning Manager about any changes or developments. - Contact the suppliers/contractors. - Supervise the work of the contractors engaged in the site for rehabilitation/remedial works. - Take up the remedial actions as per Action Data Sheets (**Annexure - 4**)

Dam / Emergency Personnel	Responsibility (During Preparedness & Emergency Events)
Emergency Planning Managers	**<u>Preparedness Responsibilities:</u>** - Coordinate routine inspections and Dam operations. - Ensure proper access to all vulnerable points for constant monitoring during emergencies. - Identify primary and secondary communication systems, both internal (between persons at the dam) and external (between dam personnel and outside entities). - Ensure the availability of adequate staff at the dam site during holidays, nights and round the clock on weekdays. - Ensure that the EAP is functional and staffs are familiar with their responsibilities. - Ensure that a signboard is installed and clearly viewed from different locations at the dam site and operation room, with the most common evidence of distress and corresponding levels of alert and remedial actions. - Ensure all the equipment/means at the dam site to respond to an emergency are easily accessible and well maintained (generators, vehicles, lanterns, radios, heavy equipment, etc.) - Ensure the installation and proper maintenance of a warning system (sirens, horns) in the critical areas within the floodplain (less than 2 hours of wave arrival time) - Ensure the currently approved version of the EAP is available to all relevant stakeholders (those who have a functional role in the emergency response) - Ensure all necessary means to manage the emergency response are available and operative in the Emergency Operation Centre. - Participate in exercises for the test/improvement of this EAP. **<u>During Emergency Responsibilities:</u>** - Ensure continuous and reliable communication with dam site officers - Receive and assess any distress condition as notified by site engineers, observers or regular inspection. - Classify the incident/distress condition reported by the observer into the different Emergency Levels (Blue, Orange, Red) based on **Annexure - 4** (Emergency Level Determination/Action Sheets). - If necessary, initiate/implement the Emergency Action Plan and the Emergency Operation Centre. - Provide updates on the situation to the District(s) Disaster Management Authority to assist them in making timely and accurate decisions regarding warnings and evacuations. - Propagate the emergency information to other relevant stakeholders. - Support the communication needs of local emergency authorities.

Dam / Emergency Personnel	Responsibility (During Preparedness & Emergency Events)
Dy. General Manager (Civil), Dams & Colony, DVC, Maithon	**Preparedness Responsibilities:** - Ensure an annual review of the EAP. - Coordinate the EAP's annual/regular testing events, such as tabletop exercises, mock drills, and stakeholder consultations. - Coordinate training events in problem detection, evaluation and appropriate corrective measures - Supervise the functioning of a control room and ensure it is well equipped with all types of information to facilitate the rescue and relief operations - Ensure proper access to the site at the earliest possible. - Ensure that all related machinery/equipment are in running condition and can be deployed as per requirement at the emergency site. - Formation of Purchase Committee / Committee in consultation with the competent authority to procure material from appropriate sources through spot purchase. **During Emergency Responsibilities:** - Provide decision support and technical support to Emergency Planning Manager as appropriate. - Advise the Emergency Planning Manager of the emergency level determination if time permits. - Disseminate information and make contact to utilize media as appropriate during an emergency on behalf of the General Manager (Civil).
SE(Civil) & MRO, DVC, Maithon	- Ensure effective transmission of hydro-metrological and stream flow data through different means. - Ensure the correctness of Gauge Discharge sites under his control every year well before monsoon. - Have a constant liaison with RMO, IMD, Kolkata during emergency periods related to flood events. - Have a constant liaison with Member Secretary, DVRRC, during emergency periods related to flood events and issue release advice which shall be strictly adhered to by the Dam Emergency Managers & Dam Site Engineers.
General Manager (Civil) & General Manager (Hydel)	**Preparedness Responsibilities:** - Assist the Dam Owner's officers in the preparation of Action Data Sheets **(Annexure - 4)** - Recommend specific actions to improve the readiness for emergency actions - Support and Monitor the remedial construction activities, special investigations, etc. - Depending upon the quantum of repair/reconstruction work, decide whether the work is to be executed through large construction firms or purely through the department or small contractors. - Undertake an engineering assessment of the safety hazard at the dam in collaboration with the Dam Safety Organization.

Dam / Emergency Personnel	Responsibility (During Preparedness & Emergency Events)
	During Emergency Responsibilities: - Advise the dam's Emergency Planning Manager/ Dy. General Managers with the emergency level determination, if time permits. - Advise the dam's Emergency Planning Manager/ Dy. General Managers with remedial actions to take if Blue/Orange events occur and if time permits. - Keep a close watch on the different activities being carried out by various agencies at the time of emergency

3.2. Dam Safety Organization Responsibility

DVC has established a unit called Dam Safety (DS) for each dam and a centralised Dam Safety Organization (DSO) at Maithon. Additionally, DSU (Dam Safety Unit) is established at each dam for daily monitoring of dams. The DSU / DSO is the first point of contact for BLUE alerts. Considering the integrated operation of Maithon & Panchet reservoirs as per the direction of DVRRC, DSO shall engage with DVRRC & SE(C) & MRO for any decisions related to emergency level determination and further actions. The following are the basic emergency planning roles and responsibilities for the Dam safety authorities (Local, Central and National levels):

- Dam Safety Organizations are responsible for undertaking an engineering assessment of the safety hazard at the dam.
- The General Manager (C), Dam Safety / Sr. Manager(C), Dam Safety may inspect the Dam at its discretion and inform the Emergency Planning Manager if the dam is considered to be at BLUE alert.
- The General Manager (C), Dam Safety / Sr. Manager(C), Dam Safety may advise the Dam Owner/Emergency Planning Manager to take remedial actions if BLUE/ORANGE events occur.
- The General Manager (C), Dam Safety / Sr. Manager(C), Dam Safety may have an active role in ORANGE/RED alert levels. The DSO may advise the Dam Owner/Emergency Planning Manager of the emergency level determination.
- The General Manager (C), Dam Safety / Sr. Manager(C), Dam Safety may be called on to be the Subject Matter Expert at the Emergency Operation/Response Centre.
- The General Manager (C), Dam Safety / Sr. Manager(C), Dam Safety is responsible for reviewing and accepting the Emergency Action Plan before its final publication.
- DVC Dam Safety Organization shall constitute a Dam Safety Review Panel consisting of engineers, geologist and hydrologist to analyse the distress conditions of the Dam periodically.
- Support for preparing asset management plans, emergency preparedness plans, emergency warning systems, flood plain mapping, preparation of flood inundation

maps in different areas for lower Damodar Valley and mitigation measures during impact downstream.

- The General Manager (C), Dam Safety / Sr. Manager(C), Dam Safety shall coordinate with National Dam Safety Authority on any aspect of Dam Safety.

3.3. Responsibilities for Notification

After an event level has been determined**,** appropriate notifications should be made following the corresponding notification Flow Chart provided in this EAP (**See Notification Flow Charts 1 & 2**). These Notification Flowcharts list the names and contact information and identify who will be notified of a dam safety incident, by whom, and in what order. Alternate contacts and their confirmed telephone number is also listed in case the primary contact is unavailable. Each official listed in the notification flowcharts should be familiar with it and immediately notify the Emergency Planning Manager in case of cessation of their functions within the organization.

Dam / Emergency Personnel	Responsibility during Emergency Events
Dam Site Engineers	- Keep informing the Emergency Planning Manager about the situation's progress at the dam site.
Emergency Planning Managers	- Notify the District Disaster Management authorities in case of an Orange/Red alert - Notify the District Authorities about any emergency response actions at the dam site and their impacts in the downstream area (e.g. large releases) - Assist the District Authorities involved in the emergency response actions with information about the condition at the dam site - For residences located immediately downstream of a dam that would be inundated within minutes of a dam failure and the available warning time is very limited, Emergency Planning Manager will arrange to notify the residents directly without waiting for the local administration to act.
Dy. General Manager (Civil), Dams & Colony, DVC, Maithon	- Notify Dam Safety Organization and request technical advice as per the requirement - Notify/inform higher authorities on the mishap as per the notification flow chart of particular alert level as per the situation at the site. - Notify/inform media representatives about the emergency. - Define emergencies for which each mode of communication will be utilized and include an example of a news release that would be the most effective for each possible emergency, avoiding disseminating false/overstated messages amongst the population.
District Collector(s)/ Magistrate / District Disaster Management Authority	- Implement the Notification Flow chart for regional and State Disaster Management Contacts - Contact Local Law Enforcement Authorities and Relief Authorities under their jurisdiction - Liaising and coordinating with Early Warning Agencies like IMD, CWC, NRSC, etc., for disaster-specific information and disseminating the

Dam / Emergency Personnel	Responsibility during Emergency Events
	information for coordinating with the State Govt. and facilitating the deployment of NDRF in the disaster-affected districts during disaster - Issue public announcements in coordination with Dam Owner's officials and media representatives about the status of the emergency event
Relief Authorities (Police Department, Civil Defense, Army Forces)	- Notify downstream residents in vulnerable areas - Provide to the District Disaster Management Authority precise and accurate feedback information about the progress of relief actions and advise when the emergency can be terminated - Notify their corresponding command of the necessity to deploy more resources to attend to the rescue and relief actions.
Media Representatives	- Disseminate wide public awareness during the emergency condition of the dam through social media platforms such as Facebook, Twitter, Whatsapp & Instagram, etc. - The news media, including radio, television and newspapers, should be utilized to the appropriate extent. - Pre-plan in coordination with **Dy. General Manager (Civil), Dam & Colony & SE, Circle II, DVC, Maithon** the most effective way to disseminate the most delicate and common emergency situations among the population. Pre-defined news shall be available to improve the readiness of the decision-making process

3.4. Responsibilities for Evacuation

Evacuation and relief actions are exclusive responsibilities of Districts Authorities and emergency response & relief forces at the local and state level. In case of a potential failure/emergency event at the Maithon Dam site, 8 districts would be directly affected. Therefore, evacuation/ relief actions are required to be taken up by each district's representative within their jurisdiction, as detailed under **Section 11**.

The Flood Hazard Reference Values suggesting Flood wave arrival time, evacuation route, shelter locations etc. **(Annexure –9)** and the Inundation cum Evacuation Map **(Annexure – 10)** shall be utilized for evacuation during specific conditions. As the maps, settlements, shelter locations etc., shown in the map have been finalized with the help of Satellite imagery, there may be chances of some leftover settlements, which also need to be evacuated. The Disaster Management Authorities/evacuation team shall utilize the information of Maximum Water Surface Elevation (against each settlement) as given in the Flood Hazard Reference Values cum Evacuation Table **(Annexure – 9)** for evacuating the marked settlements as well as leftover portions. The same information will help them identify/modify the shelter points. Any changes required to be incorporated in the shelter details or other details shall be shared with Dam Site Engineers, Emergency Planning Managers, or the office of General Manager (Civil), DVC, Maithon, for updating this document.

District's Disaster Management Authority is responsible for coordinating actions with the specialised teams/forces: Police and Fire Departments, National Disaster Management Authority / Response Force, Civil Defence, and Army.

Within their responsibilities are:

A. UNDER NO EMERGENCY (Preparedness)

- Participate in review, updates and exercises of the EAP
- Dissemination among the population, making them aware of the risk to their lives.
- Conduct training/education programs among the population regarding how to act before, during and after emergency events such as flash floods.

B. UNDER ORANGE ALERT

- Prepare emergency response personnel for possible evacuations that may be needed if a RED alert is declared.
- Provide resources as necessary to the dam owners.
- Served as the primary contact responsible for coordinating all emergency actions for potentially affected communities.
- Consider drafting a State of Local Emergency in preparation for the RED alert.
- Maintain close liaison with the district and the State Governments as well as the nearest units of Armed Forces/Central police organizations and other relevant Central Government organizations like Ministries of Communications, Water Resources, Health, Drinking Water, Surface Transport, who could supplement the efforts of the district administration in the rescue and relief operations
- Decide in coordination with the Emergency Planning Manager when to terminate the Emergency.

C. UNDER RED ALERT

- Initiate warnings and order evacuation of people under vulnerable areas as per inundation maps (**Annexure – 10**)
- Direct local emergency response services (may include local law enforcement) to evacuate people and close roads/crossings within the evacuation area (see local Evacuation Plan, **Annexure – 9 Table** and **Annexure – 10 maps**).
- Declare a State of Local Emergency if required.
- Provide resources as necessary to the dam owners.
- Decide in coordination with the Emergency Planning Manager when to terminate the Emergency.

Police Department(s) Responsibilities

- Warn the public about vulnerable areas in their jurisdiction as per inundation maps (**Annexure – 10**).
- Secure and control access to evacuated areas.
- Install barricades in the affected bridges and crossings as per **Annexure – 9 (**flood hazard values and evacuation plan**)** and **Annexure – 10**.

- Assist in conducting rescue and recovery operations as required.
- Ensure proper access to the emergency services
- Prioritize the vehicle movement to the emergency site
- Control the traffic and divert through alternative routes.
- Ensure no unauthorized persons entering into the emergency site.
- Permit with minimum delay the entry of authorized personnel and recognized outside agencies, vehicles etc., involved in the emergency operations that come to help.
- Any other responsibility as entrusted by the high officers.

Fire Department(s), Army & Navy Forces Responsibilities

- Assist in evacuation operations and initiate the evacuation of impact areas in cooperation with the Emergency Management Agency and Police Department.
- Request mutual aid for boats and initiate rescue of trapped residents as needed.
- Supply special equipment/teams to support rescue operations (e.g. Helicopters, divers, off-road and amphibious vehicles)

3.5. Responsibilities for Termination and Follow-up

- Once EAP operations have begun under BLUE, ORANGE or RED alert levels, the EAP operations must eventually be terminated and follow-up procedures completed. EAP operations can only be terminated after completing operations under **RED** or **BLUE** alert levels. If **ORANGE** Event Level is declared, the operations must be designated **RED** Event Level or **BLUE** before terminating the EAP operations.
- Please check the Action data Sheets (**Annexure – 4**) for further details on when to declare an emergency event terminated. The table below shows the primary responsibilities in the termination and follow-up process.

Dam / Emergency Personnel	Responsibilities (Termination & Follow-up)
Emergency Planning Manager	- Declare the termination of the emergency operations in coordination with the District Disaster Management Authority and Relief/Response Forces. - Conduct a review process of the EAP procedures. - Identify EAP procedures that were followed effectively and any ways that the EAP could be improved. - Identify the causes that could have triggered the emergency event and propose actions to improve readiness and early detection. Support from the Dam Safety Organization may be requested in this regard - For Major Emergencies, the Emergency Planning manager will maintain detailed records of costs expended and prepare a detailed report. (**See Section 9. Reports)**
Dy. General Manager, Dams & Colony /	- Ensure that all parties participating in the EAP activities are involved in the review process.

Dam / Emergency Personnel	Responsibilities (Termination & Follow-up)
General Manager (Civil) / General Manager (Hydel)	- Impose a time frame within which the EAP review is to be completed. - Propose any ways that the EAP could be improved. - Present the results of the EAP evaluation in a documented report to **the Chairman, Member Secretary & Member Technical, DVC.** - Ensure that there is no danger of the spread of any epidemics or waterborne diseases after the floods.
Dam Safety Organization (State / Central level)	- Identify in coordination with the Emergency Planning Manager the causes that could have triggered the emergency event and propose actions to improve readiness and early detection. A report should be presented to the dam owner's authorities.
District(s) - All districts - and National Disaster Management Authority	- Declare the termination of the emergency operations in coordination with the Emergency Planning Manager and Relief/Response Forces. - Identify EAP procedures that were followed effectively and any ways that the EAP could be improved.

4. COMMUNICATIONS NETWORKS

Every monsoon Hydraulic Data Division, DVC Maithon, sets up a communication network between gauging stations and the information control room at the Office of the Manager Reservoir Operations (MRO). Additionally, DVC issues **Flood Warning Memorandum** before every monsoon and shares the memorandum with all the concerned agencies and persons. The memorandum details the procedures for flood warning and flood release for DVC dams. Emergency Planning Managers shall coordinate with the established system of Flood Warning to disseminate information during an emergency through the local communication system, including Whatsapp groups. The communication network will notify local officials and downstream residents via cell phones, landlines, or emergency personnel (in person or using their radios). The various networks for emergency use include the networks of following:

- Office of the Manager Reservoir Operations, Maithon.
- Indian Meteorological Department, Kolkata.
- Central Water Commission Office at Maithon.
- All affected Districts' Police and Fire Departments.
- Jharkhand Disaster Management Authority.
- West Bengal Disaster Management Authority.
- Army/Navy Forces.

Sample public announcements in English, Hindi & Local Language (Bangla) is provided in **Annexure – 3** and internal suggested phone messages are also available in **Notification Flow Chart 1 & 2**. Verification or authentication of the situation can be made by contacting the Emergency Planning Manager and the corresponding district disaster management officials.

Television, Radio and bulk SMS facilities of the local Mobile Network Operators can be used as much as possible to notify area residents of the potential dangers.

As per notification responsibilities (**Section 3.3. Responsibilities for Notification**), public announcements are to be issued by the concerned District Disaster Management officials in coordination with media representatives.

5. Emergency Detection, Evaluation, and Classification

5.1. Emergency Detection

5.1.1. Situations

Many dam conditions can lead to emergencies, not all of which will necessitate the implementation of the EAP. However, if any of them occurs, the appropriate actions must be taken.

