



Indian National Committee on Large Dams

INTERNATIONAL DAM SAFETY CONFERENCE



IMPLEMENTATION OF DAM SAFETY EMERGENCY ACTION PLAN: THE MALAYSIAN EXPERIENCE ON COMMUNITY-BASED DISASTER MANAGEMENT APPROACH



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10-12 October 2022 at Jaipur, Rajasthan (India)



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PRESENTATION OUTLINE

- INTRODUCTION
- DAM SAFETY PRACTICES IN MALAYSIA
- TYPES OF EAP EXERCISE
- EXPERIENCE OF EAP IMPLEMENTATION IN MALAYSIA

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DAM SAFETY MANAGEMENT IN MALAYSIA (MyDAMS)

Changes & Decommissioning



Introduction

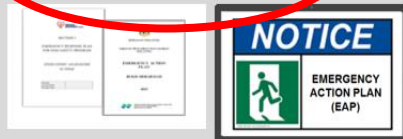


Legal Requirements

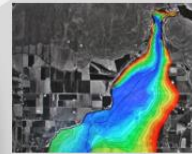


Provides a framework for the management of dam safety, and guidelines for development and implementation of dam safety practices throughout Malaysia

Emergency Action Plan



Potential Hazards of Dams & Safety Principles



Dam Rehabilitation



Dam Safety Management System



GOVERNMENT OF MALAYSIA
MALAYSIA DAM SAFETY MANAGEMENT GUIDELINES (MyDAMS)

Surveillance & Safety Review



Dam & Reservoir O&M



Construction & Commissioning



Investigation & Design



2017
MyDAMS

Objectives:

1. Identify emergency conditions which could endanger the integrity of the Dam and which require immediate action,
2. Prescribe procedures which should be followed by Dam owner to respond to and mitigate these emergency conditions at the dam, and
3. Provide timely warning to Dam owner and suit the local agencies mechanism response plan for downstream communities
4. Dam break information & FHM - flood arrival time, time to max flood depth, max flood flow velocity, max flood inundation depth, and flood extent, evacuation route & shelter

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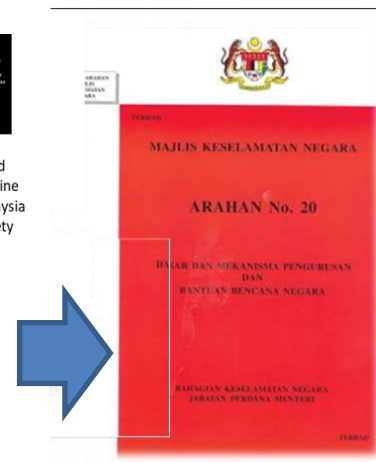
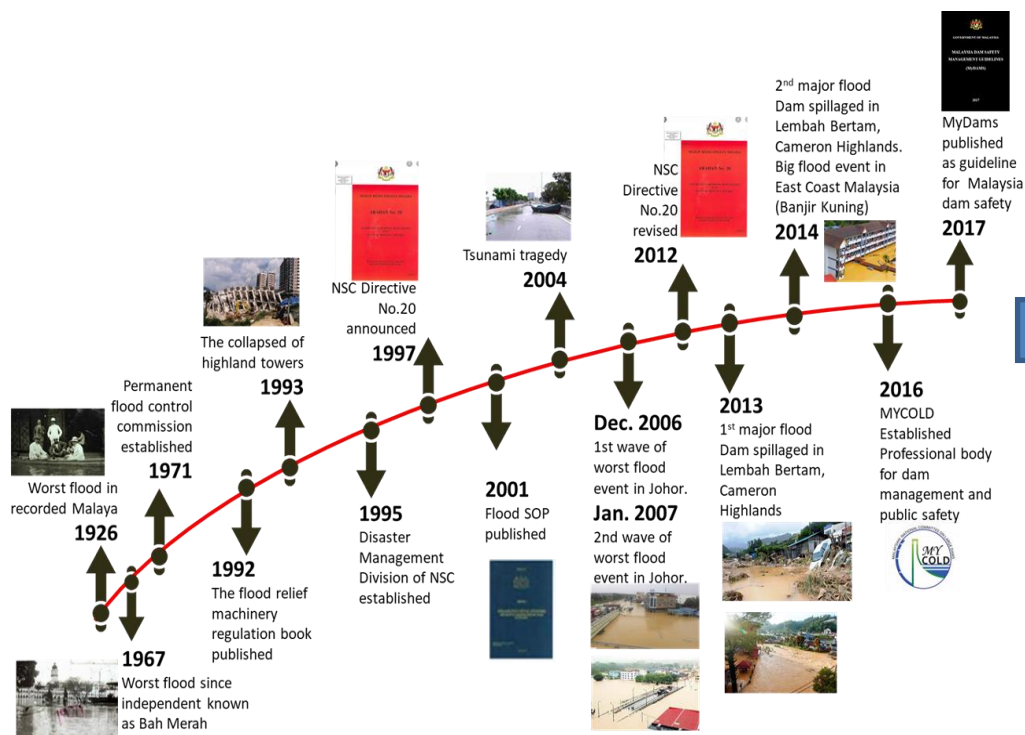
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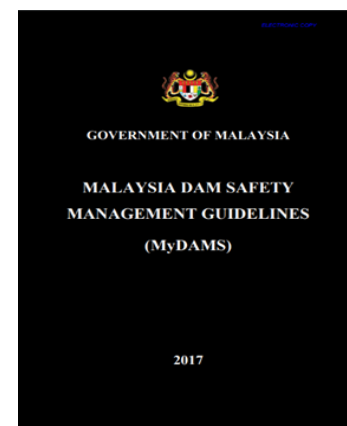
REFERENCE DOCUMENTS RELATED TO EAP



