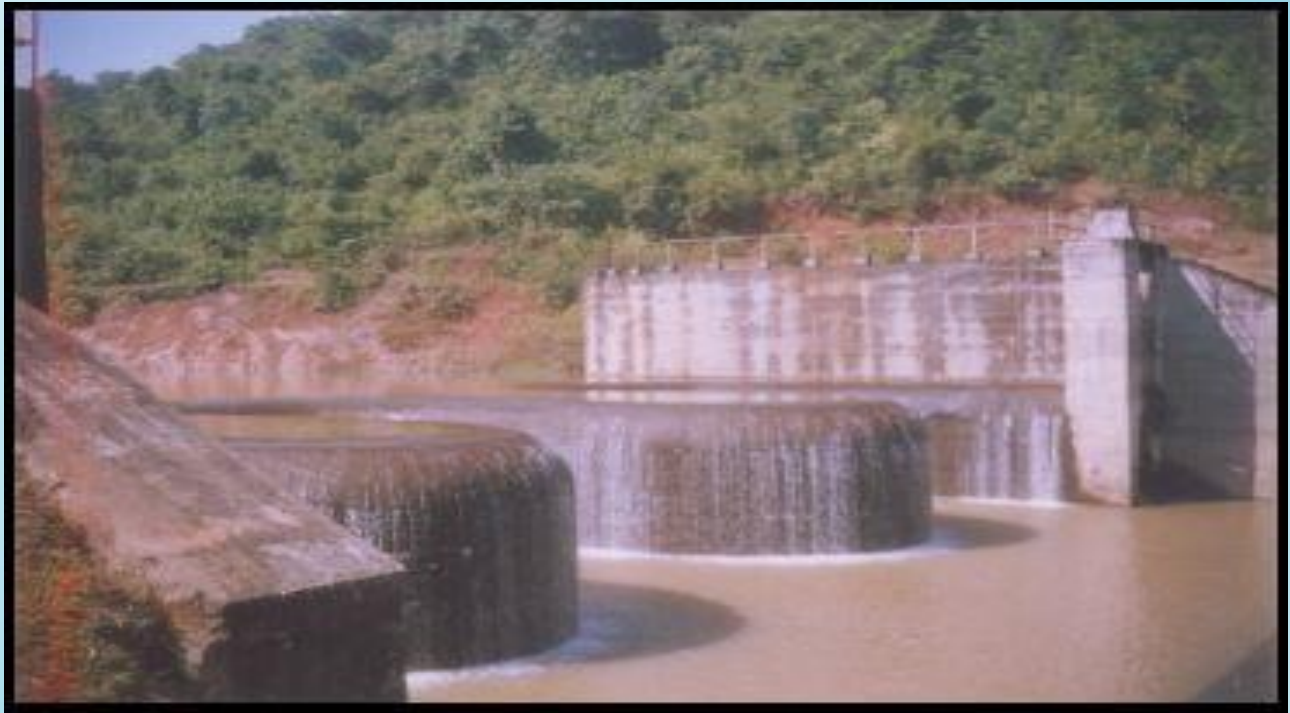




**TIER-I EMERGENCY ACTION PLAN
SAPUA DAM**



Prepared For:
Odisha Water Resources department

October 2019

SAPUA DAM
Project ID Code [OR10MH0156]
Dhenkanal ,Odisha

Disclaimer

Every effort has been taken to estimate the severity of flooding and inundation areas likely to be affected by Sapua Dam in an emergency condition. These estimates are based on available primary and secondary data. Every effort has been made to foresee varied emergency possibilities and develop appropriate notification procedures for timely rescue and operations .However ,implementations of the emergency Action Plan (EAP) involves many agencies ,who are required to work in a coordinated manner to reduce the consequence s of the emergency triggered by the dam site condition .Effectiveness of the rescue and relief operations depend on many factors of all the agencies involved in rescue and relief efforts and availability of facilities like power ,telephones, communications, etc.EAP Developer may therefore ,not be held responsible for the EAP.

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Sapua Dam
Project ID Code [OR10MH0156]
Approval and Implementation

This Emergency Action Plan has been prepared by Odisha Water Resources Department in collaboration with Central Project Management Unit .This version of the document is hereby approved and is effective immediately and supersedes all previous editions .

<hr/>	<hr/>
Chief Engineer & Basin Manager, Brahmani Basin, Samal	Date

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

<hr/>	<hr/>
Chief Engineer, Dam Safety, Odisha, Bhubaneswar	Date

<hr/>	<hr/>
Collector & District Magistrate, Dhenkanal	Date

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Collector & District Magistrate, Cuttack	Date

Annexure

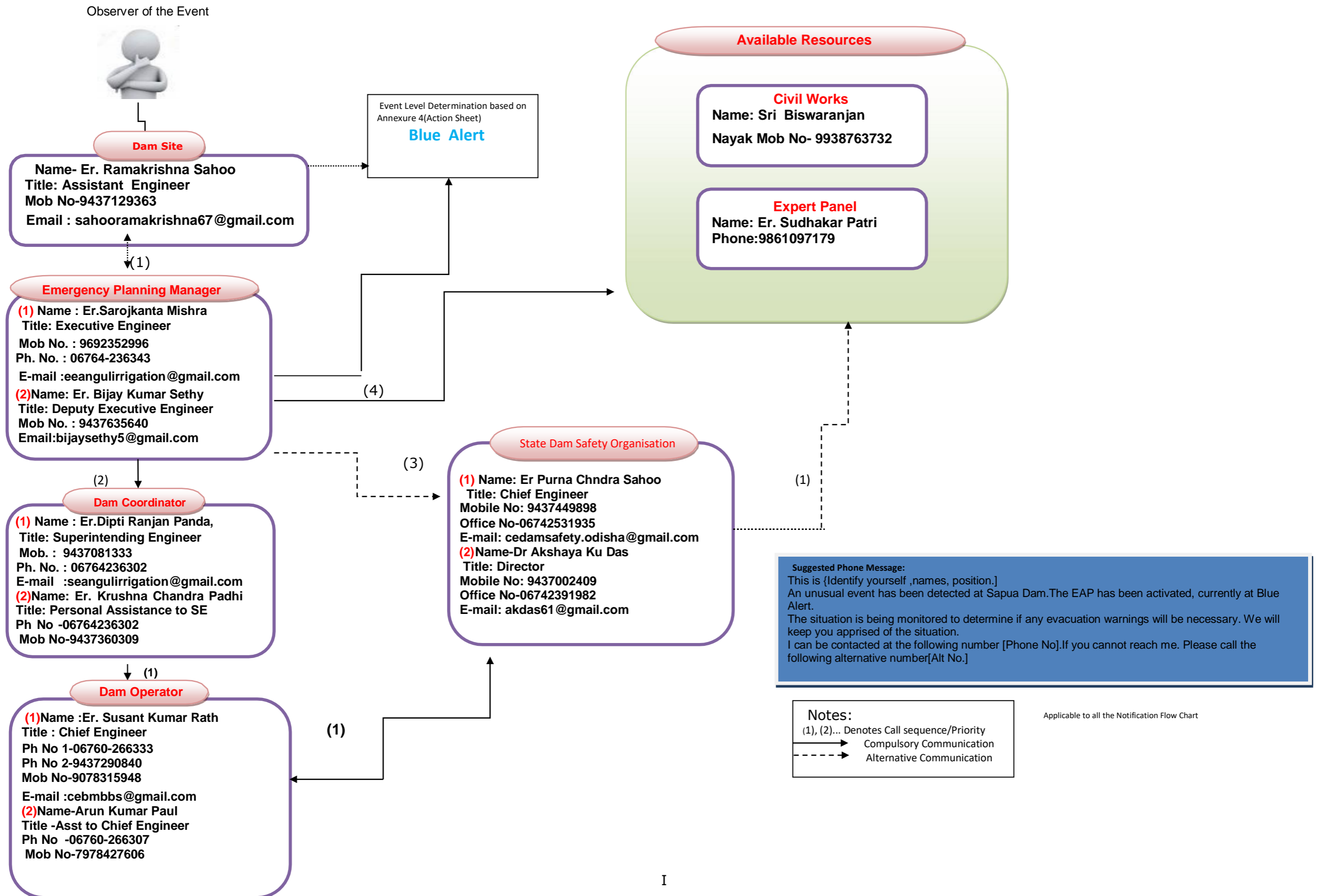
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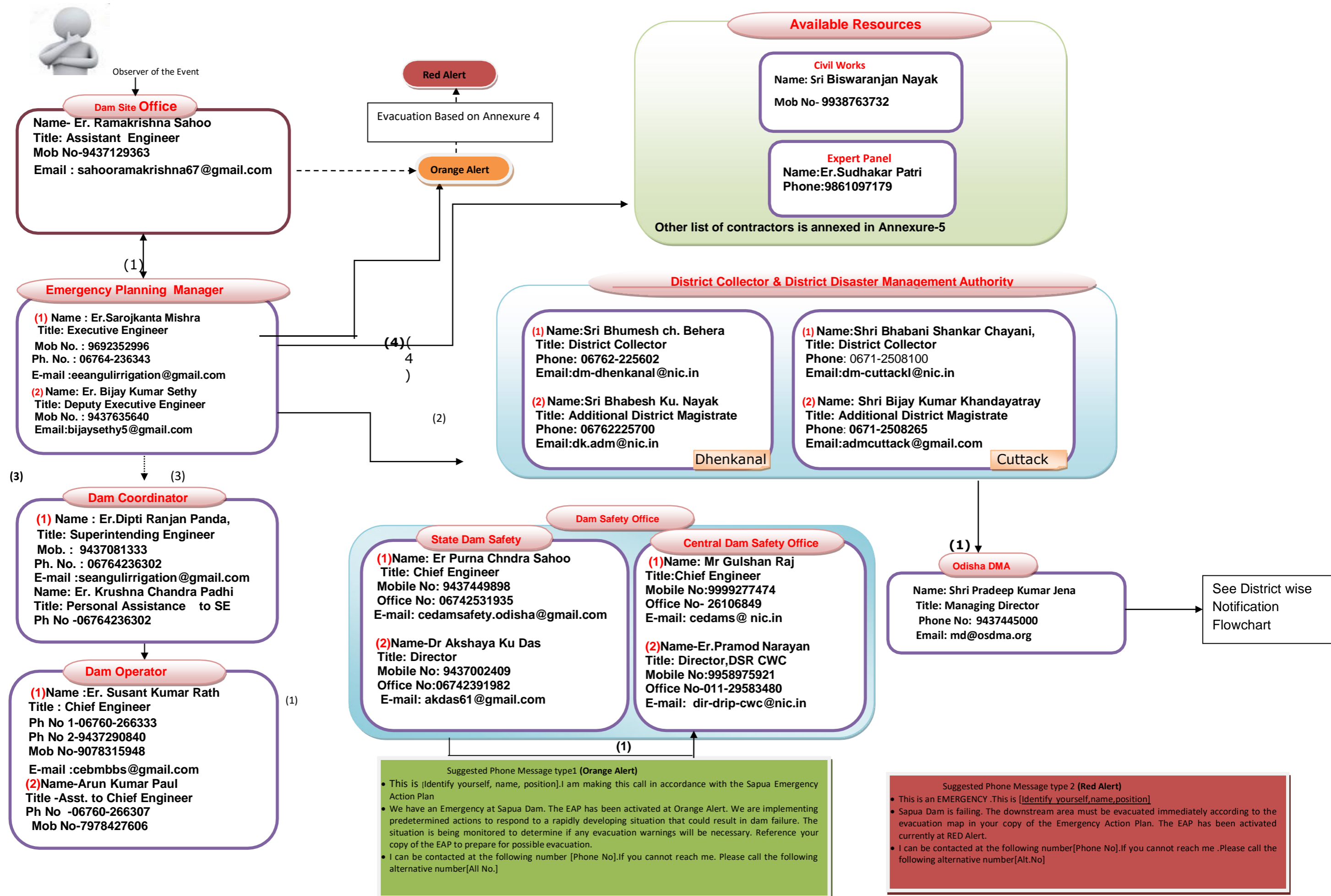
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Watch Condition Notification Flow Chart (Internal Alert)



