



• Government of Maharashtra •
Water Resources Department

Surya Project (Dhamni Dam), Tal. Vikramgad, Dist. Palghar
SOP-Flood Management

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Standard Operating Procedure For Flood Control of Dhamni Dam of Surya Project

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१९	जिल्हा पूरनियंत्रक अधिकारी, नांव, पत्ता, दुरध्वनी / भ्रमणध्वनी क्रमांक, ई-मेल.	:-	इंजि. प्रकाश ब. मिसाळ अधीक्षक अभियंता, ठाणे पाटबंधारे मंडळ, ठाणे दूरध्वनी - ०२२-२५३२९८५९/२५३२९३८६ मो. ८८८८८०७६५० ई-मेल - seticthn@gmail.com /			

२०	प्रकल्प पूरनियंत्रक अधिकारी, नांव, पत्ता, दूरध्वनी / भ्रमणध्वनी क्रमांक, ई-मेल.	:- इंजि. र. भा. पवार , कार्यकारी अभियंता, पालघर पाटबंधारे विभाग, मनोर दूरध्वनी - ८००७३३५३७३ मो. ७५८८८५१६०४/८६९८३८८९९९ ई-मेल - cepidpalghar@gmail.com
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Statement showing storage content in Dhamni Dam at various levels

R.L. (In M.)	Storage (In Mm³)	R.L. (In M.)	Storage (In Mm³)
68.00	0.001	97.00	48.485
69.00	0.040	98.00	54.622
70.00	0.073	99.00	60.760
71.00	0.119	100.00	66.897
72.00	0.158	101.00	75.155
73.00	0.344	102.00	83.412
74.00	0.530	103.00	91.670
75.00	0.716	104.00	99.927
76.00	0.902	105.00	110.517
77.00	1.390	106.00	121.107
78.00	1.879	107.00	131.697
79.00	2.367	108.00	142.287
80.00	2.855	109.00	155.055
81.00	3.876	110.00	167.822
82.00	4.896	110.60	175.488
83.00	5.917	111.00	180.590
84.00	6.937	112.00	193.357
85.00	8.710	113.00	207.852
86.00	10.482	114.00	222.347
87.00	12.255	115.00	236.842
88.00	14.027	116.00	251.337
89.00	16.002	117.00	267.833
90.00	19.697	118.00	284.222
91.00	22.532	118.60	285.310
92.00	22.367	119.00	300.664
93.00	29.612	120.00	317.107
94.00	33.857	120.35	323.622
95.00	38.102	124.00	391.567
96.00	42.347		

Discharge Table

Statement showing discharge through one gate, when gate opened for maintaining the required level in reservoir-formula used

$$Q = (2/3) \times V \times 2.3 \text{ C.L. } (H_1^{3/2} - H_2^{3/2}) \text{ in F.P. System}$$

Sr. No.	Reservoir level (In M.)	Water over crest H1 (In M.)	Gate Opening D	(H1-d) (H2)	d/H1	C in F.P.S. System	Discharge through one gate (In cumecs)
1	2	3	4	5	6	7	8
1	113.60	3.00	0.400	2.600	0.135	0.705	24.72
2	115.60	5.00	0.300	4.700	0.060	0.727	24.94
3	117.60	7.00	0.275	6.725	0.039	0.725	26.86
4	118.60	8.00	0.305	7.695	0.038	0.730	32.13

CHAPTER NO. 1

PREAMBLE

Dhamni Dam of Surya Project Tal. Vikramgad is constructed as a multi-purpose project designed for water storage and not as flood control measures.

Recurring flood losses hamper the economic development of the area. Flood is a constant threat to the population residing in the area where inundations occur frequently. The situation calls for improved flood preparedness in order to ensure that appropriate and effective response measures are taken during flood emergency and thereby minimize the loss of life, property and environment. Apart from an effective disaster response system, it is important to have an effective flood prevention and mitigation strategy to reduce the vulnerability.

Thus far, flood control measures have been undertaken through planned pre-monsoon meetings at different levels- from the project level to the State level. These coordination meetings envisage exchange of information and specific coordination activities among authorities responsible for flood management, and sensitization for pre-monsoon & monsoon activities.

The Government of Maharashtra Department of Water Resources Directorate of Disaster Management felt the need for standardizing the operating procedures. With this in view the Department of Water Resources has prepared the SOP for flood management of Dhamni Dam of Surya Project Tal. Vikramgad Dist. Palghar.

1.1 GENERAL OPERATIONS OF DHAMNI DAM OF SURYA PROJECT :

The primary requirement of dams is to plan the outflows in such a manner that by the end of the monsoons the reservoirs are filled to 100% capacity, subject to the adequacy of rainfall. The operation of each gated dam is regulated through a Reservoir Operation Schedule (ROS) that lays out the schedule of releases. The ROS is prepared on the basis of fortnightly reports 95% dependable yields during the monsoon. As per the ROS the reservoirs are kept at lower levels in order to have absorption capacity to accommodate flood water and thereby enable controlled discharges through spillway gates.

Water managers face the challenge of controlling the outflows while at the same time maintaining reservoir levels such that they are filled by the end of the monsoon. The increasingly inconsistent pattern of rainfall and its uneven distribution due to climate change have increased the difficulty of this task.

CHAPTER NO. 2

OBJECTIES OF SOP

This SOP aims at taking timely action with a view to prevent or minimize damage to human and animal life and to property and environment in and around the river. This will be done by improving systematic coordination among Departments and stakeholders, and streamlining communication at all levels of decision making. Objectives are as follows :-

- i) Identify hazard potential on downstream of the dam.
- ii) Monitor flood situation.
- iii) Warning about probable floods in advance, to have advance action.
- iv) Monitor and protect irrigation as well as all other infrastructures created and protection of Human lives & live stocks.
- v) Restore damaged infrastructure due to floods.

2.1 The SOPs are prepared for Dhamni Dam of Surya Project Major Project

- i) Gated dams with manual, electrical or mechanical power operated gates, irrespective of the storage capacity or spillway discharging capacity.