Section 4 Item 9
Prepare Emergency Action Plan

Section 5 Item 11
Early Warning System

Section 6 Item 15 & 16
Drill & Public Awareness / Education (Held on a regular basis exercise between inter agencies and private entities



Section 10.4 : Preparation of EAP

- Introduction
- Roles & Responsibilities
- Emergency Identification, Evaluation and Classification
- Notification
- Attendance and Communication Procedures
- Inundation Maps
- Preventive Actions
- Appendices

Section 10.5.2 : Exercise Plan

- Workshop, Tabletop Exercise, Drill Exercise, Functional Exercise, Full-Scale Exercise

JOURNEY OF POLICY & MECHANISM OF NATIONAL DISASTER MANAGEMENT

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IMPORTANCE OF EMERGENCY PREPAREDNESS

LEGISLATIVE REQUIREMENTS

Legislative requirement in most jurisdictions

DAM SAFETY

Prudent dam safety management practice

BEST PRACTICES

Good stakeholder management



HIGH CONSEQUENCES

Dams often have high consequences of failure

EARLY RESPONSE

Early detection and response to dam safety incidents

EARLY WARNING

Early warning of dam failure to the population at risk

DSERP outlines **'who does what, when, where and how'** during the dam safety events and emergencies

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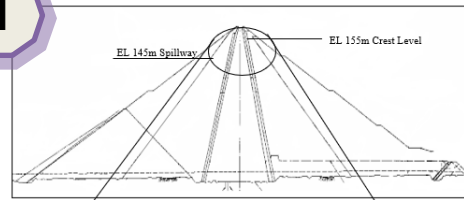
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1

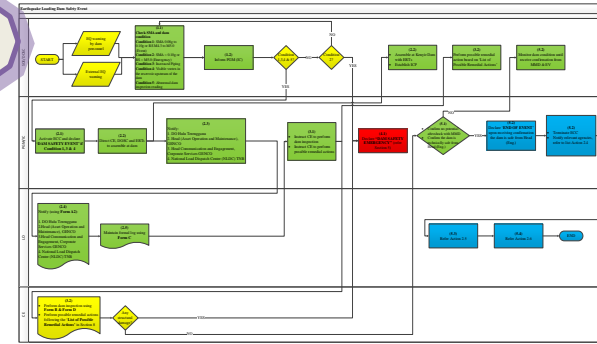
Triggering level



Central Water Commission

Action list & flowchart during emergency

2



DAM SAFETY EMERGENCY RESPONSE PLAN (DSERP)