Failure Condition Notification Flow Chart(External Alert)



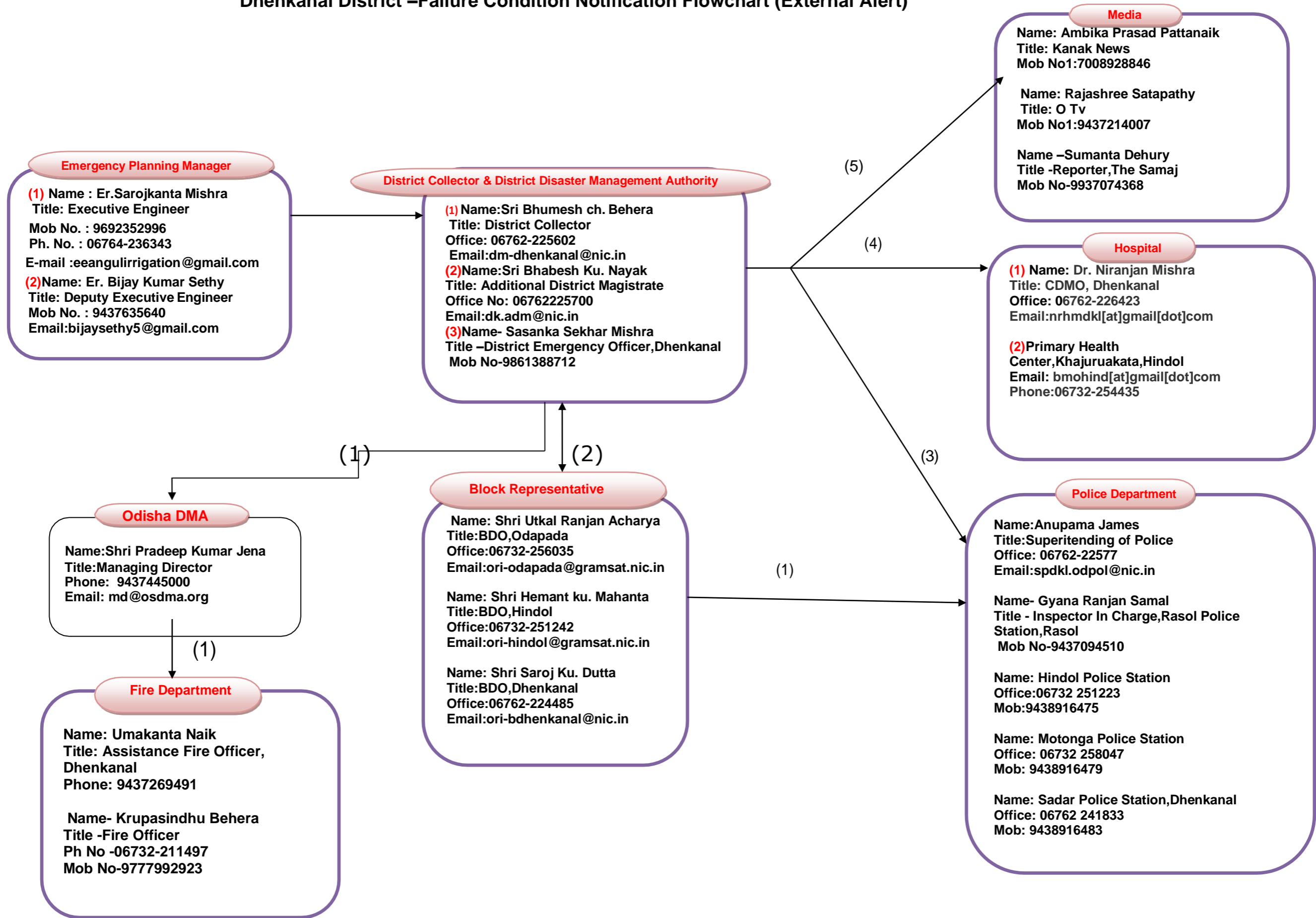
Suggested Phone Message type1 (Orange Alert)

- This is [Identify yourself, name, position].I am making this call in accordance with the Sapua Emergency Action Plan
- We have an Emergency at Sapua Dam. The EAP has been activated at Orange Alert. We are implementing predetermined actions to respond to a rapidly developing situation that could result in dam failure. The situation is being monitored to determine if any evacuation warnings will be necessary. Reference your copy of the EAP to prepare for possible evacuation.
- I can be contacted at the following number [Phone No].if you cannot reach me. Please call the following alternative number[Alt No.]

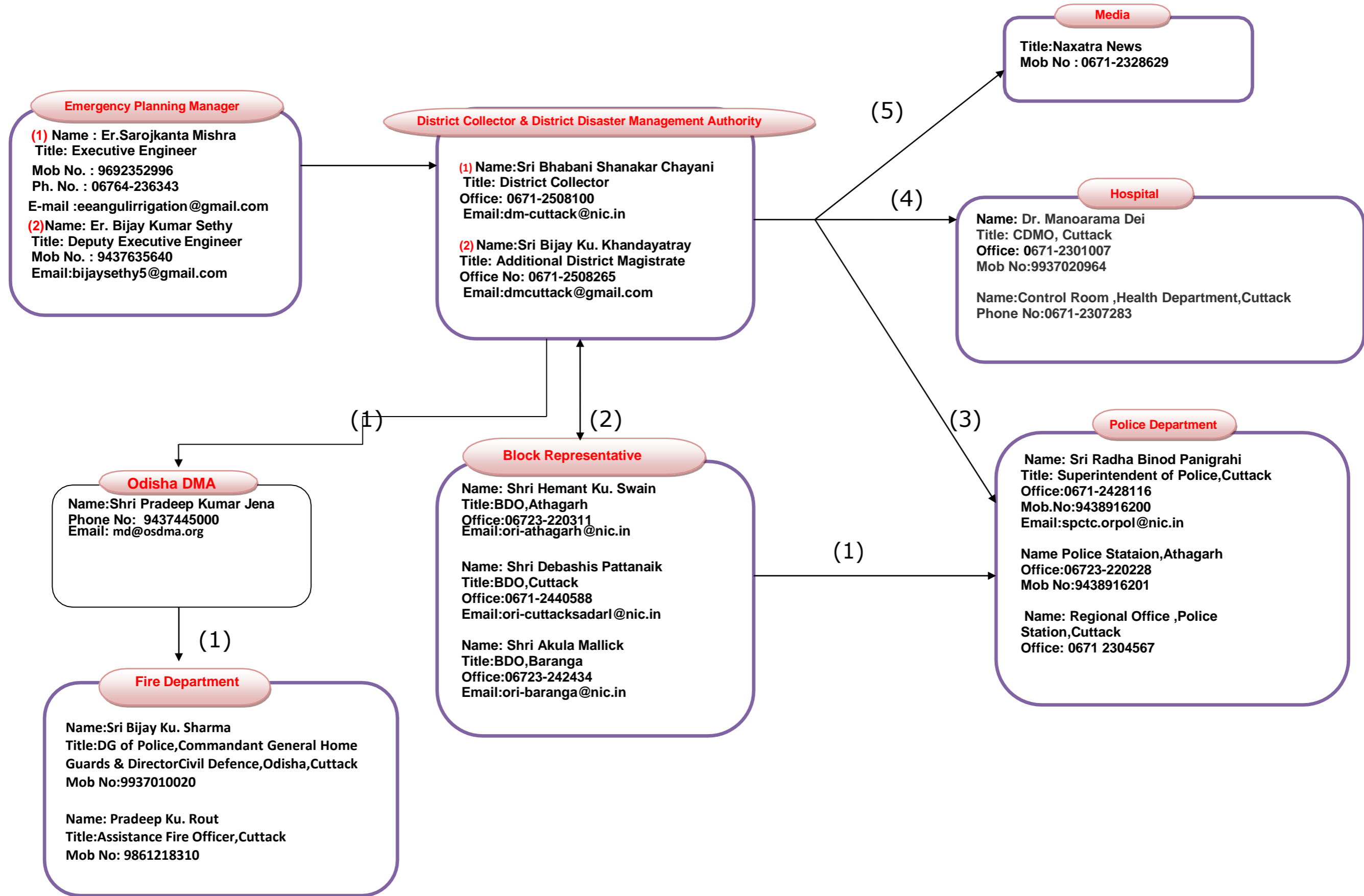
Suggested Phone Message type 2 (Red Alert)

- This is an EMERGENCY .This is [Identify yourself,name,position]
- Sapua Dam is failing. The downstream area must be evacuated immediately according to the evacuation map in your copy of the Emergency Action Plan. The EAP has been activated currently at RED Alert.
- I can be contacted at the following number[Phone No].if you cannot reach me .Please call the following alternative number[Alt.No]

Dhenkanal District –Failure Condition Notification Flowchart (External Alert)



Cuttack District –Failure Condition Notification Flowchart (External Alert)



Sapua Dam
Project ID Code [OR10MH0156]
EAP DISTRIBUTION LIST

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

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	Dr. Manorama Dei Title: Chief District Medical Officer ,Cuttack Mob No:9937020964 Office No:0671-2301007	O/o the CDMO,Cutt ack

Emergency Action Plan
Sapua Dam
Project ID Code: OR10MH0156

1 Purpose

EAP is a formal plan that depicts the identification of emergency conditions at the dam site and prescribes the pre-planned actions to be followed by the different agencies so as to mitigate the loss to a manageable extent. The sudden release of huge quantity of water or dam break creates such emergency conditions at dam as well as in the downstream areas, which requires warning, evacuation, rescue and relief operations within minimum response time. The purpose of an EAP is to protect lives and reduce property damage. EAP therefore prescribes the duties and responsibilities of the Emergency Planning Manager and operating personnel and provides designed procedures to identify unusual and unlikely condition which endangers Sapua Dam. Apart from that, this Plan is designed to notify the appropriate public officials and downstream residents, impending or actual dam failure, so that the area can be evacuated in a timely manner. EAP also contains inundation maps to show the emergency management authorities the critical areas along the river for action in case of an emergency. Therefore, the whole process includes coordination, planning and joint exercises among the Emergency Planning Managers and local emergency management authorities, who work together in response to dam safety emergencies.

2 Dam Description

General

Sapua Dam and Reservoir are owned and operated by Odisha Water Resources Department .It is located on Sapua river near village Nahada, block Hindol in Dhenkanal district. The Dam Site is 15 km from Hindol block and 42 km from Dhenkanal town. The dam was completed in 2001.

A vicinity map showing the location of the dam is presented in **Annexure -1** and salient features are in **Annexure -7**.Inundation maps showing the areas subject to flooding as a result of a dam failure along with flood scenario(Overtopping, Large controlled release & Piping are provided in the **Annexure -2** of this document .The inundation area is described further detail in the inundation Area Section of this EAP document (**Section-9**).

The main dam is 1290m. long earth dam with a labyrinth ungated spillway length of 34.5m with labyrinth length of 96m (**Figure 1**).The maximum height of the earth dam is 25.25m . The spillway is located extreme left side of the dam.The Head Regulator is provided at RD 80m of the Dam.