2.2 Components of the Standard Operating Procedure.

- i) Pre monsoon preparations ;
Appointment of flood control officers.
Fixing duties & responsibilities of flood control officers.
- ii) Operating procedure during the monsoon.
Flood control measures to be taken at dam site.
Action to be taken by Water Resources Department.
Actions to be taken by other Departments of the Government.
- ii) Post monsoon inspections of damage and distress in dam and in river.

Dam shall be inspected by the responsible relevant officer as instructed in Government Circulars and manuals, the works related with Dam Safety and require for flood control shall be taken on priority & completed by WRD officers.

CHAPTER NO. 3

PRE-MONSOON ACTIVITIES

3.1 Administrative preparation

- Guidelines for co-ordination meeting is appended in Appendix
- In the above meeting the updated list of officers & their phone numbers, email address along with previous experiences regarding flood shall be shared.
- Identify hazard potential downstream of Dam.
- EAP preparation for all Dams.
- Establishing Flood control cell at district headquarters & regional headquarters

3.2 Appointment of Flood Control Officer.

As per directives given in Govt. resolution 1) flood control-district 2009 (186/09)/IM(W) dated 16.04.2009 & 2) Flood Control-basin 2009 / (187/09)/IM(W) dated 5.5.2009, Flood Control Officers shall be appointed as below :-

Stage-1	:	Dam Controller - Sectional Engineer
Stage-2	:	Deputy. Flood Control Officer – Asst. Engr (Gr-I)
Stage-3	:	Divisional Flood Control Officer - Executive Engineer..
Stage-4	:	District Co-ordination Officer - Superintending Engineer.
Stage-5	:	Basin Flood Control Officer - Chief Engineer.

3.3 Preparation at Dam sites:-

- Carry out the pre-monsoon inspection; attend to the deficiencies that are critical for the safety of dam.
- Ensure proper operation of Gates, check electric supply, and make backup arrangements for generator.
- Make sure there is sufficient manpower for flood related operations.
- Reservoir Operation Schedule be placed at visible location on dam site.

Declaration of Response Mechanism of concerned line departments along with the role & responsibilities.

3.4 Trigger Mechanism :

The plan of action is to be prepared taking into consideration the situation at a given point of time. The Plan is to indicate the level of disaster, the type of response, communication sequence and actions of officers / State. For this, it is necessary to develop a concept of (L) and define the different levels of disasters/ situations/ events in order to facilitate the responses and immediate assistances at district level, commissioner level and state level.

Lo Level: (Preparedness Level)

This denotes the pre-monsoon period when the following preparatory activities are undertaken:- preparation of documentation regarding EAP, ROS, GOS & Communication protocol shall be prepared, establishment of flood control cells / Disaster management cells, rehearsal of Dam gate operations, removal of encroachments from river flood plain zone (area within blue line) by civic authorities, in urban area by municipal corporation and rural area by CEO, Zilla Parishad, coordination meetings, reading of SOP; Training of field officers and study of Emergency action plans for response activities will also be carried out during this period.

L1 Level : (Normal Level)

This specifies the floods that can be managed by Dam controller, Deputy flood control officer and Divisional flood control Officers / Block and Tahsil level. This denotes normal release of discharges from spillway of dam. The water levels in the rivers are within the river boundaries. Requires warning to the downstream population that releases from dam has started.

L2 Level : (Alert Level)

This denotes floods of Alert levels that can be managed at district level. The discharges in the rivers are at such a level that rivers are flowing with maximum discharge carrying capacities, and little addition of discharge from spillway or due to rainfall in free catchment area is likely to spread the inundation beyond the river boundaries.

L3 Level : (Danger level)

This specifies the floods likely to create situations which require active participation and assistance of various departments at District level and Regional level for mobilizing resources for management of damage due to floods. However the state will remain in readiness to provide assistance if needed.

L4 Level : (Disaster level)

This specifies flood levels which create a large scale disaster situation with large inundation of areas where the district and regional level authorities have been overwhelmed and require assistance from state level / Control level for rescue, relief, other responses and recovery measures.

The scale and intensity of disaster shall be determined by Revenue authorities with the assistance of Technical Agencies like Water Resources Department, IMD. The District Collector is authorized to decide on the level of disaster.

The controlling flood levels viz L1Level: (Normal Level), L2 Level: (Alert Level), L3 Level: (Danger level) & L4 Level: (Disaster level) will be specified in Appendix no. VI for each project separately.

3.5 Action to be taken by authorities of Water Resources Department.

- i. Executive Engineer in charge of dam shall prepare flood prone area maps and identify the areas located within the flood zone of the river.
 - a. Flood lines corresponding to 25 years return period flood.(Blue line)
 - b. Flood lines corresponding to 100 years return period or the spillway design outflow flood, whichever is higher. (Red line)
- c. All populated urban areas, towns, gaothans, installations and engineering works located in above flood zones.
- d. Flood plain zoning and land use governance is required to avoid critical flood situation in populated urban areas.
- e. Marking of Blue lines and Red lines shall be carried out by local bodies in rural area by Zilla Parishad, and in urban area by Nagar Palika for Municipal Corporation with the help of Executive Engineer of WRD and shall be completed before 15th May.

These inundation maps should be approved by Regional Chief Engineer for major projects, by Superintending Engineer for medium projects and by Executive Engineer for minor projects.
- ii. Warning the concerned Government departments, non-government agencies and public in general about the probable flood plain zone by giving wide publication in news papers and mass media.
- iii. Collection of hydrological data is important in accurately forecasting the floods. A representative network of data collection such as rain gauge, river gauge shall be established.
- iv. A network of communication system such as wireless system, telephone, mobile phones shall be established to connect various data collection stations with base station to enable efficient communication.

This will be incorporated in project level in standard format given in

Appendix VIII

- v. Executive Engineer will prepare report as specified in Appendix No. VI about preparedness for effective flood control and submit to Superintending Engineer.
- vi. Superintending Engineer will prepare a report as specified in Appendix- V about preparedness for effective flood control and submit it to Chief Engineer.
- vii. Chief Engineer will submit report about Flood Control and mitigation measures taken to Government before 15th November every year.
- viii. Prepare Basin-wise directory about the information and contact numbers of Flood Control Officers at all levels. Information and contact numbers of Officers of other department's viz. Revenue, Police and Rehabilitation department shall be communicated to the Secretary of the concern State and Flood control cell of WRD, Mantralaya.