- **Severe Storms/Inclement Weather:** Although generally not a threat to the dam, severe storms and other inclement weather conditions can contribute to an existing problem and hinder remedial efforts. Severe storms also cause the uncontrolled release of floodwater and increase flow in already rain-swollen areas. Hence, judicious reservoir operations shall be done as per the release advice of the ***Member Secretary, DVRRC,*** to minimize the risk of making higher releases than originally planned.
- **Tropical cyclones:** Tropical cyclones do occur in the area, with the potential for structural damage to the dam, possibly resulting in its failure. If a tropical cyclone has struck the area, inspecting the dam for any signs of wear will be appropriate.
- **Earthquakes:** This Dam is in the Seismic Zone III. This zone is classified as a Moderate Damage Risk Zone which is liable to MSK VII. The IS code assigns a zone factor of 0.16 for Zone III. Therefore, an earthquake is possible, and appropriate post-earthquake inspections as per the ***Inspection Manual for Dam Field Engineers after Seismic Events for Maithon Dam*** should be performed.
- **Sabotage:** If a threat has been made to damage the dam, appropriate actions must be taken to protect the dam.

5.1.2. Signs of Failure

Dam Site Engineers are responsible for conducting routine inspections. **Dam Emergency Planning Managers** shall analyze the conditions that could indicate the onset of problems leading to a dam failure. The early identification of potentially dangerous situations can allow time to implement EAPs. It is crucial to understand how distress can develop into failure. With appropriate action, distress may not lead to a catastrophic failure of the dam. The following sections describe some different types of failure that could lead to a dam failure.

- **Seepage Failure:** Although all earthen embankments allow minor seepage through the dam or the foundation, excessive, uncontrolled seepage can result in piping

(the movement of embankment material in the seepage flow) and lead to failure. Piping can occur for years at a slow rate. If the piping has progressed to a dangerous level, it will be evident by increased flow or the discharge of muddy water (or both). At that stage, immediate action to stop the piping is needed. Fully developed piping is difficult to control and will likely result in dam failure.

A whirlpool in the reservoir is a sign of uncontrollable piping and necessitates immediate emergency action.

- **Embankment or Foundation Sliding:** Sliding is usually first apparent when cracks or bulges in the embankment appear. Slides with progressive movement can cause the failure of the embankment.
- **Structural Failure:** The structural failure or collapse of any non-overflow portion of the dam, spillway or spillway gates could result in loss of the reservoir. A structural failure of a portion of the spillway could cause piping and possibly embankment failure.
- **Overtopping Failure:** Overtopping of the embankment results in erosion of the dam crest. Once erosion begins, it is very difficult to stop.

5.2. Emergency Evaluation and Classification

This section lists the conditions and actions that may be used to classify the level of emergency response as a guide for ***Emergency Planning Managers***. Specific dam observations and corresponding emergency classification levels can be found in the Evidence of Distress table in **Annexure - 4.**

Internal Alert Condition BLUE– A "**Watch Condition**". A problem has been detected at the dam that requires constant monitoring. At this time, the distress condition is manageable by dam personnel. The ***Dam Site Engineers*** will be responsible for monitoring and repairing as soon as possible and notify ***Dam Emergency Planning Managers*** to implement the appropriate **Notification Flowchart -** ***1.*** The following is a list of conditions that would initiate this condition:

- Cloudy or dirty seepage or seepage with an increase in flow, boils, piping, or bogs.
- Seepage around conduits.
- Large sinkholes with the corresponding seepage anywhere on the embankment or downstream from the toe.
- Cracking or movement of any concrete structure.
- Any slide that degrades the crest of the embankment or that is progressively increasing in size.
- Exceptionally heavy rainfall in the catchment of the dam reservoir. Water level above the upper guide curve; Forecast of heavy rain by IMD in next five days; possibility of large inflow to reservoir; may need to open gates in an emergency.

External Alert Condition ORANGE – This is indicative of a dam condition that is progressively getting worse, and there is a high probability of dam failure. Although there is no immediate danger, the dam could fail if conditions continue to deteriorate. The ***Dam Site Engineers*** will be responsible for initiating immediate repairs; the **Dam Emergency Planning Managers** shall monitor the overall situation and take necessary actions. The water level may be reduced, if needed, as per the advice of the ***SE(C) & MRO, DVC, Maithon, in consultation with the Member Secretary, DVRRC.*** The Dam Emergency Planning Managers shall also implement the appropriate **Notification Flowchart - *2***. The following is a list of conditions (not exhaustive) that would initiate this condition:

- Large boils, increasing in size and flow rate, especially if there is flowing muddy water.
- Significantly increasing seepage, especially flowing muddy water.
- Slides involving a large mass of material that impairs the crest of the dam and is continuing to move.
- Sinkholes with seepage flowing muddy water.
- Large cracks, movement, or failure of a portion of any major concrete structure that forms an integral part of the dam.
- An increase in the reservoir level up to 1 m below FRL with an estimation of further large inflow to reservoir; Controlled Release through Spillway
- Overtopping of a dam that is not designed for overtopping.
- Near to 'Design Flood' inflow forecast.

External Alert Conditions RED– These are "Failure" conditions. Either the dam is in immediate danger of failing or has already failed. No time remains to implement measures to prevent failure. **Evacuate immediately**. Evacuation efforts will continue until the situation is stabilized. The Dam Emergency Planning Managers are responsible for implementing the appropriate **Notification Flowchart - *2***. The following is a list of conditions that would initiate "Imminent Dam Failure" or "Dam Failure" conditions:

- Rapidly increasing boils or the presence of new, significantly flowing boils, particularly muddy ones near previously identified ones.
- Rapidly increasing seepage, especially flowing muddy water.
- Slides involving a large mass of material or which have degraded the crest of the embankment to a level that approaches the water surface level or if significant seepage is observed through the slide area.
- Settlement that is predicted to degrade to the reservoir level.
- Cracks that extend to the reservoir level.
- Significant movement or failure of any structure that forms an integral part of the dam.
- Overtopping of an earthen dam.
- Uncontrollable release of the reservoir.
- Water level has crossed FRL; Large inflow to reservoir; Large Controlled Release through Spillway.

5.3. Previously Known Problems

Sl. No.	Observations	Remedial actions taken by DVC
1.	Deformation of upstream Riprap of Main Earth dam & right Dyke	Repaired under DRIP.
2.	Non-operational Under sluices – all five gates	Work being executed under DRIP.
3.	Operational problems in the 40T Gantry Crane for the operation of the Undersluice Emergency gate & 75T Gantry Crane for the operation of Intake Emergency gates, Service gates & trash racks.	Repaired under DRIP.
4.	Deterioration of Emergency gates for Undersluices and Intakes	Rehabilitated under DRIP.
5.	No-instrumentation for monitoring of dam	Several instruments are proposed to be installed for monitoring the dam's health.
6.	Deformation of downstream slope and tail race channel of Maithon Hydel Station	Immediate repair taken up. Further repair is pending.

6. Preparedness

Preparedness actions are to be taken both before and following the development of emergency conditions and should identify ways of preparing for an emergency, increasing response readiness in a uniform, and coordinated manner, and helping to reduce the effects of a dam failure. The following are some steps that could prevent or delay failure after an emergency is first discovered.

A. **Surveillance: Dam Site Engineers** will monitor the dam during emergency situations such as a severe storm event etc., as per the Operation & Maintenance Manual of dams. They will immediately appraise any situation to the **Emergency Planning Managers.**

B. **Response on Forecast of Excessive Inflow:** ***Dam Sate Engineers as well as Emergency Planning Managers,*** will respond to the situation of excessive inflow forecast by way of controlled spillway releases as advised by the **SE(C) & MRO**,. They will warn the affected downstream authorities and initiate 24 hours monitoring.

C. **Response during Weekends and Holidays:** At least one of the Dam Site Engineers shall be available for emergency response during weekends and holidays and shall be present at the dam site within 10 minutes of the detection of an emergency condition.

D. **Response during Periods of Darkness and Adverse Weather:** If required**, the Dam Site Engineers** will arrange for the generators and lights. Dam Emergency Planning Managers shall ensure ready availability of generators/torches during darkness and adverse weather conditions to adequately monitor the situation. They shall arrange to access the site during adverse weather conditions by foot or utility vehicle.

E. **Access to the Site:** The site (right bank side) can be accessed from Dhanbad Side in all failure conditions. However, the accessibility from Asansol Side can be made through two sides, one from the Kalyaneswari side toward the left bank of the dam and the other through the Barakar Bridge towards the right bank of the dam. The access from the Barakar bridge side shall not be used after the occurrence of any of the failure conditions as mentioned under **Section 11**. The access from the Kalyaneswari side can be used only during Piping Failure as well as Large Controlled release. A map showing access information is provided in **Annexure – 1.**

7. Remedial Actions

Preventive measures can be taken in an emergency to prevent the catastrophic failure of the dam, but such repairs should be undertaken with extreme caution. The repairs are only temporary, and a permanent repair should be designed by an expert as soon as possible.

In all cases, the appropriate Notification Flowchart must be implemented, and all the concerned emergency personnel must be notified. The following actions should only be undertaken by the Site Engineers under the direction of Emergency Planning Managers.

Seepage Failure

- Plug the flow with whatever material is available (hay, bentonite, or plastic) if the entrance is in the reservoir.
- Lower the water level in the reservoir by using the low flow outlet and pumping, if necessary, until the flow decreases to a non-erosive velocity or until it stops. Place an inverted filter (a protective layer of sand and gravel) on the exit area to hold the material in place.
- Continue operating at a lower level until a repair is made.

Embankment or Foundation Sliding

- Lower the water level in the reservoir by using the low flow outlet and pumping, if necessary, at a rate and to an elevation considered safe, given the slide condition.
- Stabilize the slide, if on the downstream slope, by weighting the toe area below the slide with soil, rock, or gravel.
- Continue operating at a lower level until a repair is made.

Structural Failure

- Implement temporary measures to protect the damaged structure, such as placing rock riprap in the damaged area.
- Lower the water level to a safe elevation through the low flow outlet and by pumping if necessary.

8. Supplies and Resources

8.1. Contracts

Should Damodar Valley Corporation personnel and resources prove to be inadequate during an emergency, requests will be made for assistance from other local jurisdictions, other agencies, and industry, as needed. Such assistance may include equipment, supplies, or personnel. All agreements will be entered into by authorized officials and should be in writing whenever possible. ***Emergency Planning Managers*** shall have the authority to enter into agreements as deemed necessary to prevent the failure of the dam.

8.2. Equipment & Supplies

Equipment that are available for use and local contractors who can be contacted to provide equipment during an emergency event are listed in **Annexure - 5.**

9. Reports

Pre-monsoon (in May-June) and post-monsoon (November-December) inspections of the dam are being made each year by the **Dam Site Engineers**, as per the **O&M Manual of Maithon Dam,** to evaluate its structural safety, stability, and operational adequacy. In the event of an abnormal occurrence, reference to these reports, particularly the photographs, can be beneficial in the evaluation of a potential problem.

Technical records such as drawings and inspection reports should be stored and carefully maintained both at the Maithon Dam Site office and Emergency Operations Centre at the Dam site. All Emergency personnel of DVC, Maithon Dam shall be familiar with the location of the documents in the event of an emergency.

10. Emergency Operations Centre

10.1. Activity Log

Emergency Planning Managers shall ensure that any unusual or emergency condition should be documented, including the following:

- Activation or deactivation of emergency facilities.
- Emergency notifications to other District Disaster Management Authorities, local governments, and state and central government agencies.
- Significant changes in the emergency.
- Major commitments of resources or requests for additional resources from external sources.
- Telephone calls should be recorded in chronological order.
- Issuance of protective action & recommendations to the public.
- Evacuations.
- Casualties.
- Termination of the incident.

10.2. Costs of the Emergency Operations Centre

For major emergencies, the Emergency Operations Center will maintain detailed records of costs and expenses. These records may be used to recover costs from the responsible party or insurers or as a basis for requesting financial assistance for certain allowable response and recovery costs from the state or central government. Documented costs should include the following:

- Personnel costs, especially overtime.
- Equipment operation.
- Equipment leasing and rental.
- Contract services to support emergency operations.
- Specialized supplies expended in emergency operations.

11. Inundation Area

The inundation cum evacuation maps in **Annexure – 10,** illustrate the areas subject to flooding caused by the following three failure conditions:

(i) *Dam failure at Maithon Dam caused by* ***overtopping from the inflow design flood leading to breaching and uncontrolled release of impounded water****. Also, the worst storm, which will cause such heavy inflow in Maithon Catchment, may also have an impact on Panchet Catchment and accordingly, release from Panchet has also been included in this assessment.*

(ii) *A* ***non-flood dam failure caused by internal erosion (piping)*** *with the reservoir at full supply level (often called a* ***"Fair-Weather Failure"****) leading to breaching and uncontrolled release of impounded water, and*

(iii) *A* ***large controlled-release flood without dam failure****. As the worst storm, which will cause such a large control release in Maithon Catchment, may also have an impact on Panchet Catchment and accordingly, release from Panchet has also been included in this assessment.*

After examining the results of the breach analysis of the dam, it is observed that a total of 8 (eight) Districts would be directly affected by a potential failure/ emergency event at the dam site (a list of affected blocks is tabulated below). Further, owing to a plain topography and tidal wave impact around the areas of the riverbank (especially in Howrah, Hooghly & Paschim Medinipur districts), the situation of flooding may worsen (as potential failure/emergency event at the dam site occurs mainly on account of cyclonic rainfall which coincides with tidal wave and flood in lower Damodar region near outflow). As it is not feasible to calculate the impact of dam break scenario with already flooded scenario, **Disaster Management Authorities** shall utilize the already available information to judge the situation and plan the evacuation accordingly.

As the affected settlements, shelter locations etc., shown in the map have been finalized with the help of Satellite imagery, there may be chances of some leftover settlements, which

also need to be evacuated. The **Disaster Management Authorities/evacuation team** shall utilize the information of Maximum Water Surface Elevation (against each settlement) as given in the Flood Hazard Reference Values cum Evacuation Table **(Annexure – 9)** for evacuating the marked settlements as well as leftover portions. The same information will also help them to identify/modify the shelter points. Any changes required to be incorporated in the shelter details, etc., shall be shared with Dam Site Engineers, Emergency Planning Managers, or the office of the General Manager (Civil), DVC, Maithon, for updating this document.

State	District	Affected Blocks in the worst flooding scenario (Overtop Failure)
Jharkhand	Dhanbad	Nirsa.
West Bengal	Paschim Bardhaman	Asansol, Raniganj, Andal, Faridpur Durgapur, Kanksa.
	Purba Bardhaman	Galsi-I, Galsi-II, Bardhaman-I, Bardhaman-II, Memari-I, Jamalpur, Khandaghosh, Raina-I, Raina-II, Memari-II, Kalna-II, Kalna-I Pandua
	Purulia	Neturia, Santuri
	Bankura	Saltora, Mejhia, Barjora, Sonamuki, Patrasayer, Indus
	Hooghly	Pursura, Arambag, Khanakul-I, Khanakul-II, Dhaniakhali, Tarakeshwar, Jangipara, , Polba-Dadpur.
	Howrah	Udaynarayanpur, Amta-II, Amta-I, Bagnan-I
	Paschim Medinipur	Daspur-II

11.1. Local Evacuation Plan

If imminent failure of the dam with uncontrolled downstream flooding is anticipated, local disaster management and law enforcement personnel should notify those downstream authorities for evacuation in the most expedient manner possible. The organizations and personnel on the Notification Flowchart should be contacted immediately. Local law enforcement officials, along with local mobile network operators and radio and television stations, can best spread the notice for evacuation. The immediate impact will be to areas along the Barakar & Damodar river downstream of the dam. For design flood breaches, the following actions should be taken:

- Barricading all bridges that could possibly be flooded to prevent access to the affected area. The locations are tabulated in the Flood Hazard Reference Values cum Evacuation Table **(Annexure – 9)** and shown in Inundation Maps **(Annexure – 10)**.
- The District Disaster Management office can assist with the notification to all persons and agencies involved, with the possibility of additional support, including contacting others not accessible by radio or telephone.
- District officials are generally familiar with developed areas in their jurisdiction. Such knowledge, coupled with the requirements of state law that they respond to disasters,

make them the logical officials to be notified and to spread the warning message to all areas subject to flooding.

12. Implementation

12.1. Development

The EAP shall be sent to all concerned as per **EAP Distribution List** for review, updating and acceptance.

12.2. Updating

Copies of the EAP have been provided to all authorities/officials included in the distribution list, and the document has been approved and signed by the Executive Director (Civil), DVC, Maithon.

This plan will be reviewed and updated annually before the **1st of June** of every year by the ***Emergency Planning Manager and the Sr. Manager(Civil), Circle-II, DVC, Maithon***. This review will involve corresponding personnel from local disaster management agencies in conjunction with Dam Safety Organization's staff.

Sr. Manager(Civil), Circle-II, DVC, Maithon, in consultation with Dam Safety Organisation of DVC, will organize every year prior to monsoon an orientation meeting to introduce the revised EAP to local officials and emergency responders. This meeting will give an opportunity for all the stakeholders to review and comment on the EAP document and their respective roles.

The Emergency Planning Manager will review and complete all items on the Annual EAP Evaluation Checklist in **Annexure - 6**. After the annual update is complete, a new Approval and Implementation sheet will be attached, and the annual update will be documented on the Plan Review and Update sheet in **Annexure - 7**.

If revisions to the EAP are made because of the annual update, such changes will be recorded on the **Log Sheet of Changes**. A copy of the updated portions of the EAP will be sent to all concerned as per the **EAP Distribution List**. If the EAP is reviewed and revisions are not required, the **Emergency Planning Managers** will submit written notification to all concerned that no updates to the EAP have been adopted or implemented.

12.3. Testing

The Dy. **General Manager** ***(C), Hydro, DVC, Maithon*** shall organize the following exercises as specified below:

Orientation (Stakeholders' Consultation): The ***Sr. Manager(Civil), Circle-II, DVC, Maithon,*** in consultation with the **Dam Safety Office, DVC, Maithon**, will organize an orientation meeting every year with local responders and stakeholders to solicit input, establish roles during an emergency situation and facilitate reliable responses to emergencies. In the orientation meeting, the Emergency Planning Manager will introduce

the revised EAP to local officials and emergency responders and provide those entities with the opportunity to review and comment on the documents and on their roles and responsibilities described in EAP.