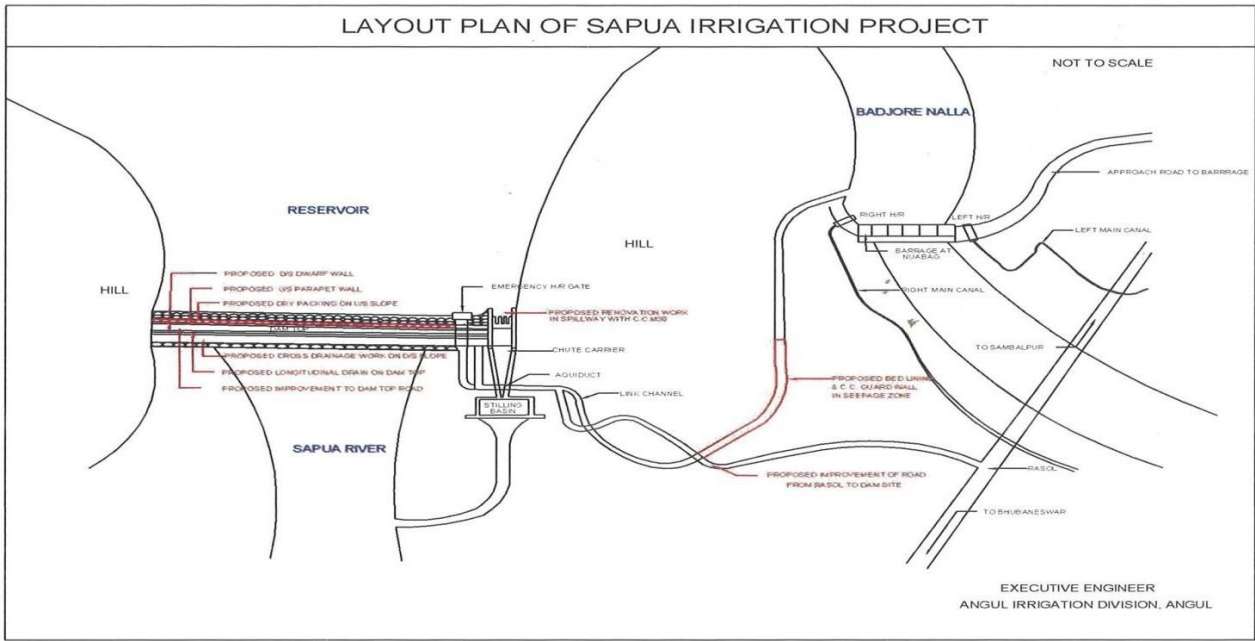


Figure 1. –General Layout Sapua Dam

Reservoir operation

Sapua Dam has an ungated spillway .presently there is no rule curve. The reservoir generally starts to fill from 161.10m (MDDL) in the 2nd week of June to RL. 168.50m (FRL) and is maintained at same level till end of October. Then slowly starts to deplete as per irrigation requirement taking in to consideration of the reservoir position.

3 Responsibilities

Dam Owner’s Responsibilities

The Dam Owner ,Odisha Water Resources Department is responsible for dam operations and maintenance .This EAP is not intended to designate a specific person for a specific responsibility but instead will designate the person’s duties or job descriptions for both ,before and during an Emergency event (Table 1)

Table 1-Dam Owner’s responsibilities

Officer Designations	Responsibilities(During Preparedness and Emergency Events)
Executive Engineer (Emergency Planning Manager)	<p><u>Preparedness Responsibilities</u></p> <ul style="list-style-type: none"> - Coordinate routine inspections and Dam’s operation. - Ensure effective transmission of hydro-meteorological and stream flow data through different means. - Ensure proper accessibility to all vulnerable points for constant monitoring during emergency situations. - Identify primary and secondary communications systems, both internal (between persons at the dam) and external (between

	<p>dam personnel and outside entities).</p> <ul style="list-style-type: none"> - Provide security measures at the dam (CCTV surveillance, security guards, fencing). - Ensure the availability of adequate staff at dam site during holidays ,nights and round the clock in weekdays. - Ensure that the EAP is functional and staffs are familiar with their responsibilities. - Ensure that a signboard is installed and clearly visual in different locations at dam site and operation room, with the most common evidence of distress and corresponding levels of alert and remedial actions . - Ensure all the equipments /means at dam site to response 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 flood plains (less than 2 hours of wave arrival time). - Ensure the current 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 test/improvement of this EAP.
	<p><u>During Emergency Responsibilities</u></p>
	<ul style="list-style-type: none"> - Ensure a continuous and reliable communication with dam site officers - Receive and assess any distress condition as notified by site engineers, observer or regular inspection. - Classify the incident/distress condition reported by the observer into the different Emergency Levels (Blue,Orange,Red) based on the ANNEXURE 4 (Emergency Level Action Sheets) and ANNEXURE 2(Inundation Maps). - Initiate /implement the Emergency Action Plan and the Emergency Operation Centre if it is deemed necessary. - Identify the areas that would be potentially impacted by the emergency events.

	<ul style="list-style-type: none"> - Provide updates of 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 communications needs of local emergency authority.
<p>Dam Site Engineers (Dy.Executive Engineer, Assistant Engineers , Junior Engineers)</p>	<p><u>Preparedness Responsibilities</u></p> <ul style="list-style-type: none"> - Monitor & 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 dam site and keep him/her posted about any progression/change. - Conduct routine dam maintenance. - Collect instrumentation measurements. - Ensure effective working conditions of the warning system (Sirens). - Participate in exercises for test /improvement of this EAP.
	<p><u>During Emergency Responsibilities:</u></p> <ul style="list-style-type: none"> - Monitor the emergency event at dam site and keep posted the Emergency Planning Manager about any change in the development. - Contact the suppliers /contractors. - Supervise the work of the labour contractors and machineries engaged in the site for rehabilitation /remedial works. - Conduct the remedial actions as per Actions Data Sheets (ANNEXURE-4).

<p>Superintending Engineer (Dam Coordinator)</p>	<p><u>Preparedness Responsibilities</u></p> <ul style="list-style-type: none"> - Ensure an annual review of the EAP. - Coordinate the annual/regular testing events of the EAP, such as tabletop exercises, stakeholder’s consultation. - Coordinate training events in problem detection ,evaluation and appropriate corrective measures . - Supervise the functioning of control room and ensure to be well equipped with all type of information to facilitate the rescue and relief operations. - Ensure proper access to site at the earliest possible. - Ensure that all related machinery/equipment are in running conditions and can be deployed as per requirement at emergency site. - Formation of Purchase Committee/Committee in consultation with Chief Engineer & Basin Manager, Brahmani Basin for procurement of Material from Appropriate Source through Spot Purchase . - Ensure the correctness of Gauge Discharge(if exists) sites under his control every year well before monsoon. <p><u>During Emergency Responsibilities:</u></p> <ul style="list-style-type: none"> - Provide decision support and technical support to Emergency Planning Manager as appropriate. - Have a constant liaison with Indian Meteorological Department (IMD) during emergency periods related with flood events. - Advise the Emergency Planning Manager of the emergency level determination, if time permits. - Disseminate information and make contact to utilize media as appropriate at the time of emergency on behalf of Chief Engineer & Basin Manager, Brahmani Basin.
<p>Chief Engineer (Dam Operator)</p>	<p><u>Preparedness Responsibilities</u></p> <ul style="list-style-type: none"> - Assist the Dam Owner’s officers in preparation of Action Data Sheets(ANNEXURE 4) - Recommend specific actions in order to improve the readiness of emergency actions - Support and Monitor the remedial construction activities such as earth moving, especial investigations, etc. - Decide depending upon the quantum of repair /reconstruction work, whether the work is to be got executed through large construction firms or purely through the department or small

	<p>contractors.</p> <ul style="list-style-type: none"> - Undertake an engineering assessment of the safety hazard at the dam in collaboration with the State Dam Safety Organisation. <p><u>During Emergency Responsibilities</u></p> <ul style="list-style-type: none"> - Advise the dam's Emergency Planning Manager/Superintending Engineer with the emergency level determination, if time permits. - Advise the dam's Emergency Planning Manager/Superintending Engineer with remedial actions to take if Blue/Orange events occurs, and if time permits. - Play the role of "Public Affairs Officer" in case external/public notifications should be released. - Keep close watch on the different activities being carried out by different agencies at the time of emergency?
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Dam Safety Organisation's Responsibilities

The following are the basic emergency planning and response roles and responsibilities for the dam safety authorities (State and National Level).The Dam Safety Organisation (DSO) is the first point of contact for BLUE alert.

- Responsibility of the Dam Safety Organisations is undertaking an engineering assessment of the safety hazard at the dam.
- The DSO may inspect the Dam at its discretion and uniform the Emergency Planning Manager if Sapua Dam is considered to be Blue alert.
- The DSO may advise the Dam Owner /Emergency Planning Manager of remedial actions to take if BLUE/ORANGE event occur.
- The DSO may have an active role in ORANGE /RED levels of alert. The DSO may advise the Dam Owner/Emergency Planning Manager of the emergency level determination.
- A DSO's officer may be called on to be the Subject Matter Expert at the Emergency Operation /Response Centre.
- The DSO is responsible for reviewing and accepting the Emergency Action Plan, before its final publication.
- Odisha Dam Safety Organisation shall constitute a Dam Safety Review Panel consisting of engineers ,geologist and hydrologists to analyse the distress conditions of Dam periodically.
- Support for the preparation of asset management plans ,emergency preparedness plans ,emergency warning systems ,flood plain mapping ,preparation of flood inundations maps in different areas for downstream areas to mitigate losses.
- Focus on legal, regulatory and technical frameworks for dam safety assurance.

- Participate /Conduct a public hearing programme before finalisation of the Emergency Action Plan.

Responsibilities for Notification

After an event level has been determined appropriate notifications should be made in accordance with the corresponding notification Flow Chart provided in this EAP(See Notification flow charts).These Notification Flowcharts list the names and contact information and identifies who is to 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 primary contact is unavoidable .Each official listed in the notification flowcharts should be familiar with it and immediately notify the Emergency Planning Manger in case of cessation of his /her functions within the organization.

Table 2-Responsibilities for Notification

Officer Designation	Responsibilities During Emergency events
Executive Engineer (Emergency Planning Manager)	<ul style="list-style-type: none"> - Notify the District Disaster Management authorities(District Collector) in case of Orange/Red alert - Notify the Districts Authorities about any emergency response actions at dam site and their impacts in the downstream area . - Assist the District Collectors/relief Authorities involved in the emergency response actions with information about condition at dam site. - Where the residences located immediately downstream of a dam that would be inundated within minutes of a dam failure, wherein the available warning time is very limited ,in that case, Emergency Planning Manager will arrange to notify the residences directly without waiting for the local administration to act upon before an emergency situation develops .
Dam Site Engineers (Dy. Executive Engineer, Assistant Engineers, Junior Engineer) Superintending Engineer/Chief Engineer	<ul style="list-style-type: none"> - Keep inform the Emergency Planning Manager about the progress of the situation at dam site. - Notify dam safety Organization and request technical advice as per required. - Notify /inform higher authorities on the mishap as per notification flow chart of particular alert level as per situation at site. - Notify/inform media representatives about the emergency situation. - Define emergency situation for which each medium will be utilized and include an example of a news release that would be the most effective for each possible emergency ,avoiding disseminate false /overstated messages among the population . - Implement the Notification Flow chart for regional and State Disaster Management contacts.

<p>District Collector (s)/District Disaster Management Authority</p>	<ul style="list-style-type: none"> - Contact Local Law enforcement Authorities and Relief Authorities under their jurisdiction. - Liaising and coordinating with Early Warning Agencies like IMD, CWC, INCOIS, etc. for disaster specific information and disseminating the 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 representative about the status of the emergency event.
<p>Relief Authorities (Police Department, Civil Defence ,Army Forces)</p>	<ul style="list-style-type: none"> - 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 to their corresponding command the necessity to deploy more resources to attend the rescue and relief actions.
<p>Media representatives</p>	<ul style="list-style-type: none"> - Disseminate wide public awareness during emergency condition of Dam through Social Media Platform such as Facebook ,Twitter ,Whatsapp &Instagram. - The news media, including radio, television and newspapers, should be utilized to the extent available and appropriate. - Pre-plan in coordination with Chief Engineer/Superintending Engineer the most effective way to disseminate the most delicate and common emergency situations among the population .Pre – defined news shall be available in order to improve the readiness of the decision –making process.