3.6 Action to be taken by other Government departments and Local Governing bodies.

- i. A District Flood Co-ordination Committee (DFCC) to be setup in each flood affected district to co-ordinate the working of the flood warning system and to take suitable precaution for evacuating the population and keeping proper vigilance at vulnerable points.
- ii. The District Collector should arrange to set up DFCC for the District. The DFCC may consist of the following officers subject to modification according to local requirements.
 - a. District Collector, Palghar
 - b. Chief Executive Officer, Zilla Parishad, Thane/ Palghar
 - c. Superintending Engineer, Thane Irrigation Circle, Thane
 - d. Superintendent of Police, Palghar
 - e. Executive Engineer, Palghar Irrigation Division, Manor Tal & Dist Palghar
 - f. Executive Engineer of Public Works & Housing Department.
 - g. Representative of Post & Telegraph Department.
 - h. Representative of the India Meteorological Department.
 - i. Representative of Railway, (if any railway works are involved)
 - j. Representative M.S.R.T.C.
 - k. Representative of the Regional Transport, Palghar
 - l. Representative of the civil supplies, Palghar
 - m. Representative of the Police Wireless, Palghar
 - n.. District Health Officer, Palghar
 - o, District Commandant of Home Guards, Palghar
 - p. A representative of All India Radio & Television, Palghar
- iii. The District Collector, Palghar shall be the Chairman of the DFCC.
- iv. Any other person considered useful by the Committee may be co-opted as a member of the Committee.
- v. DFCC should establish separate committees for towns and villages which are likely to be affected by flood within the district.
- vi. DFCC should take all the precautions for flood mitigation during the flood and necessary measures after the floods.

Flood forecasting, flood control & mitigation are indispensable in efficient and safe operation of large reservoirs and protection of flood-prone populated areas and installations on the banks of major rivers or on the downstream of important dams.

Flood committees comprising of the following persons may be formed in the towns and villages.

- a. Assistant Collector/ SDO, Tahsildar, BDO Chief Executive Officer or
- b. Sarpanch as the Chairman
- c. Local Police Station in-charge or the Police Patil
- d. Gramsevak
- e. Chairman of the village farmers Co-operative society
- f. Head Master of the Village School.

3.7 Demarcation of Alert, Danger & Disaster levels.

This will be the primary responsibility of local bodies, namely the Executive Engineer of the Zilla Parishad for rural area and in case of urban area the City Engineer of Municipal Corporation/ Council. These markings shall done with help of Engineers of WRD. (L-2) Alert, (L-3) Danger & (L-4) Disaster level shall be marked in each habitation viz, rural & urban area. This shall be marked at prominent places near river banks & residential area, e.g. bridges, temples, public buildings & houses. These marking shall also be co-related to discharges through rivers before 15th May.

Various warning signals LI Level: (Normal Level), L2 Level: (Alert Level), L3 Level: (Danger level) & L4 Level: (Disaster, level) are issued by Divisional flood control Officer Knowledge of people and Govt. agencies. By knowing the type of warning signals the people will aware of level of flood and related affecting area.

3.8 Selection of Safe places for shifting of people.

All local Government bodies, Municipal Corporation / Council and Zilla Parishad shall select safe places for rehabilitation during flood. These shall be conveyed / informed to people by radio, and notices at public places or by proper announcements.

CHAPTER NO. 4

ACTIVITIES DURING MONSOON

4.1 Functions and responsibilities of Dam Controller

- 4.1.1 During monsoon, inspect and remove obstructions, debris, vegetation near gates, outlets, spillway, approach & tail channel so as to keep the waterway unobstructed.
- 4.1.2 Inspect, monitor and carry out necessary repairs of machinery and equipments, electrical components on the dam-site i.e. Generator, Motors, Gate hoist system, electrical fittings, pumps in drainage gallery, lights and communication arrangements on site.
- 4.1.3 Inspect instrumentation installed on dam, take observations and submit the same to higher officers daily.
- 4.1.4 Round the clock inspection and monitoring of dam structure, gates, bridges on the downstream side of the dam, approach & tail channel
- 4.1.5 Hydrological data regarding rainfall at dam site and catchment area, inflow into the reservoir, reservoir levels, discharge required to be released shall be informed to flood control cell and higher level officers at standard stipulated time, and immediately in case of emergency, as specified in Appendix-II and Appendix-VII.

4.2 Functions and responsibilities of Deputy Flood Control Officer

- 4.2.1 Monitor if dams controllers are carrying out their duties and functions and report daily to the Divisional Flood Control Officer.
- 4.2.2 Inform Tahsildar, BDO of concerned Taluka 24 hours before planned release of flood over spillway of the dam and in case of L2, L3 and L4 level situation one hour before release of flood over spillway.
- 4.2.3 Inform Sarpanch and Gramsevak of concerned villages on bank of river downstream of Dam.
- 4.2.4 Inspect Dams, electrical and Mechanical equipments. Regularly during monsoon period.
- 4.2.5 Co-ordination of rainfall inflow and outflows from various dams in the same basin/ sub-basin and communicate to Executive Engineer and the Flood Control Cell in case of emergency, as specified in Appendix -II and Appendix-VII.

4.3 Functions and Responsibilities of Divisional Flood Control Officer

- 4.3.1 Inspect and carry out necessary repair of equipment, machinery, gates, outlets and instruments. Providing required materials such as instruments, fuel etc. to dam site.
- 4.3.2 Provide real time information regarding hydrological data viz, rainfall in the catchment area, inflow in the reservoir, dam levels, discharge from dam to District Co-ordination Officer and central flood control cell of WRD and flood control cells of concerned District Collector, as specified in Appendix - U and Appendix-VI I.
- 4.3.3 Inform Government and Non government agencies about probable flood in the river on downstream of dam as mentioned Appendix VII.