Tabletop exercises: The ***Sr. Manager(Civil), Circle-II, DVC, Maithon,*** in consultation with the **Dam Safety Office, DVC, Maithon** and **Emergency Planning Managers** will organize a tabletop drill once every two years to discuss and review the simulated or imaginary emergency situation. The tabletop drill involves a meeting of the **Emergency Planning Managers** with local and state Disaster Management Officials in a conference room. The drill begins with a description of a simulated event and proceeds with discussions by the participants to evaluate the EAP and response procedures and to resolve concerns regarding coordination and responsibilities. Any problems identified during a drill should be included in revisions to the EAP. Records of training and drills will be maintained in **Annexure - 8**.

Before the tabletop exercise begins, meeting participants will visit the dam to familiarize themselves with the dam site. **Emergency Planning Managers** will present a scenario of an unusual or emergency event at the dam. The scenario will be developed prior to the exercise with the support of the **Dam Safety Organization**.

Once the scenario has been presented, the participants will discuss the risk involved, responses and related actions that they would take to address and resolve the scenario throughout the exercise. The exercise provides an opportunity to discuss EAP and response procedures and resolve the questions throughout the exercise. It will also clarify roles and responsibilities and will identify additional threat mitigation and preparedness actions.

Records and reporting of the main conclusions/findings of both meetings will be maintained in **Annexure - 6** and following the deadline given in **Section 11.2.**

Exercise	Schedule	Reporting Deadlines
Orientation (Stakeholder's Consultation)	Annual	• Pre-Event: Submit Agenda to Stakeholders 30 days before the meeting • Post-Event: Update **Annexure 8** within 30 days after the meeting.
Tabletop Exercise	Once every two years (before monsoon season)	• Pre-Event: Submit Exercise Plan and Schedule to participants 90 days before the exercise • Post-Event: Update **Annexure 11** and submit Evaluation Report within 60 days after exercise

12.4. Training

The Sr. Manager(Civil), Circle-II, DVC, Maithon, will ensure all people involved in the EAP be trained to guarantee that they are thoroughly familiar with its elements, the availability of

equipment, and their responsibilities and duties under the plan. Personnel will be trained in problem detection, evaluation, and appropriate corrective measures. This training is essential for the proper evaluation of developing situations at all levels of responsibility. Training records will also be maintained in **Annexure - 8**.

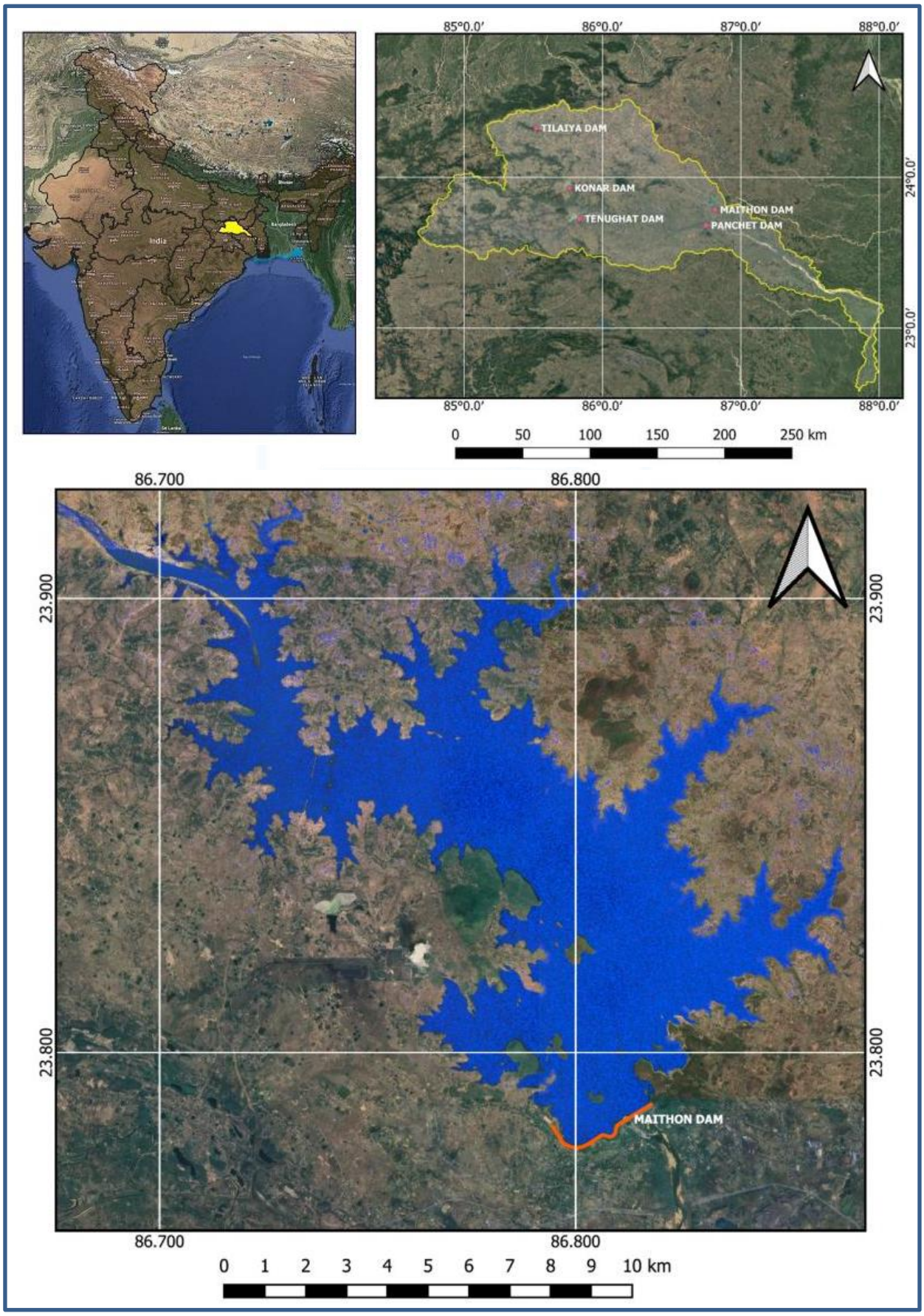
13. References

1. *Flood Inundation Maps for Maithon Dam, Jharkhand,* CWC, *March' 2018*, MoJS, DoWRRD&GR,GoI, New Delhi 110066.
2. *Flood Inundation Maps for Panchet Dam, Jharkhand, Oct' 2019,* CWC, MoJS, DoWRRD&GR, GoI, New Delhi 110066.
3. *Guidelines for Developing Emergency Action Plans for Dams, Feb' 2016,* CWC, MoJS, DoWRRD&GR, GoI, New Delhi 110066.
4. *Guidelines for Mapping Flood Risks Associated with Dams, Jan' 2018,* CWC, MoJS, DoWRRD&GR, GoI, New Delhi 110066.
5. *Flood estimation Report for Lower Ganga Plain – Subzone 1(g) (Revised),* Nov. 1994, Central Water Commission, New Delhi.
6. *Froehlich, David. An Empirical Model on Embankment Dam Breaching, Feb, 2017*, Third National Dam Safety Conference, IIT Roorkee.
7. *Manual on Estimation of Design Flood, March' 2001*, Central Water Commission, New Delhi.

14. Software & Applications used

1. *HEC-HMS*
2. *HEC-RAS 2D*
3. *ArcGIS / QGIS*
4. *Google Earth Pro*

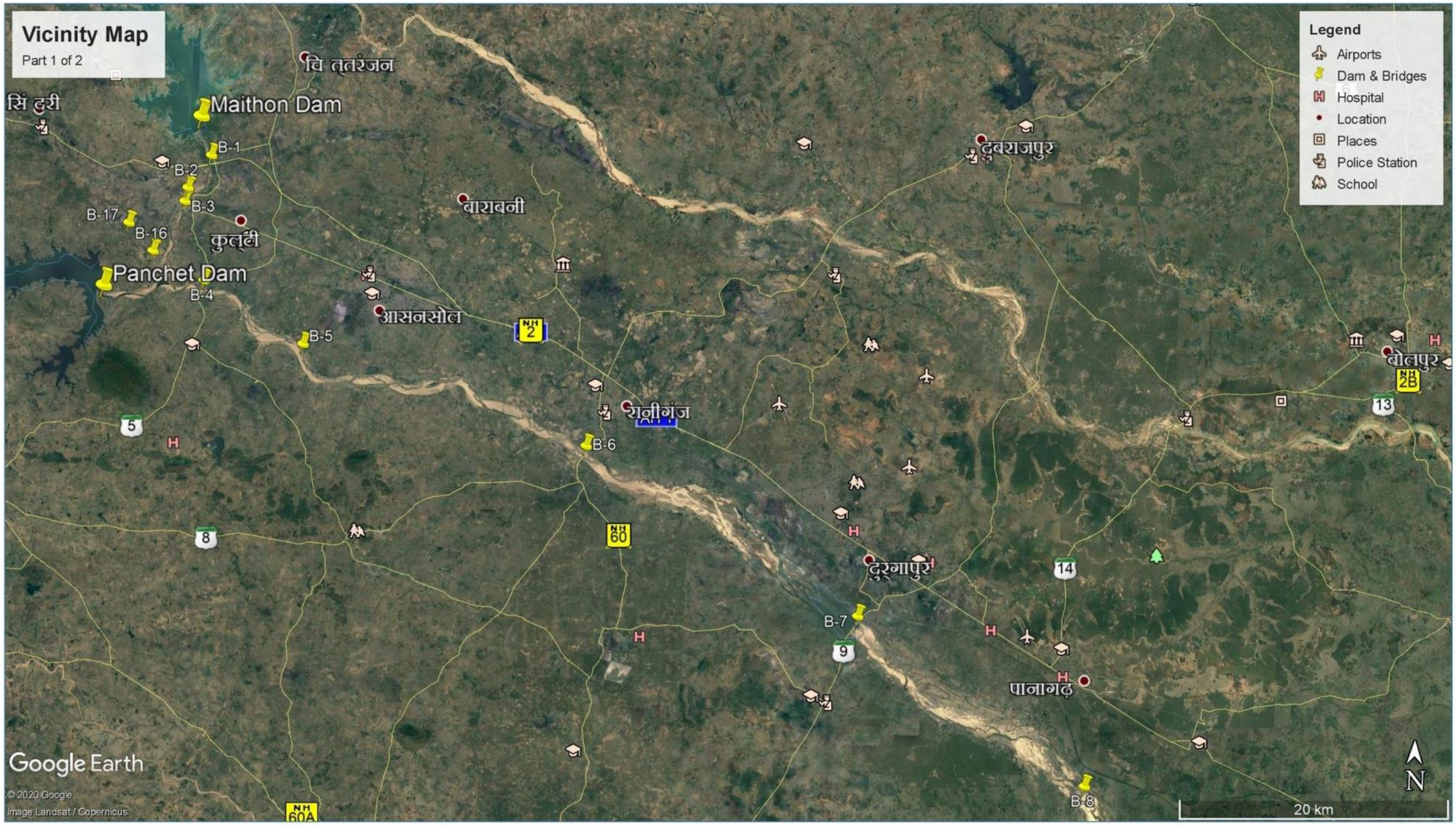
Annexure - 1: Vicinity Map of Maithon Dam



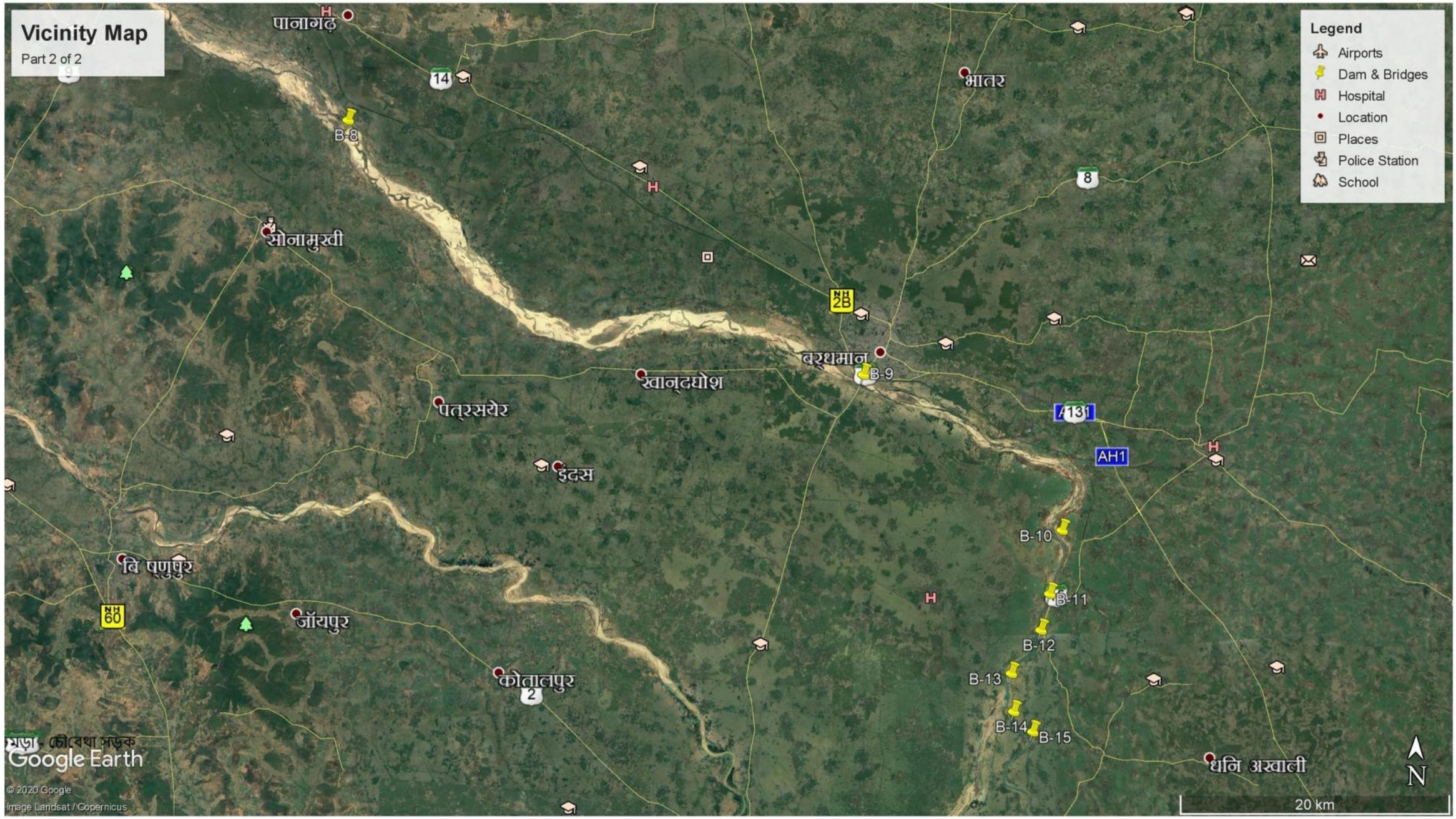
Vicinity Map of Maithon Dam

Please see overleaf for access details.

Vicinity Map - Continued



Vicinity Map - Continued



Annexure - 2: General Description of Maithon Dam

- Official Dam Name : Maithon Dam
- Name of stream : Barakar
- Dam location : Located at Dhanbad District (About 25 km from Asansol and 40 km from Dhanbad town)
- Latitude/Longitude : 23˚ 47´ N / 86˚ 49´ E
- Seismic Zone : III
- Year of Starting of Dam Construction : 1951
- Year of Commissioning of Dam Project : 1957
- Year of first impoundment : 1957
- Name of immediate: upstream Dam : Tilaiya Dam
- Name of immediate downstream Dam/ Barrage : Durgapur Barrage
- Dam Owner : Damodar Valley Corporation (DVC)
- Dam Owner's Address : Damodar Valley Corporation, Kolkata, West Bengal.

Features		S.I.	Imperial
General	Inauguration	27-Sep-1957	
	River basin	DAMODAR	
	District, State	Dhanbad, JH	
	Nearest Rail Station	Kumardhubi	
	Nearest Airport	Kolkata	
Hydrological	Catchment Area	6293 sq. km	2431 sq. mile
	River Length upto Damodar Confluence	12.9 Km	8 miles
	Avg. Annual Precipitation	114 cm	44.9 in
	Avg. Annual Runoff	2700 MCM	2190 Th. Ac. Ft
	Design Flood	14,725 cumec	520,000 cusec
	Revised Design Flood (PMF)	18,751 cumec	662,185 cusec
	Maximum Observed Flood Peak	10,449 cumec	3,69,000 cusec
	Maximum Observed Flood Date	27-09-1978	
Structural	Type	Earth & Concrete	
	Seismic Zoning	Zone III	
	Maximum Height above foundation	56.08 m	184'
	Overall Length	4426.76 m	14523'
	Type of Spillway	Ogee	
	Crest gate No. & type	12, Tainter/Radial	
	Crest Gate Size	12.19 X 12.5 m	41' x 40'
	Undersluice No. & type	5 Vertical lift	
	Undersluice Size	1.73 X 3.05 m	5'8" x 10'
	Undersluice emergency gate size	5.49 m x 3.96 m	18' x 13'
	Undersluice emergency gate gantry crane	40 T	
Reservoir	River bed Level	106.68 m	350’
	Dead Storage Level	132.59 m	435'
	Spillway Crest Level	140.21 m	460'
	Conservation Level	146.31 m	480'
	Max. Utilizable Flood Level	150.9 m	495'
	Dam Top Level	156.06 m	512'
	Dead Storage	93 MCM	75 Th. Ac. Ft
	Conservation Storage	441 MCM	357 Th. Ac. Ft
	Flood Management Storage	334 MCM	271 Th. Ac. Ft
	Maximum Flood Level (Original)	152.4 m	500'
Benefits	Irrigation Command Area (Maithon + Panchet)	4.16 Lakh ha	10.28 Lakh Ac.
	Power Installed Capacity	63.2 MW	
	Type of Power Turbine	Horizontal Shaft Francis	
	Maximum Power Generation Head	38.71 m	127'
	Water Supply (Areas)	Dhanbad & Paschim Bardhaman	
	Intake Tower Service Gates	3 Vertical Lift	
	Service Gate size	7.24 m X 4.27 m	23'9" x 14'
	Intake emergency gate size	8.33 m x 3.96 m	27'4" x 14'
	Intake emergency gate gantry crane	75 T	

Annexure - 3: Sample Public Announcements

Note: These messages are communicated to downstream residents to alert the public of impending danger. Damodar Valley Corporation should coordinate with the India Meteorological Department, the National, State & District Disaster Management Authorities prior to release. Messages can be communicated via radio, television, bulk SMSs of local mobile networks, and other media outlets.