Kenyir Dam

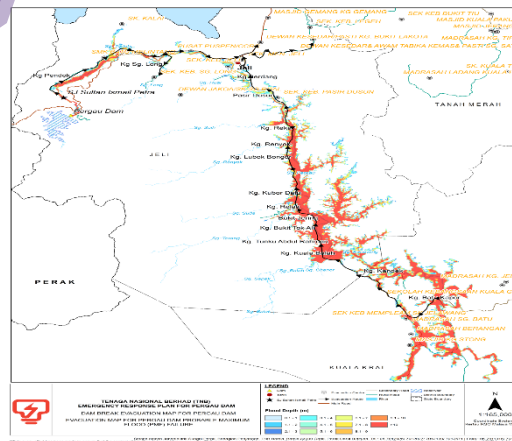
STESEN-STESEN JANAKUASA
KENYIR

July 2022



3

Evacuation route & shelter map



4

Evacuation Drill Exercise



- To guide participating community stakeholders in identifying the hazards, analyzing and designing disaster management initiatives, and analyzing and determining capacity needs through the collaboration with multiple agencies

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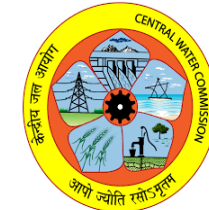


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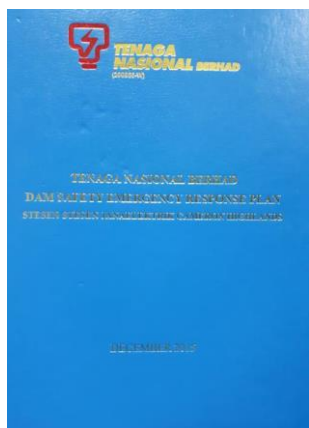
KEY ELEMENTS OF EMERGENCY ACTION PLAN

1 EAP DOCUMENT

DSERP outlines **'who does what, when, where and how'** during the dam safety events and emergencies

SECTIONS IN EAP

- Introduction
- Roles and Responsibilities
- Emergency Identification, Evaluation and Classification
- Notification
- Attendance and Communication Procedures
- Inundation Maps
- Preventive Actions
- Appendices



2 EXERCISE

it is essential that an EAP be tested periodically by conducting a drill simulating emergency conditions. Testing is necessary to train participants, as well as to identify weaknesses in this plan.



3 EARLY WARNING SYSTEM

Early warning system aim to alert community on the potential disaster, and the information will allow for early response to reduce the risk to life and property.



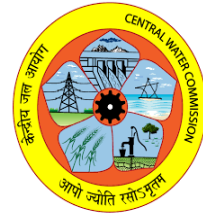
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TYPES OF EAP EXERCISE

Exercise the EAP (MyDAMS 10.5.2)

Malaysia Dams Safety Management Guidelines (MyDAMS)




ORIENTATION/ SEMNAR/ WORKSHOP



(Dam personnel and agencies)
Aim to refresh the participants to the plans and procedures in ERP. The seminar could be conducted through lectures, panel discussions or media presentations.


DRILL EXERCISE (Annually)

(Dam personnel)
Aim to train staff in house and test procedures





TABLETOP EXERCISE (Every 4 years)

(Dam personnel and agencies)
Aim to ensure that lines of communication and responsibilities between organisations work .





FUNCTIONAL EXERCISE

(Dam personnel & agencies)
Testing of communication & notifications procedure between dam personnel & agencies to simulate incident or emergency. These test is conducted at individual's agencies' place.