4.4 Functions and Responsibilities of District Co-ordination Officer:

- 4.4.1 Inform to Basin Flood Control Officer during critical flood situation about rainfall & releases from various dams under his control and follow instructions given by Basin Control Officer,
- 4.4.2 Regulate releases of discharges through dams during flood situation in river basin as a whole; communicate with Basin Flood Control Officer frequently to update him about the flood situation and inflows possible in various reservoirs,
- 4.4.3 Handle floods in the basin / sub basin. Monitor Dam Safety, safety of population on downstream of dam, reservoir operations as per approved Reservoir Operation Schedule by Chief Engineer.
- 4.4.4 Inform revenue authorities, regarding release of discharges from dams in monsoon viz. Collector, Superintendent of police etc.
- 4.4.5 Co-ordination and communication of information about the flood situation with, Municipal Corporation, local bodies, Revenue Department, Police department, along with suggestion of advance action if required. (as specified in Appendix -II and Appendix-VII).
- 4.4.6 Communicate to the public in general data such as flood prone towns and villages, warning water levels and danger water levels, discharges in rivers through print & electronic media, before onset of monsoon and during flood situations.

4.5 Functions and Responsibilities of Basin Flood Control Officer

- 4.5.1 Inform Government about flood control officers at all Levels, with their names, address, contact numbers, email address etc, as specified in Appendix -II and Appendix-VII.
- 4.5.2 4.5.2 Co-ordinate releases through various dams in the basin/sub basin and take. Mitigation measures for effective flood control based on real time situation.
- 4.5.3 Inform and communicate with public and media about the flood situation. Inform public through web site, specially prepared for flood control.
- 4.5.4 Inform Minister and Principal Secretary of Water Resources Department about the flood situation and update them on flood related information in case of emergency and danger situations.
Regional Chief Engineers shall give all the information, required hydrological data to concerned Basin Flood Control Officer. Regional Chief Engineers should co-ordinate with Basin Flood Control Officer to carryout Flood Control and mitigation effectively.

4.6 Function and Responsibilities of Inter State Flood Control Liaisoning Officer

Inter State flood control & Liaisoning Officer shall be appointed for Flood control of dams having impacts of floods on multiple states. Duties of Inter State Flood Control and Liaisoning Officer are follows

- 4.6.1 Communicate with officers of concerned State and exchange hydrological data with them on a daily basis. During critical flood situations exchange of above data shall be made hourly or at closer intervals as necessitated.

4.7 Function and Responsibilities of Executive Directors of Corporations

Executive Directors of all Irrigation Development Corporations should take review of flood Situation in the river basin/sub basins in their jurisdiction after Li level. Executive Directors should have general control over flood situation & mitigation.

CHAPTER NO. 5

POST-MONSOON ACTIVITIES

In general, floods do not occur after 15th October. However, in the context of climatic changes it is necessary that preparedness shall be continued till 30th November.

Normally, most of the dams reach at their full storage capacity upto 15th Oct. After 15th Oct. all the inflow which reaches in to the dam is required to be discharged over the spillway in to the river. Hence more alertness is required even after 15th Oct. upto 30th November.

Post monsoon inspection of Dams and river shall be carried out as per dam safety manual. Remedial measures for damages if any shall be under taken. Preventive measures for future period shall also be under taken.

Annual Basin flood control report shall be submitted to government by Basin flood control officer (i.e. Chief Engineer) before 31st December.

Chapter VI
Appendix No. I
Reservoir Operation Procedure

1) Principles of reservoir operation:

- I. Normally for Irrigation, water supply and hydro power project it is desirable to fill the reservoir as early as possible. While doing so, it should also be seen that the lake level is not brought near FRL too early in monsoon.
- ii. The adequacy of the spillway capacity and the free board considering design flood & observed floods should be periodically reviewed in the light of observed data. Such data should be continuously built up during the course of operation of reservoir by maintaining the registers.
- iii. For gated reservoir flood control requirements will govern the reservoir operation during such period of the monsoon when the floods are more severe. However, the reservoir has to be full at the end of the monsoon. The - conservative requirements should also be kept in view while handling the flood situations.
- iv. The reservoir operation should involve a careful co-ordination between the flood disposal and the building up of the conservative storage. Any error in operation of gates may endanger the safety of the dam or may cause artificial floods on downstream & or waste full spills and the reservoir may not be filled up as required in spite of adequate rain.

2) Guide curves for reservoir operation:

The guide curves shows the limits to which the reservoir water levels should be normally raise at the end of specified periods for achieving the normal planned storage of the reservoir while availing of the flood absorption capacity to the greater possible extend during the specified period.

The guide curves are made up of an upper guide curve and the lower guide curve.

- i. The upper guide curve is the upper limit of the level up to which the water level in reservoir can be built up or maintained on the respective dates. During the period of severe floods, water level the reservoir may be allowed to rise Temporarily above the upper guide curve but below the MWL at the discretion of the Officer not below the rank of Executive Engineer.
- ii. Lower guide curve indicates the minimum water levels up to which the reservoir filling must be achieved on various dates during the monsoon from the point of filling the reservoir.
- iii. Revision in Reservoir Operation Schedule: The Reservoir Operation Schedule shall be revised after every 5 years considering in flow pattern.

3) Gate Operation Schedule

The gate operation schedule must be prepared based on the site condition, the result of model studies and the regulation schedule of the reservoir. The gate operation schedule should clearly indicate the complete sequence and stages of operation of various gates corresponding to various lake levels and flood situations.

Reservoir Operation Schedule Of Dhamni Dam Of Surya Project

Dhamani Dam Of Surya Project Gate Operation Schedule

OPENING SEQUENCE FOR RELEASING FLOOD DISCHARGE

If only one gate is to be operated for 0.30 M then central gate No.3 be opened.

Normal Gate Operation

- 1) The pair of end gates (gates at higher end closer to the spray and guide wall) be opened first height of 0.30 M initially (gate No.1 & 5)
- 2) Operate the central gate No.3 by a stem height 0.30 M.
- 3) Open the remaining pair of gates by a step heights of 0.30 M (Gate No.2&4)
- 4) If only four no. of gates is to be opened, open Gate No.1,2,4,5 by step height 0.30 M
- 5) Open the gates to the required height as per above sequence 1) to 3) in step height of 0.30 m each till all the gates opened uniformly to the required extent.
- 6) While closing operations 1) to 5) above should be reversed i.e. close all the gates by as step height of 0.30 m each in reversed order starting from gate No.2 & 4. Then close the central gate No.3. Finally close the end gates No.1 & 5. Repeat the process till all the five gates are uniformly closed to the required extent.
- 7) It should be noted that partial opening of the gate with gate leaf near about water surface of the upper nappe is not permitted as it damages the bottom rubber seal, Hence this situation should be avoided.