Name of Local Media persons is appended below:

Electronic Media	1. Name: Shri Murari, Reporter, Aajtak News, Mob: 9431155458 2. Name: Shri Rajesh Sharma, Reporter, News 11 Mob: 7004148844 3. Name: Shri Manoj Kumar, Reporter, R24 Mob: 9304724167 / 9304921945 4. Name: Shri Pankaj Yadav, Ajay Bharat, Mob: 7004267987 8. All India Radio, Asansol, 0341 2250148 9. All India Radio, Kolkata, 033 2248 6064
Print Media	1. Name: Shri Dharamdev Choudhary, Dainik Jagran Mob: 8986667491 2. Name: Shri Awadh, Prabhat Khabar, Mob: 9006963876 3. Name: Shri Bishbendu, The Telegraph, Mob: 9431153828 4. Name: Shri Harendra Saini, Hindustan, Mob: 7004705701

A. Announcement for a Slowly Developing "Watch" Condition (BLUE Emergency Level)

Damodar Valley Corporation has declared a **BLUE Level** "Watch" condition for Maithon Dam, Project Identification Code JH05HH0008 as of *[time and date]*. *[Briefly describe the problem or condition.]* Although there is no immediate danger of the dam failing, *[Describe what actions are being taken to monitor and control the situation.] [State the quantity of any releases from the reservoir.]*

दामोदर घाटी निगम ने मैथन बांध, प्रोजेक्ट आइडेंटिफिकेशन कोड JH05HH0008 के लिए **नीला** लेवल "वॉच" कंडीशन को [समय और तारीख] घोषित किया है। [समस्या या स्थिति का संक्षेप में वर्णन करें।] हालांकि बांध के फेल होने का तत्काल कोई खतरा नहीं है, [वर्णन करें कि स्थिति की निगरानी और नियंत्रण के लिए क्या कार्रवाई की जा रही है।] [जलाशय से किसी भी रिलीज की मात्रा बताएं।]

দামোদর ঘাটি নিগম মাইথন বাঁধ, প্রকল্প সনাক্তকরণ কোড JH05HH0008 এর জন্য **নীল** স্তরের "ওয়াচ" শর্ত [সময় ও তারিখ] ঘোষণা করেছে। [সমস্যা বা পরিস্থিতি সংক্ষেপে বর্ণনা করুন।] বাঁধ ব্যর্থ হওয়ার আশঙ্কাজনক আশঙ্কা না থাকলেও [পরিস্থিতি

পর্যবেক্ষণ ও নিয়ন্ত্রণে কী ব্যবস্থা নেওয়া হচ্ছে তা বর্ণনা করুন।] [জলাশয় থেকে কোনও রিলিজের পরিমাণ নির্দেশ করুন]

B. Announcement for a Worsening "Watch" Condition (BLUE Emergency Level)

Damodar Valley Corporation has declared a **BLUE** Level "Watch" condition for Maithon Dam, Project Identification Code JH05HH0008 as of [time and date]. [Briefly describe the problem or condition.] Although there is no immediate danger of the dam failing a possibility now exists that the dam will fail if correction efforts are unsuccessful. [Describe what actions are being taken to monitor and correct the situation.] [State the quantity of any releases from the reservoir]. Additional news will be made available as soon as it is received.

दामोदर घाटी निगम ने मैथन बांध, प्रोजेक्ट आइडेंटिफिकेशन कोड JH05HH0008 के लिए **नीला** लेवल "वॉच" कंडीशन को [समय और तारीख] घोषित किया है। [समस्या या स्थिति का संक्षेप में वर्णन करें।] हालांकि बांध के तत्काल खतरे में होने की संभावना नहीं है, लेकिन अब यह मौजूद है कि यदि सुधार के प्रयास असफल रहे तो बांध विफल हो जाएगा। [वर्णन करें कि स्थिति की निगरानी और उसे ठीक करने के लिए क्या कार्रवाई की जा रही है।] [जलाशय से किसी भी रिलीज की मात्रा बताएं]। प्राप्त होते ही अतिरिक्त समाचार उपलब्ध कराया जाएगा।

দামোদর ঘাটি নিগম মাইথন বাঁধ, প্রকল্প সনাক্তকরণ কোড JH05HH0008 এর জন্য **নীল** স্তর "ওয়াচ" শর্ত [সময় এবং তারিখ] ঘোষণা করেছে। [সংক্ষেপে সমস্যা বা পরিস্থিতি বর্ণনা করুন।] যদিও বাঁধটি তাত্ক্ষণিক বিপদের আশঙ্কা হওয়ার সম্ভাবনা নেই, তবে এখন এটি বিদ্যমান রয়েছে যে উন্নয়নের প্রচেষ্টা ব্যর্থ হলে বাঁধটি ব্যর্থ হবে। [শর্তটি নিরীক্ষণ ও সংশোধন করতে কী পদক্ষেপ নেওয়া হচ্ছে তা বর্ণনা করুন।] [জলাশয় থেকে কোনও রিলিজের পরিমাণ নির্দেশ করুন]] প্রাপ্তির পরে অতিরিক্ত সংবাদ সরবরাহ করা হবে।

C. Announcement for a Probable "Failure" Condition (ORANGE Emergency Level)

Urgent! This is an emergency message. Damodar Valley Corporation has announced that Maithon Dam, Project Identification Code JH05HH0008 is probably going to fail. [Describe what actions are being taken to monitor and control the situation.] It is possible that the dam will fail in [##] hours. Residents in low lying areas along the Barakar & Damodar River, as well as the district of Paschim Bardhaman, Bankura, Purulia & Purba Bardhaman and Dhanbad (only Nirsa block along Barakar & Khudia river), should prepare for immediate evacuation. Additional news will be made available as soon as it is received.

अति आवश्यक! यह एक आपातकालीन संदेश है। दामोदर घाटी निगम ने घोषणा की है कि मैथन बांध, परियोजना पहचान कोड JH05HH0008 शायद विफल हो रहा है। [वर्णन करें कि स्थिति की निगरानी और नियंत्रण के लिए क्या कार्रवाई की जा रही है।] यह संभव है कि बांध [##] घंटों में विफल हो जाएगा। बाराकर और दामोदर नदी के साथ-साथ पच्छिम बर्धमान, बांकुरा, पुरुलिया और पुरबा बर्धमान और धनबाद (केवल बराकर और खुदिया नदी

के साथ निरसा ब्लॉक) जिले के निचले इलाकों में रहने वाले लोगों को तत्काल निकासी की तैयारी करनी चाहिए। प्राप्त होते ही अतिरिक्त समाचार उपलब्ध कराया जाएगा ।

जरूरी ! एटि एकटि जरुरि वार्ता। दामोदर घाटि निगम घोषणा करेछे ये माइथन बाँध, प्रकल्प शनाक्तकरण कोड JH05HH0008 सम्भवत ब्यर्थ हते चलेछे। [परिस्थिति पर्यवेक्षण ও নিয়ন্ত্রণে কী পদক্ষেপ নেওয়া হচ্ছে তা বর্ণনা করুন।] সম্ভবত [##] কয়েক ঘন্টার মধ্যে বাঁধটি ব্যর্থ হবে। বরাকর ও দামোদর নদীর তীরবর্তী নিম্নাঞ্চলের বাসিন্দাদের পাশাপাশি পাশ্চিম বর্ধমান, বাঁকুড়া, পুরুলিয়া ও পূর্ব বর্ধমান জেলা এবং ধনবাদ (বরাকর ও খুদিয়া নদীর তীরে কেবল নীরসা ব্লক) অবিলম্বে সরিয়ে নেওয়ার প্রস্তুতি নিতে হবে। এটি পাওয়ার সাথে সাথে অতিরিক্ত সংবাদ সরবরাহ করা হবে।

D. Announcement of an Impending "Failure" Condition (RED Emergency Level)

Emergency! This is an emergency message. Maithon Dam, Project Identification Code JH05HH0008 is going to fail at any moment. Residents who have not yet evacuated yet, should immediately evacuate the district of Paschim Bardhaman, Bankura, Purulia, Purba Bardhaman, Hooghly, Howrah & Paschim Medinapore and and Dhanbad (only Nirsa block along Barakar & Khudia river). The floodwaters have already reached [Highway] and [Road]. Additional news will be made available as soon as it is received.

आपातकालीन! यह एक आपातकालीन संदेश है। मैथन बांध, प्रोजेक्ट आइडेंटिफिकेशन कोड JH05HH0008 किसी भी समय फेल होने वाला है। जिन निवासियों को अभी तक खाली नहीं किया गया है, उन्हें पाश्चिम बर्धमान, बांकुरा, पुरुलिया, पुरबा बर्धमान, हुगली, हावड़ा और पशिम मेदिनीपुर और धनबाद (केवल बराकर और खुदिया नदी के साथ निरसा ब्लॉक) जिले को खाली करना चाहिए। बाढ़ का पानी पहले ही [हाईवे] और [रोड] तक पहुँच चुका है। प्राप्त होते ही अतिरिक्त समाचार उपलब्ध कराया जाएगा ।

জরুরি অবস্থা ! এটি একটি জরুরি বার্তা। মাইথন বাঁধ, প্রকল্প শনাক্তকরণ কোড JH05HH0008 যে কোনও সময় ব্যর্থ হতে চলেছে। যেসব বাসিন্দাদের এখনও সরিয়ে নেওয়া হয়নি তাদের পশিম বর্ধমান, বাঁকুড়া, পুরুলিয়া, পূর্ব বর্ধমান, হুগলি, হাওড়া এবং পশিম মেদিনীপুর ও ধনবাদ (কেবল বরকর ও খুদিয়া নদীর ধারে নীরসা ব্লক) জেলাগুলি সরিয়ে নেওয়া উচিত । বন্যার জল ইতিমধ্যে [হাইওয়ে] এবং [রাস্তায়] পৌঁছেছে। প্রাপ্তির পরে অতিরিক্ত সংবাদ সরবরাহ করা হবে।

E. Announcement of an Ongoing "Failure" Condition (RED Emergency Level)

Emergency! This is an emergency message. Maithon Dam, Project Identification Code JH05HH0008, failed at [time and date]. Residents who have not yet evacuated yet, should immediately evacuate the district of Paschim Bardhaman, Bankura, Purulia, Purba Bardhaman, Hooghly, Howrah & Paschim Medinapore and and Dhanbad (only Nirsa block along Barakar & Khudia river). The floodwaters have already reached [Highway] and [Road]. Additional news will be made available as soon as it is received.

आपातकालीन! यह एक आपातकालीन संदेश है। मैथन बांध, परियोजना पहचान कोड JH05HH0008, [समय और तारीख] में विफल (टूट) हो गया। जिन निवासियों को अभी तक खाली नहीं किया गया है, उन्हें पाश्चिम बर्धमान, बांकुरा, पुरुलिया, पुरबा बर्धमान, हुगली, हावड़ा और पशिम मेदिनीपुर और धनबाद (केवल बराकर और खुदिया नदी के साथ निरसा ब्लॉक) जिले को खाली करना चाहिए। बाढ़ का पानी पहले ही [हाईवे] और [रोड] तक पहुँच चुका है। प्राप्त होते ही अतिरिक्त समाचार उपलब्ध कराया जाएगा।

জরুরি অবস্থা! এটি একটি গুরুত্বপূর্ণ বার্তা। মাইথন বাঁধ, প্রকল্প শনাক্তকরণ কোড JH05HH0008, [সময় এবং তারিখ] ব্যর্থ হয়েছে। যেসব বাসিন্দাদের এখনও সরিয়ে নেওয়া হয়নি তাদের পশিম বর্ধমান, বাঁকুড়া, পুরুলিয়া, পূর্ব বর্ধমান, হুগলি, হাওড়া এবং পশিম মেদিনীপুর ও ধনবাদ (কেবল বরকর ও খুদিয়া নদীর ধারে নীরসা ব্লক) জেলাগুলি সরিয়ে নেওয়া উচিত। বন্যার জল ইতিমধ্যে [হাইওয়ে] এবং [রাস্তায়] পৌঁছেছে। প্রাপ্তির পরে অতিরিক্ত সংবাদ সরবরাহ করা হবে।

Annexure - 4: Emergency Level Determination – Action Data Sheet Index

Event/General Observation	Specific Observation/Condition	Emergency Level	Action Data Sheet
Unexpected Failure	Dam unexpectedly and without warning begins to fail	RED	SHEET A
Spillway Release, Increasing Reservoir Water Surface Elevation	High intensity rainfall in the catchment area of reservoir; Forecast of heavy rain by IMD; large inflow to reservoir; may need to open gates in an emergency	BLUE	SHEET B1
	Large inflow to reservoir; Water level is 1 m below FRL; Controlled Release through Spillway	ORANGE	SHEET B2
	Large inflow to reservoir; Water level has crossed FRL; Large Controlled Release through Spillway	RED	SHEET B3
Concrete structure Cracking	Minor cracks (bigger than ¼ cm.) in the concrete structure, without leakage.	BLUE	SHEET C1
	Enlarging cracks (bigger than ¼ cm.) and active movement in the concrete structure, with leakage passing through.	ORANGE	SHEET C2
	Enlarging cracks with sudden or rapidly proceeding movements/displacements in the concrete structure with severe leakage passing through.	RED	SHEET C3
Instrumentation	Instrumentation readings are beyond threshold values.	BLUE	SHEET D1
Malfunction of Radial/Sluice Gate(s)	Structural member of a gate, either broken or severely damaged, which prevent operation of the gate(s). No leakage or uncontrolled discharge is detected. Flood can be routed without damaged/non-operational gate(s).	BLUE	SHEET E1
	Structural member of a gate, either broken or severely damaged, which prevents operation or malfunction of the gate(s). Considerable leakage or uncontrolled discharge is detected. Flood cannot be routed without damaged/non-operational gate(s).	ORANGE	SHEET E2
	Structural member of a gate, either broken or severely damaged, which prevents operation or malfunction of the gate(s). Unexpected high discharge is occurring. Flood cannot be routed without damaged/ non-operational gate(s).	RED	SHEET E3

Event/General Observation	Specific Observation/Condition	Emergency Level	Action Data Sheet
Earthquake	Measurable earthquake felt or reported and dam appears to be stable.	BLUE	SHEET F1
	Earthquake resulting in visible damage to the dam or appurtenances which can cause a potential dangerous situation	ORANGE	SHEET F2
	Earthquake resulting in uncontrolled release of water over dam or rapidly developing flow through cracks or rapidly developing erosion through increased seepage	RED	SHEET F3
Security Threat/ Sabotage/ Vandalism	Unverified bomb threat or verified damage to the dam/appurtenances with no impacts in the functioning of the dam	BLUE	SHEET G1
	Verified bomb threat that if carried out, could result in damage of the dam/appurtenances that impacts the functioning of the dam OR verified damages due to vandalism that impacts the normal operation of the dam.	ORANGE	SHEET G2
	Detonated bomb resulting in visible damage to the dam or appurtenances OR verified damages due to vandalism causing an uncontrolled water release	RED	SHEET G3
Embankment Overtopping	Reservoir water surface 1 m below top of the breaching Dyke	ORANGE	SHEET H2
	Water from the reservoir is flowing over the top of the breaching dyke	RED	SHEET H3
Seepage	Seepage through dam body. New or minor seepage at toe, on slope of embankment, abutments or galleries, water flowing clear.	BLUE	SHEET J1
	New, seriously or rapidly increasing seepage flow rate at toe, on slope of embankment, abutments or galleries, water flowing cloudy.	ORANGE	SHEET J2
	Serious seepage at toe, on slope of embankment, abutments or galleries. Un controllable muddy water flowing. Failure of dam is imminent.	RED	SHEET J3

Event/General Observation	Specific Observation/Condition	Emergency Level	Action Data Sheet
Sinkholes	Sinkholes anywhere in the embankment or within 150 m downstream from the toe. No seepage or flowing water.	BLUE	SHEET K1
	Sinkholes with seepage or flowing water anywhere in the embankment or within 150 m downstream from the toe.	ORANGE	SHEET K2
	Sinkholes rapidly enlarging with muddy water anywhere in the embankment or within 150m downstream from the toe.	RED	SHEET K3
Embankment cracking/ Movement	Cracks in the embankment crest or slopes greater than ½ cm or ¼ inch wide and considerable length without seepage.	BLUE	SHEET L1
	Cracks in the embankment crest or slopes greater than ½ cm or ¼ inch wide and considerable length with active movement/ slippage and seepage through cracks.	ORANGE	SHEET L2
	Sudden or rapidly proceeding slides of the embankment slopes. Cracks that extends up to the reservoir elevation.	RED	SHEET L3

RED ALERT	***Event Description:*** **UNEXPECTED FAILURE**	SHEET A

RECOMMENDED ACTIONS

Emergency Planning Manager *(May be split responsibilities, i.e. One person at the dam handling on site actions and a different person who can make notifications. APPLICABLE TO ALL ACTION DATA SHEETS)*

A. Implement the "Failure Condition Notification Flowchart", using pre-scripted message.

B. Activate the Emergency Operations Centre

C. Recommend to the Districts Collectors and Disaster Management authorities **IMMEDIATE EVACUATION** downstream of the dam and affected areas as per Local Evacuation Plan

D. Stay at safe distance away from the dam. The immediate concern is the safety of the downstream public.

E. Record all information, observations, and actions on an Event Log Form (**FORM 1**).

Site's Engineers

F. Stay at safe distance away from the dam

G. Observe conditions in site periodically and provide decision support as appropriate.

General Manager (Civil / Hydel)

H. Communicate and keep informed the Chairman, Member Secretary, Member Technical, DVC

Dam Safety Organization

I. Provide decision support and technical support to the Emergency Planning Manager as appropriate.

RE-EVALUATION / DECISIONS

Evaluate conditions CONTINUOUSLY and determine if:

A. The event warrants downgrade if there is no longer an impending threat of dam failure with no additional rainfall occurring YET there is damage to the dam that prevents safe impoundment of water. All contacts on Notification Flow Chart shall be notified of downgrade.