FULL SCALE EXERCISE



(Dam personnel, agencies and community)
These test actual on ground drills together with agencies and community

DENAI KEBANGSAAN






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RECOMMENDED EAP EXERCISE FREQUENCY (MyDAMS, 2017)

Type of Exercise	Frequency
Seminar/ Dialogue	Annually
Workshop and Competition	After Dam Safety Review or during revision of EAP
Drill	Annually
Tabletop Exercise	Every 4 years before functional exercise
Functional Exercise	5-yearly
Full-Scale Exercise	To be considered when there is a need. It should be carried out at least after a functional exercise. Whenever possible, the emergency management resources should be shared among the participants.



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*Experience of EAP Implementation in
Malaysia*

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TNB DAM SAFETY DSERP JOURNEY (2003-NOW)

02

Sungai Perak Hydro electric Scheme

5 Dams (Temenggor, Bersia, Kenering, Chenderoh & Pergau)
35 scenarios



TNB Dam Safety Program – Nine Elements

- 1 Dam Surveillance
- 2 Dam Operations and Maintenance
- 3 Regular Reporting
- 4 Audit and Review
- 5 Performance of Dams with Heightened Safety Awareness
- 6 Investigation and Resolution of Dam Safety Deficiencies
- 7 Emergency Preparedness (DSERP)**
- 8 Maintaining Personnel Capability & Access to Key Technical Information (**Training & Drill**)
- 9 Communication with External Stakeholders (**ICBDM**)

4 Dams (

Legend

- ▲ JPS Dam
- ▲ TNB Dam
- ▲ MADA Dam
- ▲ JKR/JBA/State Water Bo
- Flood Prone Area



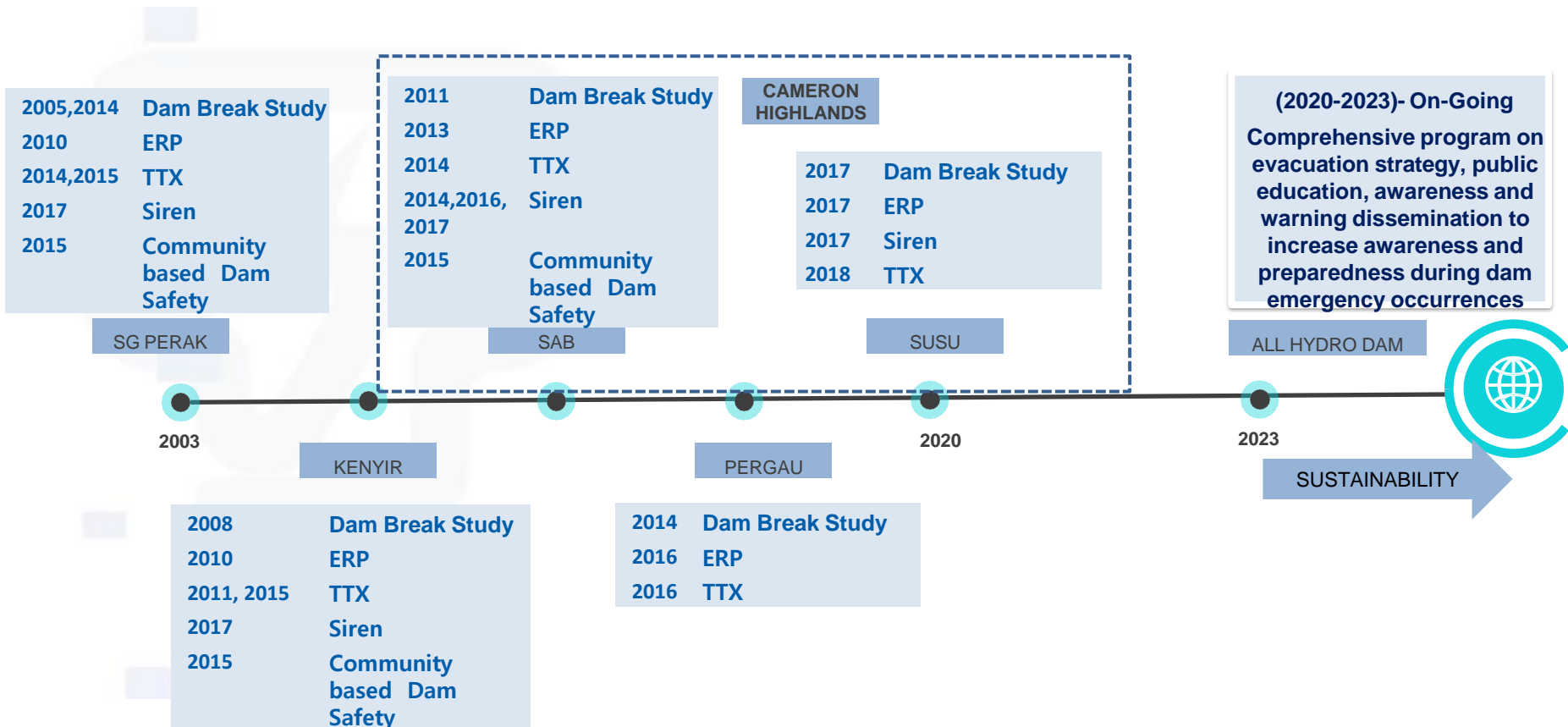
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TNB DAM SAFETY DSERP JOURNEY (2003-NOW)