Appendix-II

COMMUNICATION PROTOCOL FOR GOVERNMENT PROJECTS.

Trigger Mechanism

- **Preparedness Level (L₀Level)**

In monsoon period sectional officer of Dam shall inform to Dy. Engr. and Ex. Engineer at Local level & Dy. Engineer will communicate to flood control Cell

Sr. No	Trigger Level	Who will communicate	To Whom	How & what
1	Preparedness Level (L ₀ Level)	Shri. Y.K.Padekar Sectional Engineer, Irrigation Sub Dn. Manor	Executive Engineer, Flood Control Cell, Palghar Irrigation Division, Manor	Phone No- 8007335373 Mobile No. 7588851604/8698388999 E-mail : eeidpalghar@gmail.com

- **Normal Level (L₁Level)**

In above situations flood shall be ascertained separately for each project and integrated also before reaching to this situation, following communication method shall be adapted by telephone, wireless, email & fax

Sr. No	Trigger Level	Who will communicate	To Whom	How& what
	(L ₁ Level) Normal Level	Executive Engineer, Flood Control Cell, Palghar Irrigation Division, Manor, Tal & Dist Palghar	Superintending Engineer, Thane Irrigation Circle, Thane	Phone No- 022-25329859 / 25329386 Mobile No : 8888807650 E-mail : seticthn@gmail.com

3.Alertl Level (L2 Level)

In Alert situations flood shall be ascertained separately for each project and integrated also before reaching to this situation, following communication method shall be adapted by telephone, wireless, email & fax

Sr. No	Trigger Level	Who will communicate	To Whom	How& what
01.	(L2 Level) Alert Level	Executive Engineer, Flood Control Cell, Palghar Irrigation Division, Manor, Tal & Dist Palghar	Superintending Engineer, Thane Irrigation Circle, Thane	Phone No- 022-25329859 / 25329386 Mobile No : 8888807650 E-mail : seticthn@gmail.com Every 3 Hour Rainfall and Outflow of Dam
			Collector, Palghar	Phone : 02525-253111 Cell : 9820647580 E-mail : collectorpalghar@gmail.com
02.		Superintending Engineer, Thane Irrigation Circle, Thane	Chief Engineer, (WRD) Konkan Region, Mumbai	Phone No- 022-22672232/ 22674442 Mobile :- 9421942225 E-mail : cewrdr@gmail.com Every 3 Hour Rainfall and Outflow of Dam

4. Danger I Level (L3 Level)

In case of flood discharges which are about to reach danger levels or crossing danger levels in rivers and likely to create inundation of habitation of habitations. However the disaster situation is manageable at district level and immediate relief measures are required, then this alarming situation shall be reported to highest authorities by the Chief Engineer, in-charge of Basin flood control.

Sr. No	Trigger Level	Who will communicate	To Whom	How & what
01.	(L3 Level) Danger I Level	Executive Engineer, Flood Control Cell, Palghar Irrigation Division, Manor Tal & Dist :- Palghar	Superintending Engineer, Thane Irrigation Circle, Thane	Phone No- 022-25329859 / 25329386 Mobile No : 8888807650 E-mail : seticthn@gmail.com Every 3 Hour or at closer interval Rainfall and Outflow discharge of Dam/ River
02.		Superintending Engineer, Thane Irrigation Circle, Thane	Chief Engineer, (WRD) Konkan Region, Mumbai	Phone No- 022-22672232/ 22674442 Mobile :- 9421942225 E-mail : cewrdrkr@gmail.com
03.		Chief Engineer, (WRD) Konkan Region, Mumbai	Principal Secretary, WRD, Hon. Minister, WRD	Phone No. : 022-22023038/ 22023109 022-22842791/22842720 Every 3 Hour
04.		Principal Secretary (CAD), WRD,	Hon. Chief Minister, Government of Maharashtra Hon. Chief Secretary, Government of Maharashtra	Phone No. 022-22025151/ 22025222 / 22025073 022-22025042/ 22028762 Every 3 Hour

5. Disaster I Level (L.4 Level)

Disaster situation where the district & regional level authority require assistance from state level. the scale and intensity of disaster shall be determined by revenue authorities with assistance of technical agencies like WRD&IMD. The declaration by Collector is sufficient for L4 level disaster

Sr. No	Trigger Level	Who will communicate	To Whom	How& what
	(L.4 Level) Disaster I Level	State Level Officer, Disaster Management Cell	Central Govt. Army Navy Air Force	Hot Line Inflow / Outflow discharge of Dam/ River

Appendix-III

Communication Protocol for Non Government Projects:

----- Not Applicable -----

Appendix-IV

Communication Protocol for Interstate Project. :

----- Not Applicable -----

Appendix – V

Preparedness checklist for Superintending Engineer :

(To be Filled in By the Superintending Engineer and submitted to the Chief Engineer before June every year.)

No.	Preparedness measures	Details/Remarks
1	The Department is familiar with flood manual, Government resolutions and flood response procedures are clearly defined.	Yes
2	Orientation and training for flood response plan and procedures Undertaken. Special skills required during emergency operations imparted to take official and the staff,	Mock Drill is undertaken regularly
3	Reviewed and updated <ul style="list-style-type: none"> ● Precautionary measures and procedures ● Precaution to be taken to protect equipments. ● During flood & post flood procedures to be followed. 	Pre monsoon Inspection done periodically. Not Applicable Flood operations done as per R O S.
4	Flood monitoring mechanisms can be activated in all flood prone areas from 1st June.	Yes, Flood Management Cell Formed
5	All staff are well aware of precautions to be taken to protect their own live and personal property	Yes
6	Each technical staff has instruction and knows operating procedures for flood conditions.	Yes
7	Methods of monitoring and impounding the levels in the dam. Methods of alerting. Officers on other dam sites and the central flood conditions. Mechanism evolved for. 1) Forewarning settlement in the downstream. 2) Evacuation. 3) Co- ordination with other dam authorities.	Men deployed for monitoring levels By Cell Phone/ SMS Intimation to Revenue Authority and Police well in advance Necessary Arrangements done Yes
8	An officer has been appointed at flood control cell for flood management.	Yes (Separate Sheet Attached)
9	Sources of materials required for response operations have been identified.	Yes.