B. Event may be Terminated only when either:

- There is no longer an impending threat of dam failure with no additional rainfall occurring and it has been determined by Dam Safety staff safe to impound water or;
- The dam has failed AND there is no longer a threat to the downstream public

All contacts on Notification Flow Chart shall be updated of changes.

Based on this evaluation, follow the appropriate action

A. EVENT LEVEL DOWNGRADE	B. TERMINATION	
Monitor conditions until damage is repaired	Go to **Termination and Follow-up**	

BLUE ALERT	***Event Description:*** **SPILLWAY RELEASE :** High intensity rainfall in the catchment area of reservoir; Forecast of heavy rain by IMD; large inflow to reservoir; may need to open gates in an emergency	SHEET B1

RECOMMENDED ACTIONS

Emergency Planning Manager

A. Implement the "Watch Condition Notification Flowchart", using pre-scripted message.

B. Make careful observation and inspection of every part of the dam; this should be done to monitor without compromising the safety of anyone performing the tasks.

C. Record all information, observations, and actions on an Event Log Form (**FORM 1**).

D. Contact the General Manager (Civil / Hydel) at least daily to report the latest observations and conditions. If conditions change significantly, go to re-evaluation/decision section and follow relevant steps immediately.

Site's Engineers

E. Observe conditions in site periodically and provide decision support as appropriate.

F. Provide corrective actions or work as required.

General Manager (Civil / Hydel)

G. Direct specific and appropriate procedures for reservoir operations.

Dam Safety Organization

H. Provide decision support and technical support to the Emergency Planning Manager as appropriate.

RE-EVALUATION / DECISIONS

Evaluate conditions CONTINUOUSLY and Determine if:

A. The event can be terminated when the intensity of rainfall is dwindling as per the Forecast.

B. The event warrants escalation to ORANGE alert if the reservoir level reaches one metre below FRL

All contacts on Notification Flow Chart shall be updated of changes.

Based on this evaluation, follow the appropriate action

A. EVENT LEVEL DOWNGRADE	B. TERMINATION	C. EVENT LEVEL ESCALATION
Monitor conditions until damage is repaired	Go to **Termination and Follow-up**	Go to **SHEET B2** (ORANGE Alert)

ORANGE ALERT	***Event Description:*** **SPILLWAY RELEASE:** Large inflow to reservoir; Water level is one (1) metre below FRL; Controlled Release through Spillway.	**SHEET B2**

RECOMMENDED ACTIONS

Emergency Planning Manager

A. Implement the "Failure Condition Notification Flow Chart", using pre-scripted message.

B. Identify the areas that would be potentially impacted by the emergency events

C. Make careful observation and inspection of every part of the dam; this should be done without compromising the safety of anyone performing these tasks. Monitor water level in the reservoir in every hour.

D. Record all information, observations, and actions on an Event Log Form (**FORM 1**).

E. Contact the General Manager (Civil / Hydel) hourly to report the latest observations and conditions. If conditions change significantly, go to re-evaluation/decision section and follow relevant steps immediately

Site's Engineers

F. Observe conditions in site periodically and provide decision support as appropriate.

G. Provide corrective actions or work as required.

General Manager (Civil / Hydel)

H. Direct specific and appropriate procedures for reservoir operations.

Dam Safety Organization

I. Provide decision support and technical support to the Emergency Planning Manager as appropriate.

RE-EVALUATION / DECISIONS

Evaluate conditions CONTINUOUSLY and Determine if:

A. The event warrants downgrade to BLUE alert if rainfall is dwindling as per the Forecast.

B. The event remains at the current Event Level (No change in situation).

C. The event warrants escalation to RED alert if the integrity of the dam appears to be threatened by sudden or rapidly proceeding movements/displacements.

All contacts on Notification Flow Chart shall be updated of changes

Based on this Evaluation, follow the appropriate action

A. EVENT LEVEL DOWNGRADE	B. EVENT LEVEL REMAINS THE SAME	C. EVENT LEVEL ESCALATION
Go to SHEET B1(BLUE Alert)	Continue recommended actions on this sheet	Go to **SHEET B3** (RED Alert)

RED ALERT	**Event Description:** **SPILLWAY RELEASE:** Large inflow to reservoir; Water level has crossed FRL; Large Controlled Release through Spillway.	SHEET B3

RECOMMENDED ACTIONS

Emergency Planning Manager

A. Implement the "Failure Condition Notification Flowchart", using pre-scripted message.

B. Identify the areas that would be potentially impacted by the emergency events

C. Recommend to the Districts Collectors and Disaster Management Authorities **IMMEDIATE EVACUATION** downstream of the dam and affected areas as per Local Evacuation Plan.

D. Stay a safe distance away from the dam. The immediate concern is the safety of the downstream public

E. Record all information, observations, and actions on an Event Log Form (**FORM 1**).

Site's Engineers

F. Observe conditions from a safe place at dam site periodically and provide decision support as appropriate.

General Manager (Civil / Hydel)/ Dam Safety Organization

G. Provide decision support and technical support to the Emergency Planning Manager as appropriate.

RE-EVALUATION / DECISIONS based upon ANNEX TABLE I

Evaluate conditions CONTINUOUSLY and Determine if:

A. The event warrants downgrade to ORANGE alert if there is no longer an immediate impending threat of dam failure and water level reduced to 1 m below FRL.

B. The event remains at the current Event Level (No change in situation).

All contacts on Notification Flow Chart shall be updated of changes.

Based on this determination, follow the appropriate action

A. EVENT LEVEL DOWNGRADE	B. EVENT LEVEL REMAINS THE SAME	C. TERMINATION
Go to SHEET B2(ORANGE Alert)	Continue recommended actions on this sheet	Go to **Termination and Follow-up**

BLUE ALERT	***Event Description:*** **STRUCTURE CRACKING:** Minor cracks (bigger than ¼ cm.) in the masonry/concrete structure, without leakage.	SHEET C1

RECOMMENDED ACTIONS

Emergency Planning Manager

A. Implement the "Watch Condition Notification Flowchart", using pre-scripted message.

B. Make careful observation and inspection of every part of the dam; this should be done to monitor without compromising the safety of anyone performing the tasks.

C. Monitor water levels in the reservoir. Install a measurement device to monitor progress/movement in crack(s).

D. Classify and describe the type of crack pattern and evaluate possible causes.

E. Record all information, observations, and actions on an Event Log Form (**FORM 1**).

F. Contact the General Manager (Civil / Hydel) at least daily to report the latest observations and conditions. If conditions change significantly, go to re-evaluation/decision section and follow relevant steps immediately.

Site's Engineers

G. Photograph and record the location, direction (longitudinal, vertical, diagonal etc.), depth, length, width and offset of each crack that has been discovered. Compare observations with earlier results.

H. Closely monitor the crack for changes and look for structural damage, including mis alignment, settlement, vertical and horizontal displacements.

General Manager (Civil / Hydel)

I. Review the pertinent information in order to recommend appropriate actions to Emergency Planning Manager. Provide corrective actions or works as required.

Dam Safety Organization

J. Provide decision support and technical support to the Emergency Planning Manager as appropriate.

RE-EVALUATION / DECISIONS

Evaluate conditions CONTINUOUSLY and Determine if:

A. The event can be terminated if it is determined that the dam no longer pauses an immediate threat to downstream.

B. The event remains at the current Event Level.

C. The event warrants escalation to ORANGE alert if the cracks are enlarging AND leakage begins to flow from cracks.

All contacts on Notification Flow Chart shall be updated of changes.

Based on this evaluation, follow the appropriate action

A. TERMINATION	B. EVENT LEVEL REMAINS THE SAME	C. EVENT LEVEL ESCALATION
Go to **Termination and Follow-up**	Continue recommended actions on this sheet.	Go to **SHEET C2** (ORANGE Alert)

ORANGE ALERT	***Event Description:*** **STRUCTURE CRACKING:** Enlarging cracks (bigger than ¼ cm.) and active movement in the masonry/concrete structure, with leakage passing through.	SHEET C2

RECOMMENDED ACTIONS

Emergency Planning Manager

A. Implement the "Failure Condition Notification Flow Chart", using pre-scripted message.

B. Identify the areas that would be potentially impacted by the emergency events

C. Make careful observation and inspection of every part of the dam; this should be done without compromising the safety of anyone performing these tasks. Monitor closely for changes in the spillways and outlet structures that may be affected. Items to be monitored include vertical, horizontal and lateral displacements, structural cracking and tilting of spillway walls.

D. Monitor water levels in the reservoir and development of new crack(s).

E. Record all information, observations, and actions on an Event Log Form (**FORM 1**).

F. Contact the General Manager (Civil / Hydel) hourly to report the latest observations and conditions. If conditions change significantly, go to re-evaluation/decision section and follow relevant steps immediately.

Site's Engineers

G. Observe conditions in site periodically and provide decision support as appropriate.

H. Provide corrective actions or work as required.

General Manager (Civil / Hydel)

I. Study an emergency lowering of the reservoir.

Dam Safety Organization

J. Provide decision support and technical support to the Emergency Planning Manager as appropriate.

RE-EVALUATION / DECISIONS

Evaluate conditions CONTINUOUSLY and Determine if:

A. The event warrants downgrade to BLUE alert if the water level is lowered to safe level. Event may not be terminated until repairs are made and causes of crack (s) have been determined.

B. The event remains at the current Event Level.

C. The event warrants escalation to RED alert if the integrity of the dam appears to be threatened by sudden or rapidly proceeding movements/displacements.

All contacts on Notification Flow Chart shall be updated of changes

Based on this Evaluation, follow the appropriate action

A. EVENT LEVEL DOWNGRADE	B. EVENT LEVEL REMAINS THE SAME	C. EVENT LEVEL ESCALATION
Go to SHEET C1(BLUE Alert)	Continue recommended actions on this sheet	Go to **SHEET C3** (RED Alert)

RED ALERT	**Event Description:** **STRUCTURE CRACKING:** Enlarging cracks with sudden or rapidly proceeding movements/ displacements in the masonry/concrete structure with severe leakage passing through.	SHEET C3

RECOMMENDED ACTIONS

Emergency Planning Manager

A. Implement the "Failure Condition Notification Flowchart", using pre-scripted message.

B. Identify the areas that would be potentially impacted by the emergency events

C. Recommend to the Districts Collectors and Disaster Management Authorities **IMMEDIATE EVACUATION** downstream of the dam and affected areas as per Local Evacuation Plan.

D. Stay a safe distance away from the dam. The immediate concern is the safety of the downstream public

E. Record all information, observations, and actions on an Event Log Form (**FORM 1**).

Site's Engineers

F. Observe conditions from a safe place at dam site periodically and provide decision support as appropriate.

General Manager (Civil / Hydel)/ Dam Safety Organization

G. Provide decision support and technical support to the Emergency Planning Manager as appropriate.

RE-EVALUATION / DECISIONS based upon ANNEX TABLE I

Evaluate conditions CONTINUOUSLY and Determine if:

A. The event warrants downgrade to ORANGE alert if there is no longer an immediate impending threat of dam failure and water level reduced to 1 m below FRL.

B. The event remains at the current Event Level (No change in situation).

C. Event may be Terminated only when:

- The dam has failed AND there is no longer a threat to the downstream public

All contacts on Notification Flow Chart shall be updated of changes.

Based on this determination, follow the appropriate action

A. EVENT LEVEL DOWNGRADE	B. EVENT LEVEL REMAINS THE SAME	C. TERMINATION
Go to SHEET C2(ORANGE Alert)	Continue recommended actions on this sheet	Go to **Termination and Follow-up**

BLUE ALERT	***Event Description:*** **INSTRUMENTATION:** Instrumentation readings are beyond threshold values.	SHEET D1

RECOMMENDED ACTIONS

Emergency Planning Manager

A. Implement the "Watch Condition Notification Flowchart", using pre-scripted message.

B. Make careful observation and inspection of every part of the dam related with the instruments' measurements.

C. Monitor water levels and instrument readings for changes or anomalies.

D. Record all information, observations, and actions on an Event Log Form (**FORM 1**).

E. Contact the General Manager (Civil / Hydel) at least daily to report the latest observations and conditions.

F. If instrumentation readings at the dam are determined to indicate a potentially dangerous situation, go to the re-evaluation/decision section and follow relevant steps immediately.

Site's Engineers

G. Contact the Hydraulic Data Division & MRO's office regarding the anomalies.

H. Closely monitor the instruments' performance and increase frequency readings to determine negative/ dangerous trends.

General Manager (Civil / Hydel)

I. Review all pertinent information in order to recommend appropriate actions to Emergency Planning Manager. Provide corrective actions or works as required.

Dam Safety Organization

J. Provide decision support and technical support to the Emergency Planning Manager as appropriate.

RE-EVALUATION / DECISIONS

Evaluate conditions CONTINUOUSLY and Determine if:

A. The event can be terminated if instrumentation readings back to normal or if instrument reading determined to be invalid.

B. The event remains at the current Event Level.

C. The event warrants escalation, if instrumentation readings at the dam are determined to indicate a potentially dangerous situation.

All contacts on Notification Flow Chart shall be updated of changes.

Based on this evaluation, follow the appropriate action

A. TERMINATION	B. EVENT LEVEL REMAINS THE SAME	C. EVENT LEVEL ESCALATION
Go to **Termination and Follow-up**	Continue recommended actions on this sheet.	Monitor conditions until damage is repaired.

BLUE ALERT	***Event Description:*** **MALFUNCTIONING OF GATES:** Structural member of a gate, either broken or severely damaged, which prevent operation of the gate(s). No leakage or uncontrolled discharge is detected. Flood can be routed without damaged/non-operational gate(s).	SHEET E1

RECOMMENDED ACTIONS

Emergency Planning Manager

A. Implement the "Watch Condition Notification Flowchart", using pre-scripted message.
B. Make careful observation and inspection of every part of spillways, gates etc.
C. Monitor water levels in the reservoir and flood forecasting reports continuously.
D. Record all information, observations, and actions on an Event Log Form (**FORM 1**).
E. Contact the General Manager (Civil / Hydel) at least daily to report the latest observations and conditions. If conditions change significantly, go to re-evaluation/decision section and follow relevant steps immediately.
F. If forecasting reports bring about the need to operate the damaged/nonoperational gate(s) go to the re-evaluation /decision section and follow relevant steps immediately.

Site's Engineers

G. Contact the Hydro-Mechanical officials for rectifying defects
H. Monitor and supervise any remedial action and inform Emergency Planning Manager
I. Assure forecast data is transmitted at a higher frequency than normal operations

General Manager (Civil / Hydel)

J. Review the pertinent information in order to recommend appropriate actions to Emergency Planning Manager. Provide corrective actions or works as required.

Dam Safety Organization

K. Provide decision support and technical support to the Emergency Planning Manager as appropriate.

RE-EVALUATION / DECISIONS

Evaluate conditions CONTINUOUSLY and Determine if:

A. The event can be terminated if the anomalies has been rectified and the gates back to normal operation
B. The event remains at the current Event Level.
C. The event warrants escalation to ORANGE alert if the forecast data indicate that it is impossible to handle the flood without the operation of damaged gate

All contacts on Notification Flow Chart shall be updated of changes.

Based on this evaluation, follow the appropriate action

A. TERMINATION	B. EVENT LEVEL REMAINS THE SAME	C. EVENT LEVEL ESCALATION
Go to **Termination and Follow-up**	Continue recommended actions on this sheet.	Go to **SHEET E2** (ORANGE Alert)

ORANGE ALERT	***Event Description:*** **MALFUNCTIONING OF GATES**: Structural member of a gate, either broken or severely damaged, which prevents operation or malfunction of the gate(s). Considerable leakage or uncontrolled discharge is detected. Flood cannot be routed without damaged/non-operational gate(s).	**SHEET E2**

RECOMMENDED ACTIONS

Emergency Planning Manager

A. Implement the "Failure Condition Notification Flow Chart", using pre-scripted message.
B. Identify the areas that would be potentially impacted by the emergency events
C. Make careful observation and inspection of every part of spillways, gates etc.
D. Monitor water levels in the reservoir and flood forecasting reports continuously.
E. Record all information, observations, and actions on an Event Log Form (**FORM 1**).
F. Contact the General Manager (Civil / Hydel) hourly to report the latest observations and conditions. If conditions change significantly, go to re-evaluation/decision section and follow relevant steps immediately.

Site's Engineers

G. Observe conditions in site periodically and provide decision support as appropriate.
H. Provide corrective actions or work as required.