Responsibilities for Evacuation

Evacuation and relief actions are exclusive responsibilities of Districts Authorities, and emergency relief forces at local and state level. For Sapua Dam, Hindol, Odapada, Dhenkanal Blocks of Dhenkanal District and Athagarh block of Cuttack district would be directly affected by a potential failure/emergency event at the dam site, and therefore, block's representatives are responsible for evacuation /relief actions in their jurisdiction.

District collector acting a District's Disaster Management Authority is responsible to coordinate actions along with the following specialized teams/forces: Police and Fire Department, National Disaster Management Authority (Response Force), Civil Defence.

Within their responsibilities are:

UNDER NO EMERGENCY (Preparedness)

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

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.
- Serve as the primary contact responsible for coordination of all emergency actions for potentially affected communities.
- Consider drafting a State of Local Emergency in preparation for RED alert.
- Maintain close liaison with the district and the State Governments as well as the nearest units of Armed Forces/Central police organisations and other relevant Central Government organisation 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.

Under RED Alert

- Initiate warnings and order evacuation of people under vulnerable areas as per inundation maps **(ANNEXURE 2)**
- Direct local emergency response services (may include local law enforcement) to carry out the evacuation of people and close roads /crossings within the evacuation area (see local Evacuation Plan, ANNEXURE 2 and ANNEXURE 3 tables).
- 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 Responsibilities

- Warn the public under vulnerable areas in their jurisdiction as per inundation maps (ANNEXURE 2).
- Secure and control access to evacuated areas.
- Install barricades in the affected bridges and crossings as per flood hazard values in **ANNEXURE 2 & bridges in ANNEXURE 3.**
- Assist in conducting rescue and recovery operation 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.
- Permit with minimum delay the entry of authorized personnel and recognised outside agencies, vehicle etc. involved in the emergency operations that come to help.

Fire Department(s), Civil Defence Responsibilities

- Assist in evacuation operations and initiate the evacuation of impact areas in cooperation with 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)

Responsibility for Termination & Follow-up

Once EAP operations have begun under BLUE, ORANGE or RED alerts, 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.

. Table3 below shows the main responsibilities in the termination and follow-up process.

Table-3 Responsibility for Termination and Follow up

Officer Designation	Responsibilities (Termination and Follow-up)
<p style="text-align: center;">Executive engineer (Emergency Planning Manager)</p>	<ul style="list-style-type: none"> -Declare the termination of the emergency operations in coordination with District Disaster Management Authority and Relief/Response Forces. -Conduct a review process of the EAP procedures. -Identify EAP procedures that were followed effectively, as well as 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 cost expended and will prepare a detailed report in this regard.(See Reports section in 8.3)
<p style="text-align: center;">Superintending Engineer / Chief Engineer</p>	<ul style="list-style-type: none"> -Ensure that all parties that participated in the EAP activities are involved in the review process. -Impose a time frame within which the EAP review is to be completed. -Propose any ways that the EAP could be improved. -Present the final results of the EAP evaluation in a

**Dam Safety Organization
(State / Central level)**

documented report to the Principal Secretary of Odisha Water Resources Department.

-Ensure that there is no danger of spread of any epidemics or water borne diseases after the floods.

-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 in this regard.

**District (s) – All districts
and National Disaster
Management Authority**

-Declare the termination of the emergency operations in coordination with Emergency Planning Manager and Relief / Response Forces.

-Identify EAP procedures that were followed effectively, as well as any ways that the EAP could be improved.

4 Communications Networks

Local Officials and downstream residents will be notified by landline telephone ,if available ;otherwise via cell phones or emergency personnel(in person using their radios networks for emergency use include the network of the following :

- Indian Meterological Department
- Central Water Commision
- All affected Districts,Blocks and Fire Departments
- Odisha Disaster Management Authority

Sample public announcement appear in **ANNEXURE 6** and internal suggested phone messages are also available in each notification flow chart .Verification or authentication of the situation can be made by contacting the Emergency Planning Manager and the corresponding district disaster management official. Television, Radio and bulk SMS facilities of the local Mobile Operators can be used as much as possible to notify area residents of the possible dangers.

5 Emergency Detection, Evaluation,and Classification

Emergency Detection

Situations

Many dam conditions can lead to emergency situations, not all of which will require the implementations of the EAP. However, if any of them occur ,the appropriate actions must be taken .**ANNEXURE 4** of this EAP shows the most common emergency situations that may

emerge in Sapua Dam and appurtenances ,along with the corresponding specific actions to be done by each of the dam's officials. Some of these emergency situations are summarized as follows:

- **Severe Storms/Inclement Weather:** Although generally not in themselves threat to the dam ,severe storms and other inclement weather conditions can contribute to an existing problem and hinder any remediation efforts .Several storms also cause the excessive release of floodwater, and increase flow in already rain –swollen areas .
- **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 in the area, an inspection of the dam for any signs of damage will be appropriate.
- **Earthquake:** Sapua dam is located in the Seismic Zone Number III. This zone is classified as Moderate Damage Risk Zone which is liable to MSK VII. and also 7.8 The IS code assigns zone factor of 0.16 for Zone III. Thereafter, an earthquake is a possibility and appropriate post earth earthquake inspections should be performed.
- **Sabotage:** A threat to damage the dam has been made .Appropriate actions must be taken to protect the dam.

Signs of Failure

Site engineers in coordination with the Emergency Planning Manager (Executive Engineer) are responsible for conducting routine inspections and identifying conditions that could indicate the onset of problems leading to a dam failure. The early identification of potentially dangerous conditions can allow time for the implementation of the EAP. The following sections describe some of the different types of failure which could lead to a dam failure.

- Seepage Failure: Although all earthen embankments allow some 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 is very likely to result in 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 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.

Emergency Evaluation and Classification

This section lists the conditions and actions which may be used to classify the level of emergency response, as a guide for the **Emergency Planning Manager**. Specific dam observations and

corresponding emergency classification levels can be found in **ANNEXURE 4**, along with appropriate and recommended actions to follow in each case.

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 Emergency Planning Manager** along with the support of site engineers will be responsible for monitoring and repair as soon as possible and implementing the appropriate Notification Flowchart. 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
- Large sinkholes with corresponding seepage anywhere on the embankment or downstream from the toe.
- Any slide that degrades the crest of the embankment or that is progressively increasing in size.
- Cracking or movement of any concrete structure.
- Exceptionally heavy rainfall in the catchment of the dam reservoir.

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 Emergency Planning Manager will be responsible for initiating immediate repairs, including lowering the reservoir if appropriate and implementing the appropriate Notification Flowchart. The following is a list of conditions 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 to near the top of the dam .
- Near or above the '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 Emergency Planning Manager** is responsible for implementing the appropriate Notification Flowchart. 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 the earthen dam.

6 Previously Known Problem

Structural Concerns: The length & level of stilling basin at the end of chute carrier is inadequate to dissipate the energy at all observed discharges. The hydraulic jump extending beyond the stilling basin will have scouring effect on D/S bed.

7 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.

Surveillance

Round the clock surveillance at the dam and its appurtenant (on the rim of reservoir (left & right)) will be carried out by site engineers during emergency situations. For this, the posting of special observer of high experience and keen observation is an important requirement of EAP during high flood period. To ensure that the whole system (including civil structures & mechanical installations) is being maintained well up to satisfactory level, the repair maintenance must be carried out as per requirement of O & M of Sapua Dam. In addition it must be ensured that maintenance and upkeep of different components is carried out and will be only possible through deployment of well procedure conversant and trained staff. The list of such persons should be displayed on a photo frame mounting at convenient safe places at dam site and list of local telephone numbers inside the dam & outside the dam area. It will be updated from time to time for any change.

Response during weekends and holidays

The Standard Operating Procedure with Operation & Maintenance Manual is strictly followed throughout the year whether it is weekends/holidays/night. **Executive Engineer will** be available for emergency response during weekends and holidays and can be present at the dam site within 15 minutes of detection of an emergency condition. In case of non-availability of the **Executive Engineer**, the **Assistant Executive Engineer** or **Deputy Executive Engineer** will take his responsibilities.

Response during periods of darkness and adverse weather

The Emergency Planning Manager (**Executive Engineer**) and **Site Engineers** will arrange for access to generators and lights to adequately monitor the situation. **Site Engineers** will ensure the generators and emergency light are well maintained and available under any circumstances. **Executive Engineer will** be able to access the site during adverse weather conditions by off road vehicle.

Access to the site.

The following access to the dam are available, and depending of the emergency situation some of them should be used with caution or totally avoided (See **Table 4** and **ANNEXURE 1. Vicinity Map**)

Table 4. condition of Accesses to Sapua Dam under Emergency Condition

From	Access Description	Approx. Distance (km)	Emergency Condition		
			Large Controlled Release	Piping	Overtopping
Rajanga	Rajanga to Dam site through right hill	1.4 km.	Safe to use	Safe to use	Safe to use
Rasol	Rasol to Dam site	4.50 km.	Use with Caution	Safe to use	Safe to use

Remedial Actions

Preparedness and remedial actions 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 engineer as soon as possible.

Specific actions for different emergency situations are described in the **ANNEXURE 4** (Action Data Sheets). Examples of the actions to be taken for dam's officials under the direction of a professional engineer or contractor are described below. In all cases, the appropriate Notification Flowchart must be implemented and the personnel of the Odisha Dam Safety Organization be notified.

Consider the following remedial actions if the dam's integrity is threatened by:

Seepage Failure

- Plug the flow with whatever material is available (clay, bentonite, or plastic) if the entrance is in the reservoir.
- Consider lower the water level in the reservoir.
- 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 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.

8 Supplies and Resources

Contracts

If Sapua Project's 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 the following authorized officials, as deemed necessary to prevent the failure of the dam:

- Emergency Planning Manager (Executive Engineer, Angul Irrigation)
- Superintending Engineer, Angul Irrigation Circle, Angul
- Chief Engineer & Basin Manager, Brahmani Basin , Samal.

Equipment and Supplies

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

Reports

Pre-monsoon and post-monsoon inspections of the dam are made every year during the month of **May and December** respectively by the **Site Engineers** in coordination with the **Emergency Planning Manager** 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 are stored and carefully maintained at the Control Room in dam site and in the **Emergency Planning Manager's Office**. **Site Engineers** are familiar with the location of the documents in the event of an emergency situation.

9 Emergency Operations Centre

Activity log

Any unusual or emergency condition should be documented, including the following:

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

Costs of the Emergency Operations Centre

For major emergencies, the emergency operations centre will maintain detailed records of costs expended. 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:

- Personal cost
- Equipment operation
- Equipment leasing and rental
- Contract services to support emergency operation
- Specialized supplies expended in emergency operations

10 Inundation Area

Inundation maps in **ANNEXURE 2** illustrate the areas subject to flooding from a failure of the dam. The maps were prepared using the results of a two-dimensional flow analysis and contain profiles of the peak flood levels expected, as well as an estimation of the time from the beginning of the breach to the moment the location start to be inundated. More hazard reference values such as depth, velocity and water surface elevation are included in **ANNEXURE 2** in both, **tabular and map format for each of the affected locations**

The bridges under inundated areas are summarized in the **ANNEXURE 3** and are labelled in the **Evacuation Planning Map**.

In addition to the above, Submerged roads are shown in **Annexure- 1(Vicinity Map)** would be .

The potential consequences either due to a hypothetical breach scenario of Sapua Dam or due to flood higher than inflow design flood which results in high lift above the spillway.

Local Evacuation Plan

If imminent failure of Sapua Dam with uncontrolled downstream flooding is anticipated, local disaster management and law enforcement personnel should notify those downstream, for evacuation in the most expedient manner possible following the procedure given in the notification flow charts of this document (**Notification Flow Chart Tab**). Local law enforcement officials, along with local mobile network

operators, radio and media representatives can best spread the notice for evacuation (See **Responsibilities Sections**)

- Police Departments will barricade all bridges and roads that could possibly be flooded to prevent access to the affected area. These bridges affected are shown in the **ANNEXURE 3** .Inundation Maps along with Flood Hazard Reference Values in crossings locations included in this annexure indicate the appropriate barricade locations under the responsibility of local law-enforcement authorities.
- The Districts Disaster Management Authority (Districts Collector) will assist with the notification of all persons and agencies involved (relief authorities), with the possibility of additional support-including contacting others not accessible by radio or telephone.
- Relief Authorities (Police, Fire Department) 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.
- Based on the specific results of the dam breach analysis, a local evacuation plan has been developed to assist disaster management authorities in the relief actions. The local evacuation plan can be found in the **ANNEXURE 3** of this EAP,

11 Implementation Development

This EAP version has been prepared by Odisha Water Resources Department in collaboration with Central Project Management Unit. CPMU, Disaster management authority and other agency will also review the document and their comments will be incorporated.