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COMMUNITY SURVEY DAM SAFETY PROGRAM (2021)

Results and Finding



Training program
Dam safety initiates influence people's *response* and making them more *prepared*

Experience gain from *participatory* in Dam safety program did have influenced community responses: **>80%** agreed that they and their family were prepared to face dam disaster.

RII ranking on preference medium for Dam Safety information

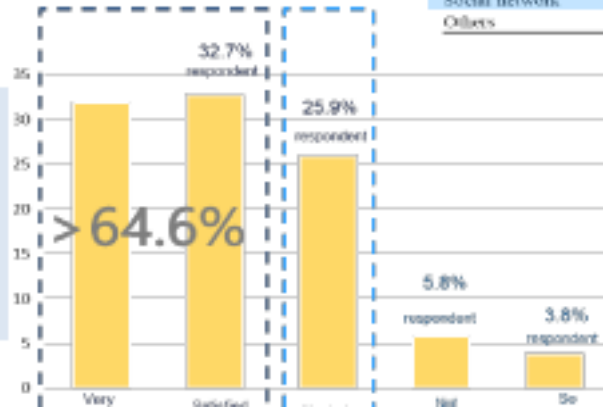
Medium	Responses												
	Strongly Disagree		Disagree		Neutral		Agree		Strongly Agree		I of R scores		Rank
	F	Score	F	Score	F	Score	F	Score	F	Score			
Community Leader	25	25	33	66	90	270	296	1184	403	2015	3560	1	
Community meetings	63	63	53	106	118	354	248	992	365	1825	3340	2	
Forums/ workshop	128	128	119	238	93	279	337	1348	170	850	2843	3	
Signage	125	125	134	268	126	378	257	1028	205	1025	2824	4	
Leaflets	218	218	192	304	83	249	183	732	211	1055	2558	5	
Friends/ relatives	366	366	192	304	77	231	148	592	104	520	2013	6	
TV / Radio	341	341	166	332	127	381	134	536	79	395	1985	7	
Newspaper	333	333	254	508	103	309	97	388	60	300	1838	8	
Electronic messages	368	368	213	426	121	363	117	468	28	140	1765	9	
Social network	410	410	225	450	88	264	77	308	47	235	1667	10	
Others	3	3	0	0	2	6	7	28	10	50	87	11	

Note: Relative Importance Index (RII) ranking analysis

The RII result shows:

- Community leaders is the most influence personnel due to the culture background. – The best person to deliver information in a community (trusted).
- The community are willing to participate and gives their commitment in community meeting.
- They prefer a physical sessions which involved them face to face. Electronic modes are less preferred, because
 - Not all have devices – expensive, not familiar with the gadgets.
 - Remote area – internet connection are not good

Assessment community satisfaction with drill exercise for Dam disaster



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DISASTER RISK REDUCTION STRATEGY

- Aims to provide sufficient information, train community response and preparedness as well as develop community resilience in DRM.