General Manager (Civil / Hydel)

I. Study an emergency lowering of the reservoir.

Dam Safety Organization

J. Provide decision support and technical support to the Emergency Planning Manager as appropriate.

RE-EVALUATION / DECISIONS

Evaluate conditions CONTINUOUSLY and Determine if:

A. The event warrants downgrade to BLUE alert if leakage was stopped and but still repair action should be done.
B. The event remains at the current Event Level.
C. The event warrants escalation to RED alert if the leakage is rapidly increasing through gates or the failure of gate is imminent. Unexpected discharges during non-flood season should be considered as high-risk events where an escalation in the level of alert is necessary.

All contacts on Notification Flow Chart shall be updated of changes

Based on this Evaluation, follow the appropriate action

A. EVENT LEVEL DOWNGRADE	B. EVENT LEVEL REMAINS THE SAME	C. EVENT LEVEL ESCALATION
Go to SHEET E1(BLUE Alert)	Continue recommended actions on this sheet	Go to **SHEET E3** (RED Alert)

RED ALERT	**Event Description:** **MALFUNCTIONING OF GATES**: Structural member of a gate, either broken or severely damaged, which prevents operation or malfunction of the gate(s). Unexpected high discharge is occurring. Flood cannot be routed without damaged/non-operational gate(s).	SHEET E3

RECOMMENDED ACTIONS

Emergency Planning Manager

A. Implement the "Failure Condition Notification Flowchart", using pre-scripted message.
B. Identify the areas that would be potentially impacted by the emergency events
C. Recommend to the Districts Collectors and Disaster Management Authorities **IMMEDIATE EVACUATION** downstream of the dam and affected areas as per Local Evacuation Plan.
D. Stay a safe distance away from the dam. The immediate concern is the safety of the downstream public
E. Record all information, observations, and actions on an Event Log Form (**FORM 1**).

Site's Engineers

F. Observe conditions from a safe place at dam site periodically and provide decision support as appropriate.

General Manager (Civil / Hydel)/ Dam Safety Organization

G. Provide decision support and technical support to the Emergency Planning Manager as appropriate.

RE-EVALUATION / DECISIONS based upon ANNEX TABLE I

Evaluate conditions CONTINUOUSLY and Determine if:

A. The event warrants downgrade to ORANGE alert if there is no longer an immediate impending threat of dam failure and water level lowered below the crest level of spillway.
B. The event remains at the current Event Level (No change in situation).
C. Event may be Terminated only when:
   - The gate has failed AND there is no longer a threat to the downstream public

All contacts on Notification Flow Chart shall be updated of changes.

Based on this determination, follow the appropriate action

A. EVENT LEVEL DOWNGRADE	B. EVENT LEVEL REMAINS THE SAME	C. TERMINATION
Go to SHEET E2 (ORANGE Alert)	Continue recommended actions on this sheet	Go to **Termination and Follow-up**

BLUE ALERT	***Event Description:*** **EARTHQUAKE:** Measurable earthquake felt or reported and dam appears to be stable.	SHEET F1

RECOMMENDED ACTIONS

Emergency Planning Manager

A. Implement the "Watch Condition Notification Flowchart", using pre-scripted message.
B. Make careful observation and inspection of every part of dam as per "Inspection Manual for Dam Field Engineers after Seismic Events for Maithon Dam"
C. Be prepared for after shocks
D. Record all information, observations, and actions on an Event Log Form (**FORM 1**).
E. Contact the General Manager (Civil / Hydel) at least daily to report the latest observations and conditions.
F. If inspection has determined a potentially dangerous situation, go to the re-evaluation /decision section and follow relevant steps immediately.

Site's Engineers

G. Conduct a comprehensive site inspection of the dam and appurtenant elements and make a report on most important finding as per "Inspection Manual for Dam Field Engineers after Seismic Events for Maithon Dam"
H. Monitor and supervise any remedial action and inform Emergency Planning Manager

General Manager (Civil / Hydel)

I. Review the pertinent information in order to recommend appropriate actions to Emergency Planning Manager. Provide corrective actions or works as required.

Dam Safety Organization

J. Provide decision support and technical support to the Emergency Planning Manager as appropriate.

RE-EVALUATION / DECISIONS

Evaluate conditions CONTINUOUSLY and Determine if:

A. The event can be terminated if the dam is determined to be stable and a sufficient amount of time has passed. After shocks are not expected.
B. The event remains at the current Event Level.
C. The event warrants escalation to ORANGE alert if the inspection has determined a potentially dangerous situation

All contacts on Notification Flow Chart shall be updated of changes.

Based on this evaluation, follow the appropriate action

A. TERMINATION	B. EVENT LEVEL REMAINS THE SAME	C. EVENT LEVEL ESCALATION
Go to **Termination and Follow-up**	Continue recommended actions on this sheet.	Go to **SHEET F2** (ORANGE Alert)

ORANGE ALERT	***Event Description:*** **EARTHQUAKE**: Earthquake resulting in visible damage to the dam or appurtenances which can cause a potentially dangerous situation	**SHEET F2**

RECOMMENDED ACTIONS

Emergency Planning Manager

A. Implement the "Failure Condition Notification Flow Chart", using pre-scripted message.
B. Identify the areas that would be potentially impacted by the emergency events
C. Be prepared for after shocks
D. Make careful observation and inspection of every part of dam as per "Inspection Manual for Dam Field Engineers after Seismic Events for Maithon Dam".
E. Monitor water levels in the reservoir and development of new damages or movements.
F. Record all information, observations, and actions on an Event Log Form (**FORM 1**).
G. Contact the General Manager (Civil / Hydel) hourly to report the latest observations and conditions.
H. If visible damages aggravate, rapidly go to re-evaluation/decision section and follow relevant steps immediately.

Site's Engineers

I. Observe conditions in site periodically and provide decision support as appropriate.
J. Conduct a comprehensive site inspection of the dam and appurtenant elements and make a report on most important finding as per "Inspection Manual for Dam Field Engineers after Seismic Events for Maithon Dam"
K. Provide corrective actions or work as required.

General Manager (Civil / Hydel)

L. Study an emergency lowering of the reservoir.

Dam Safety Organization

M. Provide decision support and technical support to the Emergency Planning Manager as appropriate.

RE-EVALUATION / DECISIONS

Evaluate conditions CONTINUOUSLY and Determine if:

A. The event warrants downgrade to BLUE alert if the water level in the reservoir is lowered below the bottom level of the damaged section
B. The event remains at the current Event Level.
C. The event warrants escalation to RED alert if one or multiple of the conditions have been observed;

Uncontrolled release of water over dam/rapidly developing flow through cracks

All contacts on Notification Flow Chart shall be updated of changes

Based on this Evaluation, follow the appropriate action

A. EVENT LEVEL DOWNGRADE	B. EVENT LEVEL REMAINS THE SAME	C. EVENT LEVEL ESCALATION
Go to **SHEET F1**(BLUE Alert)	Continue recommended actions on this sheet	Go to **SHEET F3** (RED Alert)

RED ALERT	**Event Description:** **EARTHQUAKE:** Earthquake resulting in uncontrolled release of water over dam or rapidly developing flow through cracks or rapidly developing erosion through increased seepage	SHEET F3

RECOMMENDED ACTIONS

Emergency Planning Manager

A. Implement the "Failure Condition Notification Flowchart", using pre-scripted message.
B. Identify the areas that would be potentially impacted by the emergency events
C. Recommend to the Districts Collectors and Disaster Management Authorities **IMMEDIATE EVACUATION** downstream of the dam and affected areas as per Local Evacuation Plan.
D. Stay a safe distance away from the dam. The immediate concern is the safety of the downstream public
E. Record all information, observations, and actions on an Event Log Form (**FORM 1**).

Site's Engineers

F. Observe conditions from a safe place at dam site periodically and provide decision support as appropriate.

General Manager (Civil / Hydel)/ Dam Safety Organization

G. Provide decision support and technical support to the Emergency Planning Manager as appropriate.

RE-EVALUATION / DECISIONS based upon ANNEX TABLE I

Evaluate conditions CONTINUOUSLY and Determine if:

A. The event warrants downgrade to ORANGE alert if there is no longer an immediate impending threat of dam failure and water level lowered below the leakage level in the water.
B. The event remains at the current Event Level (No change in situation).
C. Event may be Terminated only when:
   - The dam has failed AND there is no longer a threat to the downstream public

All contacts on Notification Flow Chart shall be updated of changes.

Based on this determination, follow the appropriate action

A. EVENT LEVEL DOWNGRADE	B. EVENT LEVEL REMAINS THE SAME	C. TERMINATION
Go to SHEET F2 (ORANGE Alert)	Continue recommended actions on this sheet	Go to **Termination and Follow-up**

BLUE ALERT	***Event Description:*** **SECURITY THREAT/SABOTAGE:** Unverified bomb threat or verified damage to the dam/appurtenances with no impacts in the functioning of the dam	SHEET G1

RECOMMENDED ACTIONS

Emergency Planning Manager

A. Implement the "Watch Condition Notification Flowchart", using pre-scripted message.
B. Notify Law Enforcement Authorities to help to evaluate the situation.
C. Make careful observation and inspection of every part of dam.
D. Record all information, observations, and actions on an Event Log Form (**FORM 1**).
E. Contact the General Manager (Civil / Hydel) at least daily to report the latest observations and conditions
F. If inspection has determined a potentially dangerous situation go to the re-evaluation /decision section and follow relevant steps immediately.

Site's Engineers

G. Access the dam only if the area has been cleared by Law Enforcement.
H. Observe conditions from a safe place at dam site periodically and provide decision support as appropriate.

General Manager (Civil / Hydel)

I. Review the pertinent information in order to recommend appropriate actions to Emergency Planning Manager. Provide corrective actions or works as required.

Dam Safety Organization

J. Provide decision support and technical support to the Emergency Planning Manager as appropriate.

RE-EVALUATION / DECISIONS

Evaluate conditions CONTINUOUSLY and Determine if:

A. The event can be terminated if the dam is determined to be stable and damages have been repaired. Local law enforcement authority has confirmed that there is no threat in the dam structure and surroundings.
B. The event remains at the current Event Level.
C. The event warrants escalation to ORANGE alert if the inspection has determined a potentially dangerous situation

All contacts on Notification Flow Chart shall be updated of changes.

A. TERMINATION	B. EVENT LEVEL REMAINS THE SAME	C. EVENT LEVEL ESCALATION
Go to **Termination and Follow-up**	Continue recommended actions on this sheet.	Go to **SHEET G2** (ORANGE Alert)

ORANGE ALERT	***Event Description:*** **SECURITY THREAT/SABOTAGE:** Verified bomb threat that if carried out, could result in damage of the dam/appurtenances that impacts the functioning of the dam OR verified damages due to vandalism that impacts the normal operation of the dam.	SHEET G2

RECOMMENDED ACTIONS

Emergency Planning Manager

A. Implement the "Failure Condition Notification Flow Chart", using pre-scripted message.
B. Notify Law Enforcement Authorities to help to evaluate the situation.
C. Identify the areas that would be potentially impacted by the emergency event
D. Make careful observation and inspection of every part of dam.
E. Record all information, observations, and actions on an Event Log Form (**FORM 1**).
F. Contact the General Manager (Civil / Hydel) hourly to report the latest observations and conditions.
G. If inspection has determined a potentially dangerous situation go to the re-evaluation /decision section and follow relevant steps immediately

Site's Engineers

H. Access the dam only if the area has been cleared by Law Enforcement.
I. Conduct a comprehensive site inspection of the dam and appurtenant elements and make a report on most important finding.
J. Provide corrective actions or work as required.

General Manager (Civil / Hydel)

K. Study an emergency lowering of the reservoir.

Dam Safety Organization

L. Provide decision support and technical support to the Emergency Planning Manager as appropriate.

RE-EVALUATION / DECISIONS

Evaluate conditions CONTINUOUSLY and Determine if:

A. The event warrants downgrade to BLUE alert if the water level in the reservoir is lowered below the bottom level of the damaged section
B. The event remains at the current Event Level.
C. The event warrants escalation to RED alert if one or multiple of the conditions have been observed;
Uncontrolled release of water over dam/rapidly developing flow through cracks

All contacts on Notification Flow Chart shall be updated of changes

Based on this Evaluation, follow the appropriate action

A. EVENT LEVEL DOWNGRADE	B. EVENT LEVEL REMAINS THE SAME	C. EVENT LEVEL ESCALATION
Go to **SHEET G1**(BLUE Alert)	Continue recommended actions on this sheet	Go to **SHEET G3** (RED Alert)

RED ALERT	**Event Description:** **SECURITY THREAT/SABOTAGE:** Detonated bomb resulting in visible damage to the dam or appurtenances OR verified damages due to vandalism causing an uncontrolled water release	SHEET G3

RECOMMENDED ACTIONS

Emergency Planning Manager

A. Implement the "Failure Condition Notification Flowchart", using pre-scripted message.
B. Identify the areas that would be potentially impacted by the emergency events
C. Recommend to the Districts Collectors and Disaster Management Authorities **IMMEDIATE EVACUATION** downstream of the dam and affected areas as per Local Evacuation Plan.
D. Stay a safe distance away from the dam. The immediate concern is the safety of the downstream public
E. Record all information, observations, and actions on an Event Log Form (**FORM 1**).

Site's Engineers

H. Observe conditions from a safe place at dam site periodically and inform Emergency Planning Manager

General Manager (Civil / Hydel)/ Dam Safety Organization

I. Provide decision support and technical support to the Emergency Planning Manager as appropriate.

RE-EVALUATION / DECISIONS based upon ANNEX TABLE I

Evaluate conditions CONTINUOUSLY and Determine if:

A. The event warrants downgrade to ORANGE alert if there is no longer an immediate impending threat of dam failure and water level lowered below to a safe level.
B. The event remains at the current Event Level (No change in situation).
C. Event may be Terminated only when:
   - The dam has failed AND there is no longer a threat to the downstream public

All contacts on Notification Flow Chart shall be updated of changes.

Based on this determination, follow the appropriate action

A. EVENT LEVEL DOWNGRADE	B. EVENT LEVEL REMAINS THE SAME	C. TERMINATION
Go to SHEET G2(ORANGE Alert)	Continue recommended actions on this sheet	Go to **Termination and Follow-up**

ORANGE ALERT	***Event Description:*** **Potential Embankment Overtopping.** Reservoir water surface elevation 1 m below the top of the breaching dyke	SHEET H2

RECOMMENDED ACTIONS

Emergency Planning Manager

A. Implement the "Failure Condition Notification Flow Chart", using pre-scripted message.
B. Identify the area that would be potentially impacted by the emergency events.
C. Make careful observations and inspection of every part of dam; this should be done without compromising the safety of any one performing these tasks. Monitor water levels and spillway area for erosion every 15 minutes.
D. Record all information, observations and actions on an Event Log Form (**Form 1**).
E. Contact the General Manager (Civil / Hydel) hourly to report the latest observations and conditions. If conditions change significantly, go to re-evaluation/decision section and follow relevant steps immediately.

Site's Engineers

F. Observe conditions at site periodically and provide decision support as appropriate.
G. Provide corrective actions or work as required.

General Manager (Civil / Hydel)/ Dam Safety Organization

H. Provide decision support and technical support to the Emergency Planning Manager as appropriate.

RE-EVALUATION / DECISIONS

Evaluate conditions CONTINUOUSLY and Determine if:

A. The event warrants downgrade to BLUE alert if the rainfall has stopped and slowing additional inflow to reservoir. Reservoir level are below MWL.
B. The event remains at the current Event Level.
C. The event warrants escalation to RED alert the water begins to overtop the embankment

All contacts on Notification Flow Chart shall be updated of changes

Based on this Evaluation, follow the appropriate action

A. EVENT LEVEL DOWNGRADE	B. EVENT LEVEL REMAINS THE SAME	C. EVENT LEVEL ESCALATION
Go to (BLUE Alert)	Continue recommended actions on this sheet	Go to **SHEET H3** (RED Alert)

RED ALERT	**Event Description:** **Embankment overtopping**. Water from the reservoir is flowing over the top of the breaching dyke	SHEET H3

RECOMMENDED ACTIONS

Emergency Planning Manager

A. Implement the "Failure Condition Notification Flowchart", using pre-scripted message.
B. Identify the areas that would be potentially impacted by the emergency events
C. Recommend to the Districts Collectors and Disaster Management Authorities **IMMEDIATE EVACUATION** downstream of the dam and affected areas as per Local Evacuation Plan.
D. Stay a safe distance away from the dam. The immediate concern is the safety of the downstream public
E. Record all information, observations, and actions on an Event Log Form (**FORM 1**).

Site's Engineers

F. Observe conditions from a safe place at dam site periodically and inform Emergency Planning Manager

General Manager (Civil / Hydel)/ Dam Safety Organization

G. Provide decision support and technical support to the Emergency Planning Manager as appropriate.

RE-EVALUATION / DECISIONS based upon ANNEX TABLE I

Evaluate conditions CONTINUOUSLY and Determine if:

A. The event warrants downgrade to ORANGE alert if there is no longer an immediate impending threat of dam failure and water level lowered below to a safe level.
B. The event remains at the current Event Level (No change in situation).
C. Event may be Terminated only when either:

- Spillway flows have been stopped with no additional rainfall occurring
- The dam has failed AND there is no longer a threat to the downstream public

All contacts on Notification Flow Chart shall be updated of changes.

Based on this determination, follow the appropriate action

A. EVENT LEVEL DOWNGRADE	B. EVENT LEVEL REMAINS THE SAME	C. TERMINATION
Go to SHEET G2(ORANGE Alert)	Continue recommended actions on this sheet	Go to **Termination and Follow-up**

BLUE ALERT	***Event Description:*** **Seepage**: Seepage through dam body. New or minor seepage at toe, on slope of embankment, abutments or galleries, water flowing clear	SHEET J1

RECOMMENDED ACTIONS

Emergency Planning Manager

A. Implement the "Watch Condition Notification Flowchart", using pre-scripted message.
B. Make careful observation and inspection of every part of dam.
C. Record all information, observations, and actions on an Event Log Form (**FORM 1**).
D. Contact the General Manager (Civil / Hydel) at least daily to report the latest observations and conditions
E. If inspection has determined a potentially dangerous situation go to the re-evaluation /decision section and follow relevant steps immediately.