Updating

The EAP should be reviewed and updated at annually or more frequently as necessary in order to assess its workability and efficiency and to plan for improvements of the weak area.

The reviews should emphasis on the following:

Validation of contact information of personnel, mentioned in Notification flow chart. The Dam coordinator will call all contacts within the flowcharts in the EAP to verify that phone numbers and persons in the specified positions are current. The EAP will be revised if any of the contacts have changed.

The Superintending Engineer will organize every year prior to monsoon an orientation meeting to introduce the revised EAP to local officials, emergency responders. This meeting will give an opportunity to all the stakeholders to review and comment on EAP document and their respective roles.

The Emergency Planning Manager will review and complete all items on the Annual EAP Evaluation Checklist in **Annexure 8**. 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 9**.

If revisions to the EAP are made as a result of the annual update, such changes will be recorded on the Log Sheet of Changes form at the front of the report. A copy of the updated portions of the EAP will be sent to all concerned as per the EAP Distribution List. If the EAP was reviewed and revisions were not required, the Dam Operator will submit written notification to all concerned that no updates to the EAP have been adopted or implemented.

Training & Testing:

Training

The training of the personnel, involved in implementation of the EAP will be conducted by the Dam Coordinator once in a year so as to make familiar among the implementing staffs with the elements of the plan, their responsibilities and duties, the available equipment, detection of problem and remedial measures.

A sufficient number of people will be trained to ensure adequate coverage at all the time.

Testing:

The Dam Coordinator shall organize following exercises.

1. Orientation
2. Tabletop Exercises

1. Orientation: The coordinator will regularly carry out orientation meeting with local responders and stakeholders to solicit input, established roles during emergency situation and facilitate reliable responses to the emergencies. In orientation meeting, the dam coordinator will introduce the revised EAP to local officials and emergency responders and provide those entities the opportunity to review and comment on the documents and on their roles and responsibilities, described in EAP.

2. Tabletop exercises: The **Dam Coordinator** and **Emergency Planning Manger** will organize a tabletop drill once in 2years to discuss and review the simulated or imaginary emergency situation. The tabletop drill involves a meeting of **Emergency Planning Manager** 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.

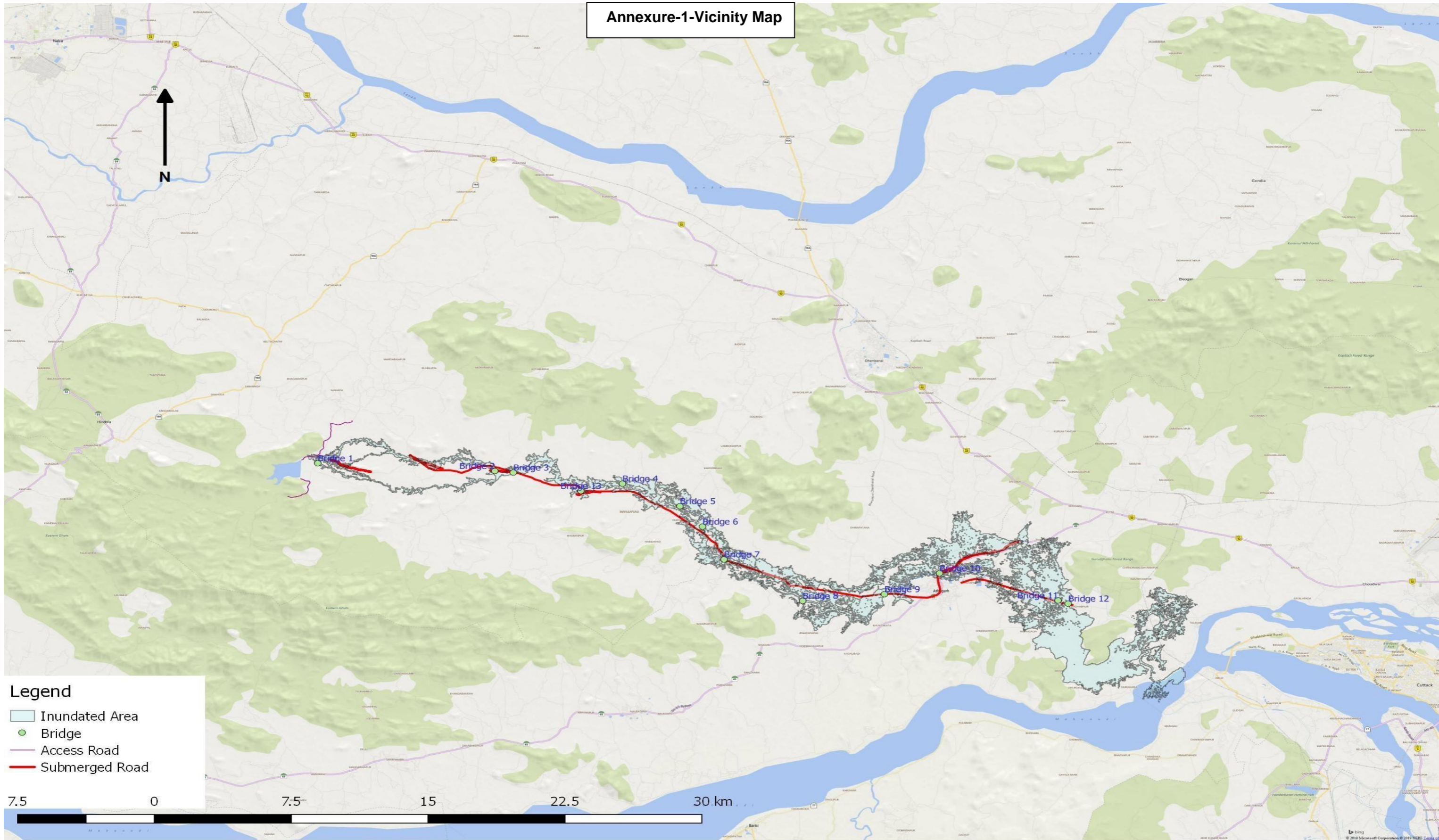
Before the tabletop exercise begins, meeting participants will visit the dam to familiarize with the dam site. **Emergency Planning Manager** will present a scenario of an unusual or emergency event at the dam. The scenario will be developed prior to the exercise with the support of the **Dam Safety Organizations**. 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 10 and following the deadline given in below **Table**

The following table describes the schedules for all EAP and exercise requirements:

EXERCISE	SCHEDULE	REPORTING DEADLINE
Orientation	Annual – except during the year of a tabletop, functional, or full-scale Exercise.	Submit information in EAP Status Report
Tabletop Exercise	Once Every 2 Years	Submit Plan & Schedule at least 90 days before exercise. Submit Evaluation Report within 60 days following exercise.

Annexure-1-Vicinity Map



Annexure 2

Flood Hazard Reference Values

Location	Distance ^a downstream from dam (km)	Estimated population at risk ^b (people)	Overtopping Failure			Non-flood Failure			Large Controlled	
			Maximum depth ^c (m)	Maximum velocity ^c (m/s)	Flood wave arrival time ^d	Maximum depth ^c (m)	Maximum velocity ^c (m/s)	Flood wave arrival time ^d	Maximum depth ^c (m)	Maximum velocity ^c (m/s)
Dandiri	1.2	199	1.13	1.79	00:20	0.53	0.81	00:25	e---	---
Nahada 2	1.5	167	2.64	2.87	00:25	2.05	2.45	00:25	1.97	3.1
Nahada 3	2	121	2.3	2.24	00:25	1.61	1.46	00:30	1.04	1
Nahada 1	2.5	140	2.71	4.08	00:25	2.15	3.54	00:30	0.18	1.16
Kathakump a	2.6	124	3.39	1.5	00:25	2.84	1.34	00:30	---	---
Kharachuli 1	6.7	179	4.85	4.57	00:50	4.49	3.3	00:55	0.37	2.07
Gandanali 3	7	77	3.28	3.00	00:55	2.54	2.74	01:05	2.56	2.62
Gandanali 2	7.2	245	3.18	2.43	01:00	2.45	1.06	01:10	2.59	0.99
Gandanali 1	7.3	53	2.11	3.05	01:00	1.24	2.57	01:10	1.4	2.52
Nayagada 4	9.2	85	2.32	2.75	01:10	1.97	2.4	01:15	---	---

Nayagada 1	9.6	182	3.38	2.95	01:15	2.9	2.72	01:20	---	---
Nayagada 2	9.8	52	2.43	3.54	01:15	2.03	3.14	01:25	---	---
Nayagada 3	10.2	37	2	0.87	01:20	1.57	0.75	01:30	---	---
Chilataila	10.7	85	3.05	2.41	01:25	2.52	2.28	01:35	1.09	1.09
Iswarapal 1	11.4	261	5.53	1.91	01:30	5.02	1.65	01:40	3.79	0.79
Iswarapal 7	12.4	35	2.37	2.14	01:50	1.89	1.5	02:00	0.72	0.26
Iswarapal 2	12.4	162	5.9	2.68	01:35	5.38	2.5	01:45	4.04	1.97
Iswarapal 3	13.6	79	2.34	1.64	02:10	1.84	1.43	02:20	0.85	0.43
Iswarapal 6	13.6	35	4.03	2.78	01:55	3.62	2.59	02:05	2.83	1.47
Jaripal 2	14.7	203	0.44	0.81	02:45	0.03	0.53	03:10	---	---
Jaripal 1	15	800	2.42	1	02:25	2.02	0.79	02:40	1.3	0.42
Ranipal / Jaripal	15.7	1,660	3.05	2.67	02:30	2.64	1.7	02:45	1.95	1.32
Sananadaba 1	16.1	945	2.55	1.97	02:40	2.14	1.69	02:55	1.53	1.01
Ranipal 1	17.2	432	1.91	2.22	02:50	1.49	1.78	03:05	1.19	1.08
Ostapal	17.3	955	1.85	1.02	03:05	1.42	0.75	03:25	0.99	0.28
Ranipal 3	17.4	559	1.37	1.38	02:55	1	1.05	03:20	0.45	0.73
Amantapada 3	18.2	981	3.2	2.57	03:00	2.86	2.22	03:20	2.64	1.72

Ghatipiri 1	18.3	523	2.12	1.63	03:00	1.66	1.48	03:20	1.2	1.26
Brundabanpur	19.5	127	0.48	0.79	03:25	0.27	0.53	03:55	0.09	0.31
Bhapur 2	19.8	869	0.65	1.54	03:45	0.41	0.95	04:15	0.29	0.86
Panamurga 2	19.8	280	1.45	0.83	03:30	1.08	0.37	04:00	0.95	0.27
Panamurga 1	19.9	457	0.94	1.07	03:40	0.53	0.67	04:20	0.4	0.59
Bhapur 3	21.4	2,378	0.71	0.54	04:10	---	---	---	0.25	0.34
Mahulapunji 1	21.5	569	0.5	0.6	04:25	0.2	0.46	05:30	0.18	0.41
Mahulapunji 2	22.4	320	1.52	1.96	04:15	1.2	1.72	04:45	1.16	1.49
Chandrasekharprasad 4	22.6	1,016	3.8	1.69	04:25	3.52	1.58	04:55	3.5	1.47
Chandrasekharprasad 5	23	493	2.25	2.2	04:35	2.09	2.04	05:05	2.07	2.01
Chandrasekharprasad	23.5	199	0.99	0.55	05:00	0.75	0.46	05:35	0.8	0.42
Chandrasekharprasad 6	24	1,082	0.69	0.87	05:00	0.53	0.63	05:35	0.56	0.6
Chandrasekharprasad 7	25.4	721	0.65	1.19	05:40	0.31	0.74	06:25	0.44	0.87
Viruda 1	26	395	0.84	0.36	07:30	0.5	0.05	09:35	0.87	0.4
Unknown	26.7	757	---	---	---	---	---	---	0.11	0.47
Unknown Settlement	27.2	271	0.07	0.24	06:55	---	---	---	0.07	0.09
Gangadharpasad 4	27.6	94	1.85	1.44	06:10	1.59	1.17	07:00	1.75	1.35