- OPEN DAY
- ROAD SHOW
- LOCAL BRIEFING
- SCHOOL CAMP
- WORKSHOP

INFORMATION DISSEMINATION



- LOCAL BRIEFING
- DRILL EXERCISE
- TABLETOP EXERCISE
- COMMUNITY EMERGENCY RESPONSE TEAM (CERT)

RESPONSE & PREPAREDNESS



- DRILL EXERCISE
- TABLETOP
- EVACUATION EXERCISE
- COMMUNITY EMERGENCY RESPONSE TEAM (CERT)

COMMUNITY RESILIENCE

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INTEGRATED COMMUNITY BASED DISASTER MANAGEMENT (ICBDM)-by TNB DRR dam safety program conducted for Hydroelectric Dam

PURPOSE

ICBDM has been framed to cater the dam safety in Malaysia.

1



AIM

To create the synergy between the three major stakeholders: Community, relevant authorities, and dam owners, to minimize loss of life and property damages in a dam-related disaster.

2

METHODS

Co-Implementing (Dam owners - agencies) various programs, training, and community events to increase their knowledge and awareness on dam safety and potential risk to public.

3



Priority 3 (P3): Invest in disaster risk reduction to increase resilience. Public and private investment in disaster risk prevention and reduction through structural and non-structural measures is critical to enhancing the economic, social, health and cultural resilience of people, communities, countries and their assets, as well as the environment.

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Education & Awareness

Training & Exercise : Drill, TTX & Evacuation

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COMMUNITY-LED DISASTER RISK REDUCTION PROGRAM

An approach focusing on strengthening community resilience

Community Engagement Program



Regular evacuation drill conducted with local communities and local agencies

DRILL EXERCISE AT SK CHEGAR GALAH 20/10/2017

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COMMUNITY-LED DISASTER RISK REDUCTION PROGRAM

Community Engagement Program



Local agencies and head of villages given task & roles in DRM program as part of program objective to develop internal structure and knowledge in disaster risk management program



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COMMUNITY-LED DISASTER RISK REDUCTION PROGRAM



School-based Program

DRILL EXERCISE
SK TELANOK
28/12/2018



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**DRIVING A SHIFT
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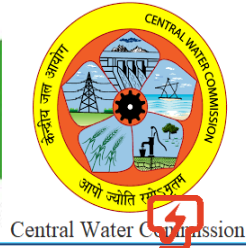
Early Warning System

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EARLY WARNING SYSTEM FOR EAP SIREN ALERT

INDICATOR	FUNCTIONS	ACTION TO BE TAKEN
WARNING (DAM SAFETY EVENT)	It initiates when reach WARNING level; indicator shall active when: i. Intermittent siren sound. ii. Yellow strobe light active.	People are ready to move from risk areas
DANGER (DAM SAFETY EMERGENCY)	It initiate when water level of dam reach DANGER level; indicator shall active when: i. Continuous siren sound. ii. Red strobe light active.	People moved to a safe place

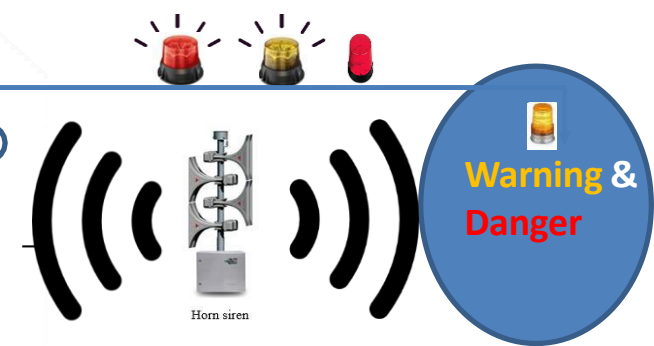
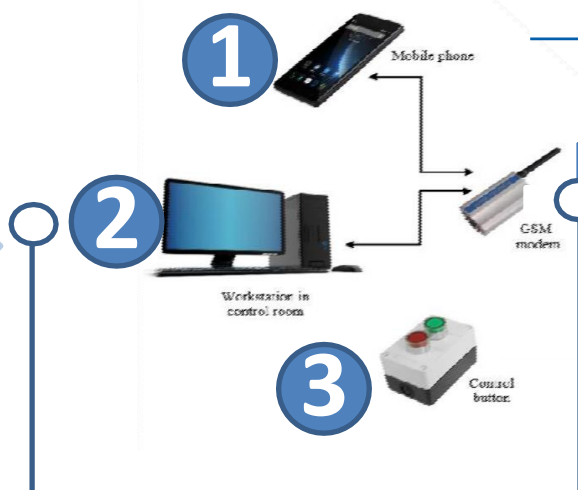