Site's Engineers

A. Observe conditions from a safe place at dam site periodically and provide decision support as appropriate.
B. Use wooden stakes or flagging to delineate seepage area. Look for upstream whirlpools.

General Manager (Civil / Hydel)

C. Review the pertinent information in order to recommend appropriate actions to Emergency Planning Manager. Provide corrective actions or works as required.

Dam Safety Organization

D. Provide decision support and technical support to the Emergency Planning Manager as appropriate.

RE-EVALUATION / DECISIONS

Evaluate conditions CONTINUOUSLY and Determine if:

A. The event can be terminated if the seepage flow has been stopped and found that it is safe to impound water.
B. The event remains at the current Event Level.
C. The event warrants escalation to ORANGE alert if the inspection has determined a potentially dangerous situation

All contacts on Notification Flow Chart shall be updated of changes.

A. TERMINATION	B. EVENT LEVEL REMAINS THE SAME	C. EVENT LEVEL ESCALATION
Go to **Termination and Follow-up**	Continue recommended actions on this sheet.	Go to **SHEET J2** (ORANGE Alert)

ORANGE ALERT	***Event Description:*** **Seepage**: New, seriously or rapidly increasing seepage flow rate at toe, on slope of embankment, abutments or galleries, water flowing cloudy.	SHEET J2

RECOMMENDED ACTIONS

Emergency Planning Manager

A. Implement the "Failure Condition Notification Flow Chart", using pre-scripted message.
B. Identify the areas that would be potentially impacted by the emergency event.
C. Make careful observation and inspection of every part of dam.
D. Record all information, observations, and actions on an Event Log Form (**FORM 1**).
E. Contact the General Manager (Civil / Hydel) hourly to report the latest observations and conditions.

Site's Engineers

G. Access the dam only if the area has been cleared by Law Enforcement.
H. Conduct a comprehensive site inspection of the dam and appurtenant elements and make a report on most important finding.
I. Provide corrective actions or work as required.

General Manager (Civil / Hydel)

J. Study an emergency lowering of the reservoir.

Dam Safety Organization

K. Provide decision support and technical support to the Emergency Planning Manager as appropriate.

RE-EVALUATION / DECISIONS

Evaluate conditions CONTINUOUSLY and Determine if:

A. The event warrants downgrade to BLUE alert if the water level in the reservoir is lowered below the bottom level of the damaged section
B. The event remains at the current Event Level.
C. The event warrants escalation to RED alert if one or multiple of the conditions have been observed;

All contacts on Notification Flow Chart shall be updated of changes

Based on this Evaluation, follow the appropriate action

A. EVENT LEVEL DOWNGRADE	B. EVENT LEVEL REMAINS THE SAME	C. EVENT LEVEL ESCALATION
Go to **SHEET J1**(BLUE Alert)	Continue recommended actions on this sheet	Go to **SHEET J3** (RED Alert)

RED ALERT	**Event Description:** **Seepage**: Serious seepage at toe, on slope of embankment, abutments or galleries. Un controllable muddy water flowing. Failure of dam is imminent.	SHEET J3

RECOMMENDED ACTIONS

Emergency Planning Manager

A. Implement the "Failure Condition Notification Flowchart", using pre-scripted message.

B. Identify the areas that would be potentially impacted by the emergency events

C. Recommend to the Districts Collectors and Disaster Management Authorities **IMMEDIATE EVACUATION** downstream of the dam and affected areas as per Local Evacuation Plan.

D. Stay a safe distance away from the dam. The immediate concern is the safety of the downstream public

E. Record all information, observations, and actions on an Event Log Form (**FORM 1**).

Site's Engineers

F. Observe conditions from a safe place at dam site periodically and inform Emergency Planning Manager.

G. Construct a large ring dike around the seepage area as appropriate.

General Manager (Civil / Hydel)/ Dam Safety Organization

H. Provide decision support and technical support to the Emergency Planning Manager as appropriate.

RE-EVALUATION / DECISIONS based upon ANNEX TABLE I

Evaluate conditions CONTINUOUSLY and Determine if:

A. The event warrants downgrade to ORANGE alert if there is no longer an immediate impending threat of dam failure and water level lowered below to a safe level.
B. The event remains at the current Event Level (No change in situation).
C. Event may be Terminated only when:
   - The dam has failed AND there is no longer a threat to the downstream public

All contacts on Notification Flow Chart shall be updated of changes.

Based on this determination, follow the appropriate action

A. EVENT LEVEL DOWNGRADE	B. EVENT LEVEL REMAINS THE SAME	C. TERMINATION
Go to SHEET J2(ORANGE Alert)	Continue recommended actions on this sheet	Go to **Termination and Follow-up**

BLUE ALERT	***Event Description:*** **Sinkholes**: Sinkholes anywhere in the embankment or within 150 m downstream from the toe. No seepage or flowing water.	SHEET K1

RECOMMENDED ACTIONS

Emergency Planning Manager

A. Implement the "Watch Condition Notification Flowchart", using pre-scripted message.
B. Make careful observation and inspection of every part of dam.
C. Monitor Water levels and change in diameter or depth of sinkholes every two hours. Attempt to determine source of sinkholes.
D. Record all information, observations, and actions on an Event Log Form (**FORM 1**).
E. Contact the General Manager (Civil / Hydel) at least daily to report the latest observations and conditions

Site's Engineers

E. Photograph and record the location, size and depth of the depression/sinkhole. Carefully walk the entire embankment and downstream area looking for additional sinkholes, movement or seepage.
F. Use wooden stakes or flagging to delineate seepage area. Look for upstream whirlpools.

General Manager (Civil / Hydel)

G. Review the pertinent information in order to recommend appropriate actions to Emergency Planning Manager. Provide corrective actions or works as required.

Dam Safety Organization

H. Provide decision support and technical support to the Emergency Planning Manager as appropriate.

RE-EVALUATION / DECISIONS

Evaluate conditions CONTINUOUSLY and Determine if:

A. The event can be terminated if the sinkholes has been repaired and found that it is safe to impound water.
B. The event remains at the current Event Level.
C. The event warrants escalation to ORANGE alert if the size of sinkhole is increasing progressively

All contacts on Notification Flow Chart shall be updated of changes.

A. TERMINATION	B. EVENT LEVEL REMAINS THE SAME	C. EVENT LEVEL ESCALATION
Go to **Termination and Follow-up**	Continue recommended actions on this sheet.	Go to **SHEET K2** (ORANGE Alert)

ORANGE ALERT	***Event Description:*** **Sinkholes**: Sinkholes with seepage or flowing water anywhere in the embankment or within 150 m downstream from the toe.	SHEET K2

RECOMMENDED ACTIONS

Emergency Planning Manager

A. Implement the "Failure Condition Notification Flow Chart", using pre-scripted message.
B. Identify the areas that would be potentially impacted by the emergency event.
C. Make careful observation and inspection of every part of dam.
D. Record all information, observations, and actions on an Event Log Form (**FORM 1**).
E. Monitor water levels and change in diameter or depth of sinkhole every two hours.
F. Contact the General Manager (Civil / Hydel) hourly to report the latest observations and conditions.

Site's Engineers

H. Observe conditions in site periodically.
I. If conditions permit, plug the flow from upstream side with available material. Place an inverted filter over the exit area to hold soil material in place.
J. Provide corrective actions or work as required.

General Manager (Civil / Hydel)

K. Study an emergency lowering of the reservoir.

Dam Safety Organization

L. Provide decision support and technical support to the Emergency Planning Manager as appropriate.

RE-EVALUATION / DECISIONS

Evaluate conditions CONTINUOUSLY and Determine if:

A. The event warrants downgrade to BLUE alert if the water level in the reservoir is lowered below the bottom level of the sinkhole.
B. The event remains at the current Event Level.
C. The event warrants escalation to RED alert if the sinkhole enlarges or the new sinkholes begins to form.

All contacts on Notification Flow Chart shall be updated of changes

Based on this Evaluation, follow the appropriate action

A. EVENT LEVEL DOWNGRADE	B. EVENT LEVEL REMAINS THE SAME	C. EVENT LEVEL ESCALATION
Go to **SHEET K1**(BLUE Alert)	Continue recommended actions on this sheet	Go to **SHEET K3** (RED Alert)

RED ALERT	**Event Description:** **Sinkholes**: Sinkholes rapidly enlarging with muddy water anywhere in the embankment or within 150m downstream from the toe.	SHEET K3

RECOMMENDED ACTIONS

Emergency Planning Manager

A. Implement the "Failure Condition Notification Flowchart", using pre-scripted message.
B. Identify the areas that would be potentially impacted by the emergency events
C. Recommend to the Districts Collectors and Disaster Management Authorities **IMMEDIATE EVACUATION** downstream of the dam and affected areas as per Local Evacuation Plan.
D. Stay a safe distance away from the dam. The immediate concern is the safety of the downstream public
E. Record all information, observations, and actions on an Event Log Form (**FORM 1**).

Site's Engineers

F. Observe conditions from a safe place at dam site periodically and inform Emergency Planning Manager.
G. Construct a large ring dike around the seepage area as appropriate.

General Manager (Civil / Hydel)/ Dam Safety Organization

H. Provide decision support and technical support to the Emergency Planning Manager as appropriate.

RE-EVALUATION / DECISIONS based upon ANNEX TABLE I

Evaluate conditions CONTINUOUSLY and Determine if:

A. The event warrants downgrade to ORANGE alert if there is no longer an immediate impending threat of dam failure and water level lowered below to a safe level.
B. The event remains at the current Event Level (No change in situation).
C. Event may be Terminated only when:
   - The dam has failed AND there is no longer a threat to the downstream public

All contacts on Notification Flow Chart shall be updated of changes.

Based on this determination, follow the appropriate action

A. EVENT LEVEL DOWNGRADE	B. EVENT LEVEL REMAINS THE SAME	C. TERMINATION
Go to SHEET K2 (ORANGE Alert)	Continue recommended actions on this sheet	Go to **Termination and Follow-up**

BLUE ALERT	***Event Description:*** **Embankment cracking**: Cracks in the embankment crest or slopes greater than ½ cm or ¼ inch wide and considerable length without seepage.	SHEET L1

RECOMMENDED ACTIONS

Emergency Planning Manager

F. Implement the "Watch Condition Notification Flowchart", using pre-scripted message.
G. Make careful observation and inspection of every part of dam.
H. Monitor Water levels and crack widths for movement or seepage.
I. Record all information, observations, and actions on an Event Log Form (**FORM 1**).
J. Contact the General Manager (Civil / Hydel) at least daily to report the latest observations and conditions

Site's Engineers

I. Photograph and record the location, length, depth and offset of each crack that has been discovered. Stakes should be placed at the end of crack and distance between stakes measured and recorded. Compare observations with earlier results.
J. Closely monitor the crack for changes.

General Manager (Civil / Hydel)

K. Review the pertinent information in order to recommend appropriate actions to Emergency Planning Manager. Provide corrective actions or works as required.

Dam Safety Organization

L. Provide decision support and technical support to the Emergency Planning Manager as appropriate.

RE-EVALUATION / DECISIONS

Evaluate conditions CONTINUOUSLY and Determine if:

A. The event can be terminated if it is determined that the dam no longer poses an immediate threat to downstream.
B. The event remains at the current Event Level.
C. The event warrants escalation to ORANGE alert if cracks are enlarging or water begins to flow from cracks.

All contacts on Notification Flow Chart shall be updated of changes.

Based on this Evaluation, follow the appropriate action

A. TERMINATION	B. EVENT LEVEL REMAINS THE SAME	C. EVENT LEVEL ESCALATION
Go to **Termination and Follow-up**	Continue recommended actions on this sheet.	Go to **SHEET L2** (ORANGE Alert)

ORANGE ALERT	***Event Description:*** **Embankment cracking**: Cracks in the embankment crest or slopes greater than ½ cm or ¼ inch wide and considerable length with active movement/ slippage and seepage through cracks.	**SHEET L2**

RECOMMENDED ACTIONS

Emergency Planning Manager

A. Implement the "Failure Condition Notification Flow Chart", using pre-scripted message.
B. Identify the areas that would be potentially impacted by the emergency event.
C. Make careful observation and inspection of every part of dam.
D. Record all information, observations, and actions on an Event Log Form (**FORM 1**).
E. Monitor water levels and development of new cracks or movement hourly.
F. Contact the General Manager (Civil / Hydel) hourly to report the latest observations and conditions.

Site's Engineers

H. Observe conditions in site periodically.
I. If conditions permit, stabilize slides on the downstream slope by adding weight in the toe area below the slide with additional soil or rock.
J. Provide corrective actions or work as required.

General Manager (Civil / Hydel)

K. Study an emergency lowering of the reservoir.

Dam Safety Organization

L. Provide decision support and technical support to the Emergency Planning Manager as appropriate.

RE-EVALUATION / DECISIONS

Evaluate conditions CONTINUOUSLY and Determine if:

A. The event warrants downgrade to BLUE alert if the water level in the reservoir is lowered below the bottom level of the embankment fill.
B. The event remains at the current Event Level.
C. The event warrants escalation to RED alert if the integrity of the dam appears to be threatened by sudden or rapidly proceeding slides.

All contacts on Notification Flow Chart shall be updated of changes

Based on this Evaluation, follow the appropriate action

A. EVENT LEVEL DOWNGRADE	B. EVENT LEVEL REMAINS THE SAME	C. EVENT LEVEL ESCALATION
Go to **SHEET L1**(BLUE Alert)	Continue recommended actions on this sheet	Go to **SHEET L3** (RED Alert)

RED ALERT	**Event Description:** **Embankment cracking**: Sudden or rapidly proceeding slides of the embankment slopes. Cracks that extends up to the reservoir elevation.	SHEET L3

RECOMMENDED ACTIONS

Emergency Planning Manager

A. Implement the "Failure Condition Notification Flowchart", using pre-scripted message.
B. Identify the areas that would be potentially impacted by the emergency events
C. Recommend to the Districts Collectors and Disaster Management Authorities **IMMEDIATE EVACUATION** downstream of the dam and affected areas as per Local Evacuation Plan.
D. Stay a safe distance away from the dam. The immediate concern is the safety of the downstream public
E. Record all information, observations, and actions on an Event Log Form **(FORM 1).**

Site's Engineers

F. Observe conditions from a safe place at dam site periodically and inform Emergency Planning Manager.

General Manager (Civil / Hydel)/ Dam Safety Organization

G. Provide decision support and technical support to the Emergency Planning Manager as appropriate.

RE-EVALUATION / DECISIONS based upon ANNEX TABLE I

Evaluate conditions CONTINUOUSLY and Determine if:

A. The event warrants downgrade to ORANGE alert if the seepage has stopped and water level in the reservoir is lowered below level of seepage.
B. The event remains at the current Event Level (No change in situation).
C. Event may be Terminated only when:
   - The dam has failed AND there is no longer a threat to the downstream public

All contacts on Notification Flow Chart shall be updated of changes.

Based on this determination, follow the appropriate action

A. EVENT LEVEL DOWNGRADE	B. EVENT LEVEL REMAINS THE SAME	C. TERMINATION
Go to SHEET L2 (ORANGE Alert)	Continue recommended actions on this sheet	Go to **Termination and Follow-up**

FORM 1

UNUSUAL OR EMERGENCY EVENT LOG

(To be completed during the emergency)

Dam name: MAITHON District: Dhanbad

When and how was the event detected? :

Weather conditions:

General description of the emergency situation:

Emergency level determination:

Made by:

Actions and Event Progression

Date	Time	Action/event progression	Recorded by

Date	Time	Action/event progression	Recorded by

Annexure - 5: Supplies & Resources

The following equipment and supplies may be necessary for use during a dam emergency. Contact information for local contractors who can provide the following items during an emergency is listed below. For supplies owned by the dam owner, the dam owner's name and the specific location of the supplies have been denoted.