Godijharia / Matikote	28	1,001	1.52	1.26	06:55	1.17	1.09	08:05	1.49	1.22
Gangadharp rasad 3	28.2	719	0.99	1.32	06:45	0.86	0.78	07:40	0.93	1.17
Arakhapatana	29.1	550	0.68	1.55	07:15	0.35	1.36	08:25	0.66	1.39
Tentulipatana	29.3	1,546	1.41	0.81	07:10	1.3	0.38	08:15	1.38	0.75
Dhirapatana 2	30.3	2,212	1.46	1.45	07:35	1.27	1.36	08:50	1.42	1.4
Dhirapatana 1	30.5	1,598	3.59	0.51	08:05	3.43	0.46	09:10	3.55	0.47
Unknown Settlement 8	30.7	679	1.38	0.94	07:50	1.15	0.6	09:05	1.36	0.86
Regedapada	31.1	173	0.62	0.2	08:40	0.47	0.15	10:20	0.72	0.18
Unknown Settlement	31.6	1,062	1.11	0.6	09:00	1.03	0.49	10:20	1.14	0.56
Koranga	32.7	1,814	2.03	1.26	09:00	1.6	0.81	10:35	2.26	1.41
Budhiapata	33	76	0.72	0.24	08:55	0.25	0.1	10:55	0.99	0.24
Sankarpur 1	33.2	871	0.31	0.34	10:05	0.24	0.2	11:35	0.34	0.33
Sathilo	33.4	1,621	0.84	1.24	10:35	0.39	0.28	12:50	1.06	1.38
Athagarh	34.5	486	1.04	0.44	10:25	0.92	0.35	12:15	1.15	0.47
Sankarpur	34.9	1,795	0.48	0.48	11:30	0.25	0.42	13:15	0.97	1.28
Unknown Settlement	35.8	977	0.78	0.47	11:40	0.49	0.3	14:05	1.18	0.47

Dorada / Iswara / Chunapada	36.5	3,143	2.54	1.6	11:40	2.1	1.28	13:40	3.04	1.78
Deopada 2	36.7	859	0.43	0.22	13:45	---	---	---	0.93	0.15
Unknown Settlement 9	37	1,416	1.02	0.17	14:30	1.01	0.11	19:25	1.03	0.2
Gopinathpur / Paikerapur / Joranda	38.4	3,693	1.33	0.32	14:30	1.13	0.17	18:15	1.86	0.36
Tarasingha	38.5	1,639	2.43	1.07	14:25	2.11	0.85	17:40	2.89	1.38
Karikol	39.1	1,182	0.43	0.24	23:25	0.39	0.2	36:35:00	0.61	0.38
Bentapada / Radhakantapatna	39.6	345	---	---	---	---	---	---	0.04	0.06
Lidayapurda la	39.6	287	0.32	0.41	16:55	---	---	---	0.73	0.64
Karakamal	39.8	199	0.51	0.78	16:45	0.29	0.75	21:20	0.93	0.7
Haridagahir	39.9	252	0.02	0.13	21:10	---	---	---	0.41	0.25
Unknown Settlement 7	40.1	275	---	---	---	---	---	---	0.27	0.12
Kulailo	40.1	1,300	0.2	0.46	17:55	---	---	---	0.33	0.76
Gajaamba	40.4	751	1.31	0.44	17:05	1.11	0.22	21:40	1.69	0.62
Silapat	40.4	433	1.51	0.52	16:05	1.3	0.4	20:00	1.9	0.73
Haripur	40.8	234	0.72	0.3	19:10	0.57	0.05	25:00:00	1.21	0.53

Parsurampur	40.8	287	---	---	---	---	---	---	0.19	0.14
Tarading	40.9	201	0.86	0.31	18:35	0.68	0.23	---	1.34	0.72
Rajanagar	41.1	971	---	---	---	---	---	---	2.2	0.37
Balipada	41.3	240	---	---	---	---	---	---	0.2	0.03
Dahisara	41.4	368	1.47	0.57	19:45	1.33	0.51	26:00:00	2.07	0.67
Bailo	41.5	148	1.5	0.45	19:25	1.35	0.39	25:25:00	2.1	0.68
Tailmal	41.7	161	0.14	0.21	22:15	0.08	0.13	29:45:00	0.53	0.58
Talagada	41.8	629	---	---	---	---	---	---	0.29	0.1
Gaurangpur	42.5	178	---	---	---	---	---	---	0.16	0.25
Champapur / Madhabpur	43.1	1,340	0.13	0.58	22:55	---	---	---	0.77	1.19
Chandrabali shyampur / Ghantikhal a/ Nidhipura	44.3	2,297	---	---	---	---	---	---	0.25	0.18
Baudhapur	47.3	317	---	---	---	---	---	---	0.43	0.48
Bhuinbarei 2	47.4	229	---	---	---	---	---	---	1.69	1.69
Mahalapada	47.5	729	---	---	---	---	---	---	1.3	0.78
Jagmohanpur	47.6	89	---	---	---	---	---	---	0.88	0.42
Baulapada / Balarampur/	47.7	2,289	---	---	---	---	---	---	5.69	1.04

Bhuinbarei	47.8	255	---	---	---	---	---	---	0.39	0.16
Dhurusia 2	47.9	481	---	---	---	---	---	---	0.44	0.27
Unknown Settlement 4	48.3	335	---	---	---	---	---	---	4.69	1.16
Nuashasan / Anantapur	48.7	7,048	---	---	---	---	---	---	1.41	0.21

^a Approximate shortest distance downstream from dam.

^b Estimated population at risk within the presumed settlement boundaries.

^c Maximum value near the specified location, which usually occurs near the center of the stream.

^d Flood wave arrival time is the time since the initiation of the dam breach until the settlement is inundated.

^e Location not inundated.

Annexure-3

Evacuation Plan

N.B.-Detail maps are available in State Dam Safety Office,Odisha

Evacuation Window	Order of Priority	Location Name	Distance from the Dam(km)	Evacuation Route	Shelter/ Refugee	Responsible for Evacuation	Contact Details
<20 min	1	Dandiri	1.2	Dandiri rd	PP DEV Mahavidyalaya	Police Station Badamba	0721 273 2228
	2	Nahada 2	1.5	Nahada 2 rd	Buhalipal Primary School	Balimi Police Station	91-6732254434
	3	Nahada 3	2	Nahada 3 rd	Buhalipal Primary School	Balimi Police Station	91-6732254434
	4	Nahada 1	2.5	Nahada 1 rd	Buhalipal Primary School	Balimi Police Station	91-6732254434
	5	Kathakumpa	2.6	Kathakumpa rd	PP DEV Mahavidyalaya	Police Station Badamba	0721 273 2228/06721-273228/9438916205
20 min-1 hr	6	Kharachuli 1	6.7	Kharachuli 1 rd	PP DEV Mahavidyalaya	Police Station Badamba	0721 273 2228/06721-273228/9438916205
	7	Gandanali 3	7	Gananali 3 rd	Buhalipal Primary School	Balimi Police Station	91-6732254434
	8	Gandanali 2	7.2	Gadanali 2 rd	Nizigarh Model PS	Police Station Badamba	0721 273 2228/06721-273228/9438916205
	9	Gandanali 1	7.3	Gadanali 1 rd	Nizigarh Model PS	Balimi Police Station	91-6732254434
1 -2hr.	10	Nayagada 4	9.2	Nayagada 4 rd	Govt.High School,Tigiria	Police Station Badamba	0721 273 2228/06721-273228/9438916205
	11	Nayagada 1	9.6	Nayagada 1 rd	Govt.High School,Tigiria	SP Office Dhenkanal	91-67622255010
	12	Nayagada 2	9.8	Nayagada 2 rd	Kantapanhara Project U.P School	SP Office Dhenkanal	91-67622255010
	13	Nayagada 3	10.2	Nayagada 3 rd.	Kantapanhara Project U.P School	SP Office Dhenkanal	91-67622255010
	14	Chilataila	10.7	Chilataila rd	Buhalipal Primary School	SP Office Dhenkanal	91-67622255010
	15	Iswarapal 1	11.4	Iswarapal 1 rd	Govt.High School,Tigiria	SP Office Dhenkanal	91-67622255010
	16	Iswarapal 7	12.4	Iswarapal 7 rd	Govt.High School,Tigiria	SP Office Dhenkanal	91-67622255010
	17	Iswarapal 2	12.4	Iswarapal 2 rd	Chandipur patana UP School	Balimi Police Station	91-6732254434
	18	Iswarapal 3	13.6	Iswarapal 3 rd	Chandipur patana UP School	Balimi Police Station	91-6732254434
19	Iswarapal 6	13.6	Iswarapal 6 rd	Chandipur patana UP School	Balimi Police Station	91-6732254434	

2-4hrs	20	Jaripal 2	14.7	Route 20	Anchal High School, Dinabandhu Pur	Badamba Police Station	0721 273 2228/06721-273228/9438916205
	21	Jaripal 1	15	Route 20	Anchal High School, Dinabandhu Pur	Badamba Police Station	0721 273 2228/06721-273228/9438916205
	22	Ranipal / Jaripal	15.7	Route 20	Dinabandhu Govt Primary School	Badamba Police Station	0721 273 2228/06721-273228/9438916205
	23	Sananadaba 1	16.1	Route 84	BD High School	Town Police Station, Dhenkanal	06723-235636/9438916238
	24	Ranipal 1	17.2	Route 84	BD High School	Town Police Station, Dhenkanal	06723-235636/9438916238
	25	Ostapal	17.3	Route 66	Lambodarpur Primary School	Town Police Station, Dhenkanal	06723-235636/9438916238
	26	Ranipal 3	17.4	Route 84	Kankadahad Primary School	Town Police Station, Dhenkanal	06723-235636/9438916238
	27	Amantapada 3	18.2	Route 66	Fasigaon UP High School	Badamba Police Station	0721 273 2228/06721-273228/9438916205
	28	Ghatipiri 1	18.3	Route 25	G.P High School	SP Office Dhenkanal	91-67622255010
	29	Brundabanpur	19.5	Route 25	Satyabadi High School	SP Office Dhenkanal	91-67622255010
	30	Bhapur 2	19.8	Route 94	Dibyajyoti High School	Tigiria Police Station	06723-235636/9438916238
	31	Panamurga 2	19.8	Route 25	Khutujhari High School	Town Police Station, Dhenkanal	06723-235636/9438916238
	32	Panamurga 1	19.9	Route 25	Khutujhari High School	Town Police Station, Dhenkanal	06723-235636/9438916238
4-6hrs	33	Bhapur 3	21.4	Route 25	Kandabindha U.P School	Town Police Station, Dhenkanal	06723-235636/9438916238
	34	Mahulapunji 1	21.5	Route 94	Fasigan UP.School	Tigiria Police Station	06723-235636/9438916238
	35	Mahulapunji 2	22.4	Route 21	Kandabindha D.P.E.P School	Town Police Station, Dhenkanal	06723-235636/9438916238
	36	Chandrasekharprasad 4	22.6	Route 94	Janata ME School	Tigiria Police Station	06723-235636/9438916238
	37	Chandrasekharprasad 5	23	Route 21	Kankadahad Primary School	Town Police Station, Dhenkanal	06723-235636/9438916238
	38	Candrasekharprasad	23.5	Route 58	Gajamara School	Town Police Station, Dhenkanal	06723-235636/9438916238
	39	Chandrasekharprasad 6	24	Route 58 & 76	Gajamara School	Town Police Station, Dhenkanal	06723-235636/9438916238