Report by :

Signature :

Name : Er. P.B. Misal

Designation : Superintending Engineer, Thane Irrigation Circle, Thane

Date :

Appendix – VI

Preparedness checklist for Executive Engineer:

(To be Filled in By the Executive Engineer and submitted to the Chief Engineer before June every year.)

No.	Preparedness measures	Yes / No	Details/Remarks
1	Communication established with <ul style="list-style-type: none"> ● Central flood control cell ● District Co-ordination officer ● Basin flood control officer ● Divisional Commissioner ● Other dam controlling officers. 	Yes Yes Yes Yes Yes	
2	An officer appointed as dam in- charge	Yes	
3	Emergency tool kits to contain following documents <ul style="list-style-type: none"> ● Flood Affected Villages Map 	Yes	List Attached
4	Water level gauges on dam structures marked.	Yes	
5	Repairs / under construction activities are well secured.	Yes	
6	Round the clock inspection, monitoring and repairs being carried out of <ul style="list-style-type: none"> ● Dams structure ● Gates & outlets ● Instruments on Dams ● Irrigation channels ● Bridges ● Culverts ● Overflow channels 	Yes Yes Yes Yes Yes Yes Yes	
7	Round the clock. Inspection, monitoring and repairs being carried out of	Yes	
8	Dam water level Co-ordination / communication whith other dam controllers.	Yes	
9	Inlet & outlet channels are cleared.	Yes	

Report by :

Signature :

Name : Er. R.B. Pawar

Designation : Executive Engineer, Palghar Irrigation Division, Manor

Date :

Appendix-VII

Sr. No.	Officer	When	To Whom	How
1.	Flood Control cell at Division Level.	1) Daily gauges About Rainfall and Storages at 8 am and 17 am	Collector, Palghar	Phone : 02525-253111 Cell No : 9820647580
			Superintendant of Police (Rural), Palghar	Phone : 02525-297023 Cell No : 9821411711
		2) The Discharge in River at alert and danger level	Collector, Palghar	Phone : 02525-253111 Cell No : 9820647580
			Superintendant of Police (Rural), Palghar	Phone : 02525 - 297023 Cell No: 9821411711
		3) Discharge release from spillway of all dams	Collector, Palghar	Phone : 02525-253111 Cell No : 9820647580
			Superintendant of Police (Rural), Palghar	Phone : 02525 - 297023 Cell No : 9821411711
2.	Sectional Engineer	1) Daily gauges About Rainfall and Storages at 8 am and 17 pm	Asst. Engr. (Grade-I), Irrigation Sub Division, Manor	Cell No. 9730865868
			Executive Engineer, Flood Control Cell, Palghar Irrigation Division, Manor	Phone : 8007335373 Cell No : 7588851604/8698388999
		2) 4 Hr before starting of release through spillway	Asst. Engr. (Grade-I), Irrigation Sub Division, Manor	Cell No : 9730865868
			Executive Engineer, Flood Control Cell, Palghar Irrigation Division, Manor	Phone : 8007335373 Cell No : 7588851604/8698388999
			Tahsildar, Palghar	Phone : 02525-254930/ 9767944999 tahpalghar@gmail.com
			Tahsildar, Vikramgad	Phone : 02520-240172 tahvikramgad@gmail.com
			Tahsildar, Dahanu	Phone : 02528-221182 tahdahanu@gmail.com
			Police Station, Kasa	Phone : 02528-264044 Cell No : 9425995454

		3) 24 Hr Rainfall recorded more than 1010mm at any rain gauge in catchment area	Asst. Engr. (Grade-I), Irrigation Sub Division, Manor	Cell No : 9730865868
			Executive Engineer, Flood Control Cell, Palghar Irrigation Division, Manor	Phone : 8007335373 Cell No : 7588851604/8698388999
		4) Every major change in discharge release through spillway	Asst. Engr. (Grade-I), Irrigation Sub Division, Manor	Cell No : 9730865868
			Executive Engineer, Flood Control Cell, Palghar Irrigation Division, Manor	Phone : 8007335373 Cell : 7588851604/8698388999
		5) 50% of Design discharge from spillway of dam	Asst. Engr. (Grade-I), Irrigation Sub Division, Manor	Cell No : 9730865868
			Executive Engineer, Flood Control Cell, Palghar Irrigation Division, Manor	Phone : 8007335373 Cell No : 7588851604/8698388999

Sr. No.	Officer	When	To Whom	How
3.	Asst. Engr. (Grade-I), Irrigation Sub Division, Manor	1) 4 Hr before starting of release through spillway	Executive Engineer, Flood Control Cell, Palghar Irrigation Division, Manor	Phone : 8007335373 Cell No : 7588851604/8698388999
		2) 24 Hr Rainfall recorded more than 1010mm at any rain gauge in catchment area	Executive Engineer, Flood Control Cell, Palghar Irrigation Division, Manor	Phone : 8007335373 Cell No : 7588851604/8698388999
		3) Every major change in discharge release through spillway	Executive Engineer, Flood Control Cell, Palghar Irrigation Division, Manor	Phone : 8007335373 Cell No : 7588851604/8698388999
		4) 50% of Design discharge from spillway of dam	Executive Engineer, Flood Control Cell, Palghar Irrigation Division, Manor	Phone : 8007335373 Cell No : 7588851604/8698388999
		5) Observation of Releases of discharge in River creating alert Level	Executive Engineer, Flood Control Cell, Palghar Irrigation Division, Manor	Phone : 8007335373 Cell No : 7588851604/8698388999
			Tahsildar, Palghar	Phone : 02525-254930/ 9767944999 tahpalghar@gmail.com
			Tahsildar, Vikramgad	Phone : 02520-240172 tahvikramgad@gmail.com
			Tahsildar, Dahanu	Phone : 02528-221182 tahdahanu@gmail.com
			Police Station, Kasa	02528-264044 Cell : 9425995454
Police Station, Palghar	02525-254939 Cell : 9890597999			