Equipment/Supplies	Location
Civil Contractors	M/s Amarjeet Enterprises, Contact: 9430103461
	M/s Kanai Gope, Contact: 7320096984
	M/s Subodh Mondal, Contact: 7004705799
	M/s Sirazul Ansari, Contact: 9431730115
	M/s Nabagopal Mondal, Contact: 7004510970
	M/s Subhash Chandra Monmdal, Contact: 7979754213
	M/s Sukla Construction, Contact: 9932893734
	M/s Asim Baksi, Contact: 7488442851
	M/s Jaybihari Choudhri, Contact: 8051532795
	M/s R.P. Construction, Contact: 9709090103
	M/s Raja Kishore Behura, Contact: 7294811299
Hydro-mechanical Works	M/s Hardware tools and machinery projects, Ahemdabad Contact 9879592850, 79268718047, 7573032588 Email tenders@htmpl.com
	M/s Greyhound Engineers (India) Pvt Ltd, Faridabad Contact 9523014802
	M/s S.G. Power, Silliguri, W.B. Contact-9800152489
	M/s Texmaco Rail & Engineering Ltd., Kolkata Contact 7605026363, +91 33 2569 1500
	M/s Maha Hydraulics Pvt. Ltd., Kanchipuram Tamil Nadu. Contact 9500121705, 9500121700 Email: sales@mahahydraulics.com
	M/s Hunger Hydraulics, India, Howrah Contact 8697704524

Equipment/Supplies	Location
	Indwell Constructions Private Limited, Durgapur, Contact: 9378161771
	M/s B.K. Construction, Durgapur, Contact: 9102038352, 6297534792, 0343-2537430
	M/s Rexroth, Kolkata Contact 8017990129
	Omprakash, M/s Technotrade, Mob: 9800897706
	Y K Enterprises BTPS, Bokaro, Mob: 9155125548
	Jha Engineering Works Madhubani, Bihar, Mob: 9449224837, 9862189547
	S N Singh, Ramgarh, Contact: 9334484903
	M/s Techno Power, Durgapur Contact 9434065081
	M/s Arun Construction, New Delhi, Contact: 9968012181
Heavy Equipment	Waliram Taneja Mines Pvt Ltd, Asansol, 9434010532
	Prasad Engineering Enterprise, Asansol, 8617676752
Backhoes, Dump trucks, Portable welding equipment, Generators, Bulldozers, Excavators, Loaders, Motor graders	N Khan Bokaro Thermal, Bokaro, Mob: 9334014824/9006972721
	B. K. Construction Bokaro Themal, Bokaro, Mob: 8521620665
Crane	M/s ELECTRONET CONTROL, Kolkata Contact 8981117648
	M/s M/S GAZE ELEVATORS INDIA, Koderma Contact 9398288817
	Khalsa Equipments, Contact: 9973677205
	Reva Cranes, Faridabad, Haryana, Contact: 9971267774
DG Set	M/s M/s United Machinery Sales & Services, Asansol, Contact 9233389014, 923389011
	Garuda Power Pvt. Ltd. Asansol 9163308179
	Rishabh Engineering Company, Dhanbad 9152665688

Equipment/Supplies	Location
Electrical Works	Ghosh Engineering Works, Contact: 9732024934
	M/s Om Electricals Power Pvt. Ltd, Hatia Ranchi Contact 9431106367, 9431545963
	Techno Electric & Engineering Co. Ltd., Kolkata (033) 4051 3000
	Raksha Electricals, Durgapur Contact: 9732093232
Consultants (Hydraulic, Geotechnical, Mechanical, Structural)	Central Water & Power Research Station (CWPRS), Pune, +91(20)24103200 / :+91(20) 24380511
	Central Soil And Materials Research Station (CSMRS), New Delhi Office Ph: +91-11-26967985 /+91-11- 26961894
Grouting Works	APAAR India, New Delhi 9711201160
	Dynasoure Concrete Treatment Pvt. Ltd., Mumbai 7738071134 /9653023194
Underwater Investigation	M/s Planys, Chennai 9833641091
	M/s Coratia Technologies, Pvt. Ltd. Rourkela, Odissa 769008 Contact 8984007355 Email:contact@coratia.com, debpradhan@coratia.com, coratech2020@gmail.com

Annexure - 6: Annual EAP Evaluation Checklist

Evaluation Checklist

Was the Annual Dam Inspection conducted?	□ Yes □ No	If yes, has the EAP been revised to include any signs of failures observed during the inspection?
Was weed clearing, animal burrow removal, or other maintenance required?	□ Yes □ No	If yes, describe actions taken and date.
Was the outlet gate operable?	□ Yes □ No	If no, describe actions taken and date.
Does the Notification Flow Charts require revision? (Note that revision of the contact information will not require EAP approval; however, the revised contact information pages will need to be distributed as replacement pages)	□ Yes □ No	If yes, list the dates of the contact information revision and redistribution.
Was annual training or a tabletop drill conducted?	□ Yes □ No	Circle : training drill Date conducted:
Are inspection and training records included in the EAP?	□ Yes □ No	
Was the EAP reviewed?	□ Yes □ No	If yes, review date:
Were changes required to the EAP?	□ Yes □ No	If yes, date of revised EAP approval:

_____ _____

[Name and title of appropriate manager for Owner] **Date:**

Annexure - 7: Plan, Review & Update

This plan will be reviewed and updated annually and tabletop drills will be carried out at least once every two years. Document these reviews below.

Date of Review: _____ Participants:

Date of Review: _____ Participants:

Date of Review: _____ Participants:

Date of Review: _____ Participants:

Date of Tabletop Drill: _____ Participants:

Annexure - 8: Training Record

Use this form to record training sessions. File the completed form in the appropriate Annexure of the EAP. All items in the EAP should be thoroughly reviewed during training. Appropriate Damodar Valley Corporation employees and EAP team members should attend a training session annually (or participate in a simulated drill).

Training Location:	
Date : **Time:** **Instructor:**	
Class Sign-in:	
Type of simulation conducted:	***Circle Emergency type:*** ***Emergency Water Release*** ***Watch Condition*** ***Possible Dam failure*** ***Imminent Dam failure*** ***Actual Dam failure***
Comments, Results of Drill:	
Revision needed to EAP based on results of Drill? **Yes☐ No ☐** **If yes, list revisions required:**	

Annexure - 9: Flood Hazard Reference Values cum Evacuation Table

Flood hazard reference values, for each of the three failure conditions, consisting of Maximum Water Surface Elevation and Flood Wave Arrival Time at various locations downstream from Maithon Dam along with shelter locations etc. are presented in this Annexure. The locations were marked from Google Earth Pro and the village name has been taken from Google Satellite Image. The chart shown here shall be used in conjunction with the Inundation cum Evacuation Maps as enclosed in **Annexure – 10.**

As the maps, settlements, shelter locations etc. shown in the map has been finalized with the help of Satellite imagery, there may be chances of some left over settlements, which also needs to be evacuated. The Disaster Management Authorities / evacuation team shall utilize the information of Maximum Water Surface Elevation (against each settlement) as given in this Annexure for evacuating the the marked settlements as well as left over portions. The same information will also help them to identify / modify the shelter points. Any changes required to be incorporated in the shelter details etc shall be shared with Dam Site Engineers, Emergency Planning Managers or the office of General Manager (Civil), DVC, Maithon for updating this document.

Note: Because of the method, procedures and assumptions used to determine the flooded areas; the limits of flooding shown and flood wave arrival times are approximate and should be used only as a guideline for establishing evacuation zones. Areas inundated in an actual event will depend on actual failure conditions and may differ from areas shown on the maps.

ENCLOSED SEPARATELY

Annexure - 10: Inundation Cum Evacuation Maps

Inundation cum Evacuation maps have been prepared for the following three causes of flooding:

1. A dam failure caused by overtopping from the inflow design flood leading to breaching and uncontrolled release of impounded water.
2. A non-flood dam failure caused by internal erosion (piping) with the reservoir at full supply level (often called a “Fair-Weather Failure”) leading to breaching and uncontrolled release of impounded water.
3. A large controlled-release flood without dam failure.

The maps, enclosed in the following pages, show

1) The area Inundated
2) Arrival time of Flood water
3) Settlements
4) Shelter Location
5) Bridges, Railway Lines & Roads

ENCLOSED SEPARATELY

Failure Condition Notification Flowchart of Maithon Dam

Maithon Dam Office Site

Shri Prakash Kumar
Manager (Civil)
Mob: 6200165884,
prakashkumar@dvc.gov.in,
prakashbitdbg@gmail.com

Shri Rabindra Kumar Nayak
Manager (M), Maithon Hydel Station
Mob: 9905712902
rabindra.nayak @dvc.gov.in

(1)

Emergency Planning Manager

Shri Lomas Kumar,
Sr. Manager (Civil) & I/c
Circle II, Maithon
7004705508,
lomas.kumar@dvc.gov.in,

Shri Sanjay Kumar
DGM (Mech), Maithon Hydel Station,
Mob:9748975012
Sanjay.kumar@dvc.gov.in

(5)

Available Resources*

Civil Works

M/s K K Jain
Gomia, Bokaro
JH – 829111
9431378985

M/s Rahul Buildcon
Bagodar, Giridih
JH – 825322
98002386994

Heavy Equipment & HM Work

N. Khan
BTPS,Bokaro
9334014824

Y K Enterprises
BTPS,Bokaro
9155125548

(2)

Office of the Chief Engineer (Civil), DVC, Maithon

Shri Sanjeet Kumar Sinha
Sr. General Manager (Civil),
DVC,Maithon
Mob:9431034049
Off.No.: 06540-279632
sanjeet.sinha@dvc.gov.in

Shri Roshan Lakra
General Manager (Civil),
DVC,Maithon
Mob:9474454835
roshan.lakra@dvc.gov.in

(1)

Office of the Executive Director (Civil), DVC, Maithon

Shri A. K. Dubey
Executive Director (Civil) & HoP, Maithon
Mob: 9431122635
email: anjani.dubey@dvc.gov.in,
email: akdubey1965@gmail.com

(1)

Office of the Chairman, DVC, Maithon

Shri S. Suresh Kumar, IAS
Chairman, DVC
Mob: (033)2355-7935
email: chairman@dvc.gov.in

(4)

Engineering& Planning, DVC, Maithon

Shri Manik Pandey
Dy. GM (Civil),
E&P, DVC, Maithon
Mob:7980727394
Off.No.:06540-279453
manik.pandey@dvc.gov.in

(3)

(1)

Office of the General Manager (Civil), Dam Safety, DVC, Maithon

Shri Sanjeet Kumar Sinha
Sr. General Manager (Civil),
DVC,Maithon
Mob:9431034049
Off.No.: 06540-279632
sanjeet.sinha@dvc.gov.in

Shri Ram Krishna
Sr Manager (Civil),
DVC,Maithon
Mob:7250169673
ram.krishna@dvc.gov.in

(3)

(3)

Manager,Reservoir Operations DVC, Maithon

Smt. Nag Sudha Kumari
Sr.Manager (Civil) & MRO,
DVC,Maithon
Mob:8002614342
Off.No.:06540-279445
nag.kumari@dvc.gov.in

(1)

CWC Regional Office, Maithon

Shri ShashiRakesh
Director,CWC, Maithon
Mobile:9711999234
Off.No.:06540-279812

(3)

District Authority, Purulia

Shri Rajat Nanda
District Magistrate, Purulia
9434001122 (R) / 8373068601(M)
dm-pur-wb@nic.in, dmpuruliawb@gmail.com

Shri Avijit Banerjee
Superintendent of Police, Purulia
03252 222304 /9147888744
sppla7@gmail.com,
puruliasp@gmail.com

Shri Manoj Bandopadhyay,
DDMO, Purulia
9432579742 / 7003165648 /
7872488802, ddmopurulia@gmail.com

District Authority, Bankura

Shri Siyad N, IAS
District Magistrate, Bankura
Contact No: 9475900047 (M),
dm-bank@nic.in

Shri Vaibhav Tiwari
Superintendent of Police, Bankura
03242 250305/ 250306,
spbankura@gmail.com

Shri Prasenjit Sengupta
DDMO, Bankura
9475900087,
dmd.bankura@gmail.com

District Authority, West Burdwan

Shri Ponnambalam S. , IAS
District Magistrate, Paschim Bardhaman
0341-2554545(O)
dmpaschimbardhaman@gmail.com

Shri Laxmi Narayan Meena
Superintendent of Police, Paschim Bardhaman
(Asansol Durgapur Police Commissionerate),
0341-2257260,
cp@asansoldurgapurpolice.in

Shri Abhijit Sarkar
DDMO, Paschim Bardhaman
Contact: 9830077994,
ddmopashimbdn@gmail.com

District Authority, East Burdwan

Shri Purnendu Kumar Maji, WBCS (Exe)
District Magistrate, Purba Bardhaman
Contact: 0342-2662428(O),
0342-2625700/2625702(R) / 9734750500 (M)
Email: dm-burd@nic.in

Shri Kamanasish Sen
Superintendent of Police, Purba Bardhaman
0342 26 62956 (O) / 24400 (R),
crbbwm@gmail.com

Shri Bamapada Kundu,
DDMO, Purba Bardhaman
Contact: 9434005678 / 9073936749 /
7980911141, ddmo.burdwan@gmail.com

District Authority, Howrah

Dr. (Ms.) P. Deepap Priya , IAS
District Magistrate, Howrah
033 -26412961(O),
dm-how-wb@nic.in

Ms Swati Bhangalia
Superintendent of Police, Howrah
033 2661 6210 / 033 2653 8088
dcrbrural@gmail.com

Shri Bandana Guha, DDMO, Howrah
9830193381,
ddmo.howrah@gmail.com

District Authority, Howrah

Smt Mukta Arya , IAS
District Magistrate, Hooghly
Contact No: 9831992000 (M)
dm-hoog@nic.in, deohooghly2021@gmail.com

Shri Kamanasish Sen, IPS
Superintendent of Police, Hooghly
033 2661 6210 (O) / 033 2653 8088 (R)
sphooghly-wb@nic.in

Shri Amiya Ranjan Mandal, DDMO, Hooghly
Contact: 7439778596,
ddmo.hooghly@gmail.com

District Authority, Paschim Medinipur

Sri Khursheed Ali Qadri, IAS
District Magistrate, Paschim Medinipur,
Contact No: 9434750400 (M),
Email: dmpmid@gmail.com

Shri Dhritiman Sarkar, IPS
Superintendent of Police, Paschim Medinipur
03222-275609,
sppaschimmedinipur@gmail.com

Shri Sandip Biswas, DDMO,
Paschim Medinipur,
Contact: 9163460173 / 9073936736 / 8348691717
dmdpaschimmedinipur@gmail.com

(1)

(2)

NDSA, New Delhi

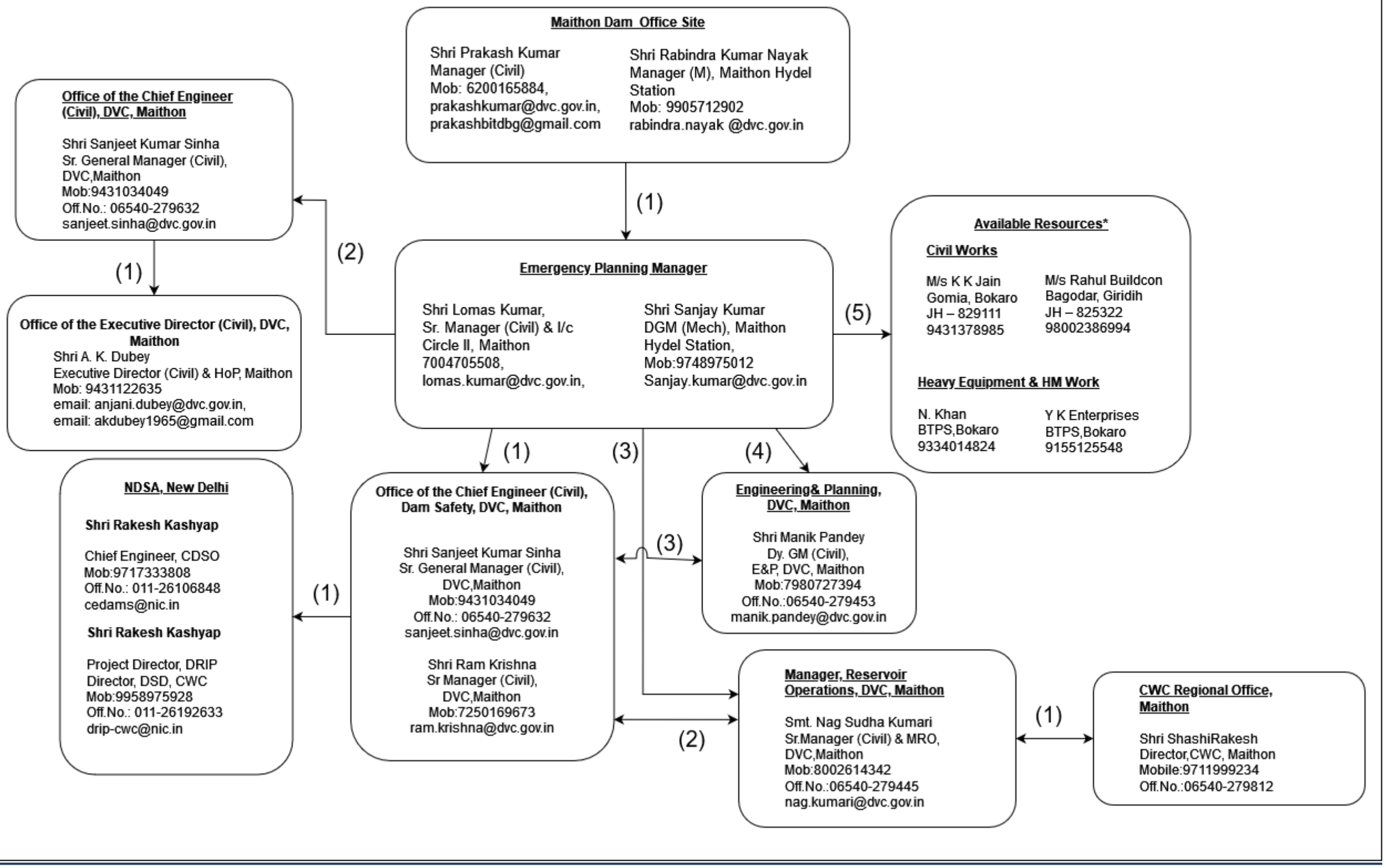
Shri Rakesh Kashyap
Chief Engineer, CDSO
Mob:9717333808
Off.No.: 011-26106848
cedams@nic.in

Shri Rakesh Kashyap
Project Director, DRIP
Director, DSD, CWC
Mob:9958975928
Off.No.: 011-26192633
drip-cwc@nic.in

National Disaster Management Authority

Shri Kamal Kishore, Member & HOD
Contact:011-26701751 / 53/
secretary@ndma.gov.in
mitigation@ndma.gov.in
NDMA Control Room : 9868891801 / 9868101885
011-26701728,011-1078
controlroom@ndma.gov.in
ndmacontrolroom@gmail.com

Watch Condition Notification Flowchart of Maithon Dam



EMERGENCY ACTION PLAN

FOR

MAITHON DAM

JH05HH0008

DAMODAR VALLEY CORPORATION

May 2024