	40	Chandrasekharprasad 7	25.4	Route 58	Badrapali,UP School	SP Office Dhenkanal	91-67622255010
6-8.5hrs	41	Viruda 1	26	Route 63	Kumbhiput Project UP School	Tigiria Police Station	06723-235636/9438916238
	42	Unknown Settlement 11	26.7	Route 63	Panchagaon High School	Tigiria Police Station	06723-235636/9438916238
	43	Unknown Settlement 12	27.2	Route 58	Saptasajya High School	Town Police Staion ,Dhenkanal	06762-226493/9438916484
	45						
	46	Gangadharprasad 4	27.6	Route 58 &76	Gajamara School	Town Police Staion ,Dhenkanal	06762-226493/9438916484
	47						
	48	Godijharia / Matikote	28	Route 63	Panchagaon High School	Tigiria Police Station	06723-235636/9438916238
	49	Gangadharprasad 3	28.2	Route 58 & 76	Kamning Primary School	Town Police Station, Dhenkanal	06762-226493/9438916484
	50	Arakhapatana	29.1	Route 59 & 76	Sadeibereni U.P School	Town Police Station, Dhenkanal	06762-226493/9438916484
	51	Tentulipatana	29.3	Route 58	Sadeibereni U.P School & Kamning Primary School	Town Police Station, Dhenkanal	06762-226493/9438916484
	52	Dhirapatana 2	30.3	Route 59 & 76	Sadeibereni U.P School & Saptasajya High School	Town Police Station, Dhenkanal	06762-226493/9438916484
	53	Dhirapatana 1	30.5	Route 76	Sadeibereni U.P School & Saptasajya High School	Town Police Station, Dhenkanal	06762-226493/9438916484
	54	Unknown Settlement 8	30.7	Route 76	Balarampur Kashiadidhi Nodal U.P School	Town Police Station, Dhenkanal	06762-226493/9438916484
	55	Regedapada	31.1	Route 56	Jagiapada Nodal Up School	Tigiria Police Station	06762-226493/9438916484
56	Unknown Settlement 14	31.6	Route 77	Balarampur Kashiadidhi Nodal U.P School	Town Police Station, Dhenkanal	06762-226493/9438916484	
8.5-10.5hrs	57	Koranga	32.7	Route 77	Balarampur High School	Town Police Station, Dhenkanal	06723-235636/9438916238
	58	Budhiapatana	33	Route 60	Gholapur Nodal UP School	Tigiria Police Station	06723-235636/9438916238
	59	Sankarpur 1	33.2	Route 42	Badrapali UP School	Town Police Station,Dhenkanal	06762-226493/9438916484

10.5-15hrs	60	Sathilo	33.4	Route 49 & 42	Gajamara School	Town Police Station,Dhenkanal	06762-226493/9438916484
	61	Athagarh	34.5	Route 37 & 60	Kadalibadi School Dadhibaman Jew M.E School	Athagarh Police Station	06723-220228/9438916201
	62	Sankarpur	34.9	Route 48	Talbarkote Primary Schpool	Town Police Station,Dhenkanal	06762-226493/9438916484
	63	Unknown Settlement 10	35.8	Route 47	Gobindapur KP High School	Town Police Station,Dhenkanal	06762-226493/9438916484
	64	Dorada / Iswara /Chunapada	36.5	Route 47	Gobindapur KP High School Nadiali School	Town Police Station,Dhenkanal	06762-226493/9438916484
	65	Deopada 2	36.7	Route 47	Odisha Institute of Engineering & Technology,Diploma College Dhenkanal	Town Police Station,Dhenkanal	06762-226493/9438916484
	66	Unknown Settlement 9	37	Route 60	Gholapur Nodal UP School	Tigiria Police Station	06723-235636/9438916238
	67	Gopinathpur / Paikerapur / Joranda	38.4	Route 57 & 50	Odisha Institute of Engineering & Technology,Diploma College Dhenkanal	Town Police Station,Dhenkanal	06762-226493/9438916484
	68	Tarasingha	38.5	Route 50	Radhanatha Nodal Bidyapitha,Khuntuni	Khuntuni Police Station	06723-222424/9438916209
15-23hrs	69	Karikol	39.1	Route 57 or Route 50	Radhanatha Nodal Bidyapitha,Khuntuni	Khuntuni Police Station	06723-222424/9438916209
	70	Bentapada /Radhakantapatna	39.6	Route 38 & 37	Dadhibaman Jew M.E School	Tigiria Police Station	06723-235636/9438916238
	71	Lidayapurdala	39.6	Route 57	Radhakishor Pur High School	Khuntuni Police Station	06723-222424/9438916209
	72	Karakamal	39.8	Route 57	Radhakishor Pur High School	Khuntuni Police Station	06723-222424/9438916209
	73	Haridagahir	39.9	Route 41	Gobinda Chandra Nodal U.P.School,Radhakishorepur	Khuntuni Police Station	06723-222424/9438916209

74	Unknown Settlement 7	40.1	Route 41	Dadhibaman Jew M.E School	Police Station, Athagarh	06723-220228/9438916201
75	Kulailo	40.1	Route 57	Radhakishor Pur High School	Khuntuni Police Station	06723-222424/9438916209
76	Gajaamba	40.4	Route 57	Radhanatha Nodal Bidyapitha,Khuntuni	Khuntuni Police Station	06723-222424/9438916209
77	Silapat	40.4	Route 57	Radhanatha Nodal Bidyapitha,Khuntuni	Khuntuni Police Station	06723-222424/9438916209
78	Haripur	40.8	Route 98 & 41	Radhanatha Nodal Bidyapitha,Khuntuni	Khuntuni Police Station	06723-222424/9438916209
79	Parsurampur	40.8	Route 27	Bishnupur Nuaostia L.P School	Police Station, Athagarh	06723-220228/9438916201
80	Tarading	40.9	Route 57	Radhanatha Nodal Bidyapitha,Khuntuni	Khuntuni Police Station	06723-222424/9438916209
81	Rajanagar	41.1	Route 38 &37	Bishnupur Nuaostia L.P School	Police Station, Athagarh	06723-220228/9438916201
82	Balipada	41.3	Route 38 & 37	Bishnupur Nuaostia L.P School	Police Station, Athagarh	06723-220228/9438916201
83	Dahisara	41.4	Route 98	Gobinda Chandra Nodal U.P.School,Radhakishorepur	Khuntuni Police Station	06723-222424/9438916209
84	Bailo	41.5	Route 27 & 98	Kandarei UP School	Khuntuni Police Station	06723-222424/9438916209
85	Tailmal	41.7	Route 37	Kadalibadi School	Police Station, Athagarh	
86	Talagada	41.8	Route 107	Kandarei UP School	Khuntuni Police Station	06723-222424/9438916209
87	Gaurangpur	42.5	Route 108 &107	Chhotiamba School	Khuntuni Police Station	06723-222424/9438916209
88	Champapur / Madhabpur	43.1	Route 98 & 41	Sitarampur Primary School	Khuntuni Police Station	06723-222424/9438916209
89	Chandrabalishya mpur /Ghantikhala/Nidhi pura	44.3	Route 41	Sitarampur Primary School	Khuntuni Police Station	06723-222424/9438916209
90	Baudhapur	47.3	Route 41	Chhotiamba School	Khuntuni Police Station	06723-222424/9438916209
91	Bhuinbarei 2	47.4	Route 41	Khamarnuagaon School	Regional Office ,Police Station,Cuttack	0671-2304567
92	Mahalapada	47.5	Route 41	Khamarnuagaon School	Regional Office ,Police Station,Cuttack	0671-2304567
93	Jagmohanpur	47.6	Route 41	Khamarnuagaon School	Regional Office ,Police Station,Cuttack	0671-2304567

94	Baulapada / Balarampur/Kataki asahi	47.7	Route 41	Gurudijhatia High School	Regional Office ,Police Station,Cuttack	0671-2304567
95	Bhuinbarei 1	47.8	Route 41	Gurudijhatia High School	Regional Office ,Police Station,Cuttack	0671-2304567
96	Dhurusia 2	47.9	Route 41	Gurudijhatia High School	Regional Office ,Police Station,Cuttack	0671-2304567
97	Unknown Settlement 4	48.3	Route 41	Jambheswar Nodal Public School	Regional Office ,Police Station,Cuttack	0671-2304567
98	Nuashasan / Anantapur	48.7	Route 109	Pithakia School	Regional Office ,Police Station,Cuttack	0671-2304567

Bridge Location

Bridge Name	latitude	longitude	Overtopping			Piping			LCR		
			Arrival time (hr)	Velocity (m/s)	Depth (m)	Arrival time (hr)	Depth (m)	Velocity (m/s)	Depth (m)	Arrival time (hr)	Velocity (m/s)
Bridge 1	20°35'34.64"	85°18'9.85"	0.08-0.25	2.25-3	9.11-10.17	0.08-1.97	8.23-12.34	0.58-0.71	2.3-3.3	0.6-1.13	0.67-0.89
Bridge 2	20°35'18.26"	85°23'44.26"	0.5-1	1.5-2.25	3.87-4.68	0.08-1.97	3.58-4.74	1.49-2.12	2.3-3.3	-	2-2.5
Bridge 3	20°35'14.96"	85°24'19.18"	0.5-2	03-Apr	5.5-6.3	0.08-1.97	4.74-6.14	1.49-2.12	4.3-5.27	-	2.5-3.35
Bridge 4	20°34'51.36"	85°27'45.44"	2.25-3	2.25-3	1.76-2.4	1.97 -4.21	1.79-2.56	0.8-1.1	0.6-1.4	1.8-4.6	2.04-2.53
Bridge 5	20°34'3.29"	85°29'33.95"	3.0-4.0	1.5-2.25	3.07-3.9	1.97 -4.21	1.15-1.79	1.49-2.12	2.3-3.3	1.13-1.8	1.38-1.67
Bridge 6	20°33'19.97"	85°30'16.58"	3.5-5.5	1.5-2.25	3.07-3.9	4.2-6.8	2.25-3.58	1.1-1.49	2.3-3.3	1.13-1.8	1.38-1.67
Bridge 7	20°32'10.11"	85°30'57.35"	5.5-7.4	1-1.5	2.4-3.0	4.2-6.8	2.56-3.58	0.7-0.87	2.3-3.4	0.6-1.13	0.67-0.89
Bridge 8	20°30'41.84"	85°33'25.91"	7.4-9.2	1-1.5	0.01-0.5	6.8-9.2	0.58-1.16	0.87-1.1	0.00-0.6	1.13-1.8	0.8-1.13
Bridge 9	20°30'56.00"	85°36'0.28"	7.4-9.2	1-1.5	2.4-3.07	9.2-11.62	0.58-1.16	1.1-4.9	1.4-2.3	-	0.67-0.89
Bridge 10	20°31'40.60"	85°37'44.55"	11-12.7	0.5-1	0.5-1.1	11.01-12.73	0.01-0.58	0.58-0.7	0.6-1.4	-	0.4-0.67
Bridge 11	20°30'42.90"	85°41'28.41"	19-2-21.3	0.01-0.5	.001-0.5	26.95-29.36	0.01-0.58	0.58-0.7	0.6-1.4	0.45-0.67	0.4-0.67
Bridge 12	20°30'36.04"	85°41'47.61"	21.3-23.5	0.5-1	1.1-1.7	26.95-29.36	0.58-1.16	0.7-0.87	1.4-2.3	0.67-0.89	0.67-0.89
Bridge 13	20°34'35.81"	85°26'26.86"	1.6-3.5	1.15-2.25	1.76-2.3	1.64-3.51	1.79-2.56	1.1-1.49	0.6-1.4	-	1.13-1.38
Bridge 14	20°28'58.92"	85°44'7.98"	-	-	-	-	-	-	4.3-5.9	0.67-0.89	0.67-0.89