Sr. No.	Officer	When	To Whom	How
4.	Executive Engineer	1) Discharge in river corresponding to alert Level and Danger level	Superintending Engineer, Thane Irrigation Circle, Thane	Phone : 022- 25329859 / 25329386 Cell No : 8888807650 E-mail : seticthn@gmail.com
			Chief Engineer, WRD Konkan Region, Mumbai	Phone : 022-22672232/ 22674442 Cell No : 9421942225 E-mail : cewrdr@gmail.com
		2) In case of Major Dams 24 Hrs before releases through spillway	Superintending Engineer, Thane Irrigation Circle, Thane	Phone : 022- 25329859 / 25329386 Cell No : 8888807650
			Collector, Palghar	Phone : 02525-253111 Cell No : 9820647580 E-mail : collectorpalghar@gmail.com
			Tahsildar, Palghar	Phone : 02525-254930/ 9767944999 E-mail : tahpalghar@gmail.com
			Tahsildar, Vikramgad	Phone : 02520-222752/9594829394 E-mail : tahvikramgad@gmail.com
			Tahsildar, Dahanu	Phone : 02528-221182/9920165659 E-mail : tahdahanu@gmail.com
			Police Station, Kasa	Phone : 02528-264044 / Cell : 9425995454
			Police Station Palghar	Phone : 02525-254939 / Cell : 9890597999
		3) Storage in dam at particular time beyond storage stipulated on ROS	Superintending Engineer, Thane Irrigation Circle, Thane	Phone : 022- 25329859 / 25329386 Cell No : 8888807650 E-mail : seticthn@gmail.com
		4) Likely place and bridges which gates affected at discharge (Considering past experience)	Superintending Engineer, Thane Irrigation Circle, Thane	Phone : 022- 25329859 / 25329386 Cell No : 8888807650 E-mail : seticthn@gmail.com
			Executive Engineer, Public Works Department, Palghar	Phone : 02525-252301 / Cell No : 8879222001
			Member of Parliament, Palghar (Shri. Rajendra Gavit)	Cell No : 9821239044
			Member of Legislative Assembly, Vikramgad (Shri. Vishnu Savara)	Cell No : 9545360001/ 9422077293
			Member of Legislative Assembly, Palghar (Shri. Amit Ghoda)	Cell No : 9765445532
			Member of Legislative Assembly, Dahanu (Shri. Paskal Dhanare)	Cell No : 9561259424

Sr. No.	Officer	When	To Whom	How
5	Superintending Engineer	1) Discharge in river at Danger level	Chief Engineer, Water Resources Department, Konkan Region, Mumbai	Phone : 022-22672232/ 22674442 Cell No : 9421942225 E-mail : cewrdr@gmail.com
			Divisional Commissioner, Konkan Region, New Mumbai	Phone : 022-27571516
			Collector, Palghar	Phone : 02525-253111 Cell No : 9820647580 E-mail : collectorpalghar@gmail.com
			Superintendent of Police (Rural)	Phone : 02525 - 297023 Cell No : 9821411711
		2) 75% of Design Discharge or more Discharge to be released from spillway	Chief Engineer, Water Resources Department, Konkan Region, Mumbai	Phone : 022-22672232/ 22674442 Cell No : 9421942225 E-mail : cewrdr@gmail.com
			Divisional Commissioner, Konkan Region, New Mumbai	Phone : 022-27571516
			Collector, Palghar	Phone : 02525-253111 Cell No : 9820647580 E-mail : collectorpalghar@gmail.com
		3)) Likely place and bridges which gates affected at discharge (Considering past experience	Chief Engineer, Water Resources Department, Konkan Region, Mumbai	Phone : 022-22672232/ 22674442 Cell No : 9421942225 E-mail : cewrdr@gmail.com
			Divisional Commissioner, Konkan Region, New Mumbai	Phone : 022-27571516
			Superintendent of Police (Rural)	Phone : 02525- 297023 Cell No : 9821411711
			Hon. Guardian Minister, Palghar District & Tribal Development, GoM (Shri. Vishnu Savara)	Cell No : 9545360001/ 9422077293
			Hon. Member of Parliament, Palghar (Shri. Rajendra Gavit)	Cell No : 9821239044
			Hon. MLA, Palghar (Shri. Amit Ghoda)	Cell No : 9765445532
			Hon. MLA, Dahanu (Shri. Paskal Dhanare)	Cell No : 9561259424
			Hon. MLA, Boisar (Shri. Vilas Tare)	Cell No : 9922607020
			Hon. MLA, Vasai (Shri. Hitendra Thakur)	Cell No : 9822037500
Hon. MLA, Nalasopara (Shri. Khitij Thakur)	Cell No : 9923750000			
4) Any Structural damages to dam and canal	Chief Engineer, Water Resources Department, Konkan Region, Mumbai	Phone : 022-22672232/ 22674442 Cell No : 9421942225 E-mail : cewrdr@gmail.com		
	Principal Secretary, WRD, Mumbai	Phone : 022- 22025042/ 22028762		

Sr. No.	Officer	When	To Whom	How
		5) Any dam failure	Chief Engineer, Water Resources Department, Konkan Region, Mumbai	Phone : 022-22672232/ 22674442 Cell No : 9420033333
			Principal Secretary, WRD, Mumbai	Phone : 022 - 222013109
			Minister, WRD	Phone : 022-22842791/22842720
			Divisional Commissioner, Konkan Region	Phone : 022-27571516
			Collector, Palghar	Phone : 02525-253111 Cell No : 9820647580
6	Chief Engineer	1) Discharge in river at Danger level	Principal Secretary, WRD, Mumbai	Phone : 022- 22025042/ 22028762
			Divisional Commissioner, Konkan Region	Phone : 022-27571516
		2) Any Structural damages to dam and canal	Principal Secretary, WRD, Mumbai	Phone : 022 - 222013109
			Minister, WRD	Phone : 022-22842791/22842720
		3) Any dam failure	Principal Secretary, WRD, Mumbai	Phone : 022 - 222013109
			Divisional Commissioner, Konkan Region, New Mumbai	Phone : 022-27571516
			Minister, WRD	Phone : 022-22842791/22842720