Annexure 4

Emergency Level Action Data Sheet

General Observation	Specific Observation	Emergency Condition Level	Emergency Action	Equipment, materials & supplies
<p>Seepage</p>	<p>When the seepage is not excessive and the seepage water is clear without sediment.</p>	<p>BLUE</p>	<ol style="list-style-type: none"> 1) Record the findings and photograph the area. Closely check entire embankment for other seepage areas. 2) Use wooden stakes or flagging to delineate seepage area. 3) Always measure the seepage and flow rate on a regular and frequent basis. 4) The seepage should be checked for turbidity. 	<p>None</p>
	<p>New, seriously rapid increase of flow rate of seepage at toe, on the slope of embankment, abutments. Cloudy appearance of seepage.</p>	<p>ORANGE</p>	<ol style="list-style-type: none"> 1) Continue 24-hr. surveillance. 2) Emergency Planning Manager will observe the conditions in site periodically and provide decision support as appropriate. 	<p>Dozer, shovels, source of fill material.</p>

			<ul style="list-style-type: none"> 3) Initiate emergency lowering of the reservoir. 4) Construct a large ring dike around the seepage area. 	
	Serious seepage at toe, on slope of embankment, abutment. Incontrollable muddy water flowing, failure of the dam is imminent.	RED	<ul style="list-style-type: none"> 1. Downstream evacuation. 2. 2. Employ all available equipment to attempt to construct a large ring dike around the seepage area. 	Dozer, shovels, source of fill material.
Sand Boiling	Small boils, no increase of water flow, flowing clear water.	BLUE	<ul style="list-style-type: none"> 1) Closely check all of downstream toe, especially in the vicinity of boil for additional boils, wet spots, sink holes or seepage. 2) Closely monitor entire area for changes or flow rate increases. 3) Small sand boiling may also be controlled by providing d/s berms beyond the toe of the dam 	None
	Large or additional boils near previously identified ones, increasing flow rate, carrying soil particles.	ORANGE	<ul style="list-style-type: none"> 1. When large sand boiling is observed, then record the reservoir's water surface elevation, and approximate the sand boil elevation. 2. Continue 24-hr. surveillance. 3. Photograph and record the 	Sandbags

			<p>size and depth of the exit, or outlet opening.</p> <p>4. Measure the flow rate.</p> <p>5. Construct sandbag ring dikes around boils. Sandbags should be placed high enough to stop soil particles from moving, if possible, but not to prevent water movement.</p>	
	Rapidly increasing size of boils and flow increasing and muddy water.	RED	<p>1) Downstream evacuation.</p> <p>2) Employ all available equipment to attempt to construct a large ring dike around the boil area.</p>	
Cracking	Numerous cracks in the crest that are slowly enlarging, especially, those perpendiculars to the centerline of the dam.	BLUE	<p>1) Inspect crack and carefully record crack location, length, depth, width, and other pertinent physical features.</p> <p>2) Continue to monitor routinely the embankment crest for evidence of further cracking.</p> <p>3) Effectively seal the cracks with suitable material at the crest's surface to prevent infiltration by surface water to prevent the infiltration by the surface water.</p> <p>4) Cracks parallel to the</p>	Measuring tape, Dozer, shovels, source of fill material.

			centerline indicate a slide. Follow remedial action for slides.	
	Large cracks in the crest that is rapidly enlarging, especially, that perpendicular to the centerline of the dam.	ORANGE	Same as above	Dozer, shovels, source of fill material.
	If the depth of the cracking appears to extend below the reservoir level.	RED	Same as above	Dozer, shovels, source of fill material.
Depressions	Probe the floor of the depression to determine whether or not there is an underlying void. An underlying void is indicative of a sinkhole.	BLUE	<ol style="list-style-type: none"> 1) Photograph and record the location, size, and depth of the depression. 2) Frequently observe the depression to ensure it has stopped developing. 3) Consult a qualified dam safety professional to figure out the cause of the depression if it is severe, or if it progressively worsens. 	Dozer, shovels, source of fill material.
Sinkholes	Sinkholes with corresponding seepage anywhere on the embankment or downstream from the toe.	BLUE	Initiate 24-hour surveillance. Construct sandbag dike around the seepage exit point to reduce the flow rate. Start filling sandbags and stockpile near sinkhole.	Dozer, shovels, pumps.

	Large sinkholes with corresponding seepage anywhere on the embankment or downstream from the toe.	ORANGE	Continue monitoring and remedial action as described above, utilize sandbags to increase the freeboard on the dam if necessary.	Sandbags, dozer, pump.
	Sinkholes rapidly getting worse, seepage flowing muddy water and increasing flow.	RED	Downstream evacuation. Utilize all available equipment and personnel to attempt to construct a large ring dike around the area.	
Settlement	Settlement of crest of embankment that is progressing, especially adjacent to concrete structures or if any corresponding seepage is present.	BLUE	Initiate 24-hour surveillance. Mobilize all available resources for repair operations to increase freeboard. Fill and stockpile sandbags. Identify any boils near settlement points for flowing material and pursue action for boils.	Sandbags, dozer, shovels, sources of fill material.
	Settlement of crest of embankment that is rapidly progressing especially adjacent to concrete structures or if any corresponding seepages is flowing muddy water or increasing flow.	ORANGE	Continue monitoring and remedial actions as described above. Use sandbags to increase the freeboard on the dam if necessary.	Sandbags, shovels, dozer, source of fill material.
	Progressing settlement that is expected to degrade the		Downstream evacuation. Utilize all	Sandbags.

	embankment to reservoir level.	RED	available equipment and personnel to build – up the crest in the area that is settling. Identify any boils near settlement points for flowing material and pursue action for boils.	
Rapidly Rising Lake	Lake level rising and rain continuing.	BLUE	Initiate 24- hour surveillance of lake level and rainfall. Generate inflow forecasts every 12 hours.	
Overtopping	Water flowing over the dam and lake continuing to rise. No significant erosion of downstream embankment.	ORANGE	Prepare for evacuation. Continue monitoring. Generate inflow forecasts every 3 hours.	Dozer, fill material, sandbags.
	Water flowing over the dam and lake continuing to rise and significant erosion of downstream embankment with development of head- cuts encroaching on the dam crest, or significant movement of sections of concrete portions of the dam.	RED	Immediate evacuation. Dam failure is imminent or ongoing.	Cameras.

Annexure 5

Supplies and Resources

Contact information for contractors who can provide the items required during an emergency is listed below.

Contractor Type	Name, Title ,Phone	Remarks
Geotechnical work	Name -AMIL Mob No-9937247299	
civil work	Name –Biswaranjan Nayak Title - 'B' Class Contractor Mob No-9938763732	
	Name:Dibakar Naik Mob No:9668180353	
JCB Operator	Name:Jagabandhu Sahu Mob No:9937733263	

Annexure-6

Sample Public Announcements

Note: These messages are communicated to downstream residents to alert the public of imminent danger. Messages can be communicated via radio, television, bulk SMSs of local mobile networks and other media outlets.

Announcement for “ Watch” Condition (BLUE Emergency Level)

The Department of Water Resources, Odisha has declared a BLUE Level “Watch” condition for Sapua dam, Project Identification Code OR10MH0156 as of [time and date]. [Briefly describe the problems or condition.]. Although there is no immediate danger of the dam failing a possibility now exists that the dam will fail if the remedial measures are unsuccessful [Describe what actions are being taken to monitor and correct the situation.]. Addition news will be made as soon as it is received.

Announcement for a Probable “ Failure” Condition (ORANGE Emergency Level)

Urgent! This is an emergency message. The Department of Water Resources, Odisha has announced that Sapua dam, Project Identification Code OR10MH0156 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 river should prepare for immediate evacuation. Addition news will be made as soon as it is received.

Announcement of an Impending “ Failure” Condition (RED Emergency Level)

Emergency! This is an emergency message. Sapua dam, Project Identification Code OR10MH0156 is going to fail at any moment. The residents should immediately evacuate the low lying areas or (indicate the specific towns /villages to be evacuated according to the expected scenario). The flood waters have already reached [Highway] and [Road]. Addition news will be made as soon as it is received.

Announcement of an Ongoing “ Failure” Condition (RED Emergency Level)

Emergency! This is an emergency message. Sapua dam, Project Identification Code OR10MH0156 failed at [time and date]. The residents should immediately evacuate the low lying areas or (indicate the specific towns /villages to be evacuated according to the expected scenario) .The flood waters have already reached [Highway] and [Road]. Addition news will be made as soon as it is received

Annexure-7

Salient Feature

Sl.	Attribute	Value
1	Name of Dam	Sapua Dam
2	River	Sapua
3	Nearest city/town	Angul
4	District	Dhenkanal
5	State	Odisha
6	Purpose	Irrigation
7	Completion year	2006
8	Basin Name	Mahanadi
9	Seismic Zone	Zone-III
10	Dam type	Earthen
11	Length of dam(m)	1290.00
12	TBL (m)	174.00
13	Width of Dam at Top (m)	6.00
14	Max height above foundation (m)	26.75
15	Type, length & crest level of spillway	Labyrinth with Chute Spillway (Ungated)
16	Design flood(m ³ /s)	535.50 (Original) 626(Revised)
17	Catchment Area (km ²)	52.00
18	Submerged Area (Th. Ha.)	866.00
19	FRL (m)	168.50
20	Dead storage level(m)	161.10
21	Gross Storage Capacity (Ha.m) at FRL	850.00
22	Reservoir Spread Area (Ha.m)	134.4
23	Gross Command Area (GCA) (ha)	1400.00
24	Culturable Command Area (CCA) (ha)	950.00
25	Annual Irrigation Potential (ha)	855.00

Annexure-8

Annual EAP Evaluation Checklist

Evaluation Year		Evaluation done by:	
Was the annual dam inspection conducted?	<input type="checkbox"/> Yes <input type="checkbox"/> No	If yes, has the EAP been revised to include any signs of failures observed during the inspection?	<input type="checkbox"/> Yes <input type="checkbox"/> No
Was weed clearing, animal burrow removal, or other maintenance required?	<input type="checkbox"/> Yes <input type="checkbox"/> No	If yes, describe actions taken and date:	
Was the outlet gate operable?	<input type="checkbox"/> Yes <input type="checkbox"/> No	If no, describe actions taken and date:	
Does the Notification Flowcharts require revision? (Note that revision of the contact information will not require EAP approval; however, the revised contact information pages will need to be redistributed as replacement pages.)	<input type="checkbox"/> Yes <input type="checkbox"/> No	If yes, list the dates of the contact information revision and redistribution:	
Was annual training or a tabletop drill conducted?	<input type="checkbox"/> Yes <input type="checkbox"/> No	Circle: training drill Date conducted:	
Are inspection and training records included in the EAP?	<input type="checkbox"/> Yes <input type="checkbox"/> No		
Was the EAP reviewed?	<input type="checkbox"/> Yes <input type="checkbox"/> No	If yes, review date:	
Were changes required to the EAP?	<input type="checkbox"/> Yes <input type="checkbox"/> No	If yes, date of revised EAP approval:	

Annexure-9

Plan Review and Update

This plan will be reviewed and updated annually and tabletop drills will be carried out at least once every five 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-10

Training Record

Use this form to record training sessions. File the completed form in the appropriate Annex of the EAP. All items in the EAP should be thoroughly reviewed during training.

TRAINING LOCATION:	
DATE:	TIME: INSTRUCTOR:
CLASS SIGN-IN:	
Type of simulation Conducted:	Circle Emergency Type: <ul style="list-style-type: none">• Emergency water release• Watch condition• Possible dam failure• Imminent dam failure• Actual dam failure
Comments, Results of Drill:	
Revisions Needed to EAP Based on Results of Drill? <input type="checkbox"/> Yes <input type="checkbox"/> No If yes, list revisions required:	