Appendix-VIII
List of Phone Numbers of Officers (Palghar District)

Sr. No.	District	Flood Control Officer	Office Phone No.	Mobile No.	Email Id	Remarks
Water Resources Department						
01.	Konkan Region	Er. S.D.Kulkarni, Chief Engineer, Water Resources Department, Konkan Region, Mumbai	022-22672232/ 22674442	9421942225	cewrdr@gmail.com	
02.	Palghar, Thane & Raigad	Er. P.B.Misal, Superintending Engineer, Thane Irrigation Circle, Thane	022- 25329859 / 25329386	8888807650	seticthn@gmail.com	
03.	Palghar	Er. R.B.Pawar, Executive Engineer, Palghar Irrigation Division, Manor	8007335373	7588851604/ 8698388999	eeppalghar@gmail.com	Surya Major Project
04.	Nashik	Er. Y.B.Patil, Executive Engineer, Bhatsa Dam Management Division, Bhatsanagar	02527 – 249594	9422606093	eebdmbhatsa@gmail.com	Upper Vaitarna Project
05.	Palghar	Er. S.G.Gaikwad, Asst. Engr (Gr-I)	02525-237010	9730865868	shashankgaikwad990@gmail.com	Surya Major Project
06.	Nashik	Er. P.S.Pawar, Asst. Engr (Gr-I)	----	8308491738 / 9275111191	vmdvaitarna@gmail.com	Upper Vaitarna Project
07.	Palghar	Er. Y.K.Padekar, Sect. Engr.	---	9209204293 9867198592	urajpadekar69@gmail.com	Surya Major Project
Municipal Corporation of Greater Mumbai						
08.	Palghar & Thane	Er. R.S.Johare, Executive Engineer, (Operation) MCGM, Thane	022- 25431905	9930260446	eeoprations.he@mcgm.gov.in	BMC Project
09.	Palghar & Thane	Er. N.D.Kulkarni, MCGM, Dy. H.E.(Operation)		9930260547	deoprations.he@mcgm.gov.in / dyheopkap@rediffmail.com	BMC Project
10.	Palghar & Thane	Er. A.V.Mahajan Asst.Engineer		9869021960	deoprations.he@mcgm.gov.in / dyheopkap@rediffmail.com	Middle Vaitarna Project
11.	Palghar	Er. A.S.Bhoir Asst.Engineer		9819170662 9167691945	deoprations.he@mcgm.gov.in / dyheopkap@rediffmail.com	Modaksagar Project
12.	Thane	Er. S.K.Kor Asst.Engineer		9930260462	deoprations.he@mcgm.gov.in / dyheopkap@rediffmail.com	Tansa Project

Revenue Department						
13.	Palghar	Dr. Kailash B. Shinde, Collector, Palghar	02525 - 253111	9820647580	collectorpalghar@gmail.com	
14.	Palghar	Shri. Shridhar Dube -Patil , Addl. Collector, Palghar	02525-253111	7021423875	collectorpalghar@gmail.com	
15.	Palghar	Shri. Kiran Mahajan. RDC (Additional), Palghar	02525-252520	9822434196	collectorpalghar@gmail.com	
16.	Palghar	Shri. Saurav Katiyaar (IAS) Assistant Collector Dahanu Sub Divisional Officer, Dahanu	02528-222231	8176013450	sdodahanu@gmail.com	
17.	Palghar	Shri. S.P. More Sub Divisional Officer, Wada	02526-270757	9730812093	wadasd123@gmail.com	
18.	Palghar	Shri. Vikas Gajare Sub Divisional Officer, Palghar	02525-297272	9545888885	sdopalghar@gmail.com	
19.	Palghar	Shri. Mahesh Sagar Tahsildar, Palghar	02525-254930	9767944999	tahpalghar@gmail.com	
20.	Palghar	Shri. Rahul Sarang Tahsildar, Dahanu	02528-221182	9867726066	tahdahanu@gmail.com	
21.	Palghar	Shri. Galipelli Tahsildar, Vikramgad	02520-240172	9689681000	tahvikramgad@gmail.com	
22.	Palghar	Shri. V.V.Kadam, District Disaster Management Officer, Palghar	02525 - 253111	9158760756 8329439902	ddmapalghar@gmail.com	
23.		Disaster Management Cell, Palghar Cell	02525-297474		ddmapalghar@gmail.com	
Home Department						
24.	Palghar	Shri. Gaurav Singe Superintending of Police, Palghar	02525-251100 297023	8669604001	sp.palghar@mahapolice.gov.in	
25.	Palghar	Police Station, Kasa	02528-264044	9425995454		
26.	Palghar	Police Station, Palghar	02525-254939	9890597999		
27.	Palghar	Police Station, Manor	02525-237058	8669604035		

Appendix – IX

Administrative Preparation

Time Table for Co-ordination meetings from project level to the state level as below:-

April 1 st week	Project level meeting
April 2 nd week	District level meeting
April 3 rd week	Basin level & interstate level.
April 4 th week	State level & interstate level

DEFINATIONS

1. Reservoir Operation Schedule:-

Reservoir Operation Schedule is the schedule prepared to serve the purpose of building up the conservation storage efficiently without involving any risk of man made flood the area on the downstream.

2. Gate Operation Schedule:-

Gate Operation Schedule is the sequence & stages of operation of various gates corresponding to various lake levels and the flood situations.

3. Guide Curves:-

Guide Curves will show the limits to which the reservoir levels should be normally raised at the end of specified periods for achieving the normal planned storage of the reservoir while availing of the flood absorption capacity to the greater possible extent during the specified periods.

4. Trigger Mechanism:-

Trigger Mechanism is the plan to indicate the level of disaster, the type of response, communication sequence and actions of officers.

- : Abbreviations : -

SOP	Standard Operating Procedure
ROS	Reservoir Operation Schedule.
EAP	Emergency Action Plan
DFCC	District Flood Co-ordination Committee
SDO	Sub Divisional Officer (Revenue)
BDO	Block Development Officer, Panchayat Samiti.
WRD	Water Resources Department
IMD	India Meteorological Department