TNB
Dam & Reservoir condition

EWS ACTIVATION OPTIONS



Decision by DDMRC/JPBD SOPs



Methods to warn the community

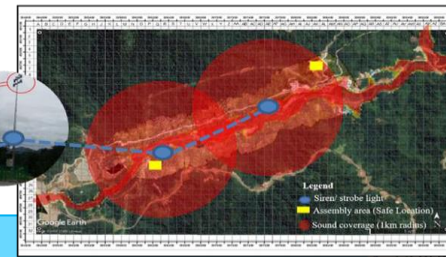
JABATAN METEOROLOGI MALAYSIA
KEMENTERIAN ALAM SEKITAR DAN AIR



DID/MMD
Weather forecast & river water level



Siren and strobe light (beacon) can be heard and seen within 1km radius





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EARLY WARNING SYSTEM FOR EAP TO ALERT COMMUNITY DURING DAM SAFETY EVENT



Kg Sayong, Perak



Kg Chegar Galah, Perak



Kg Gajah, Perak

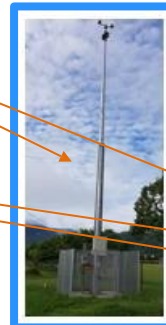
19 sirens installed



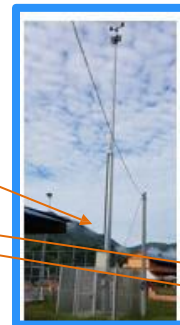
Kg Melintang, Kelantan



Kg Gunong, Kelantan



Kg Jenagor, Terengganu



Kg Dura, Terengganu

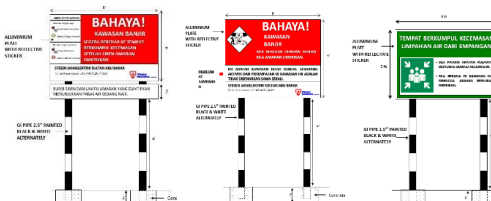


Kg Teji, Pahang



Kg Susu, Pahang

PRIVATE INVESTMENT



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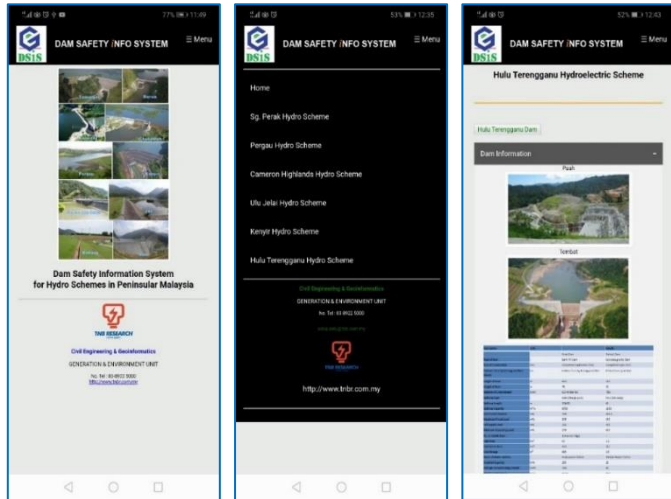
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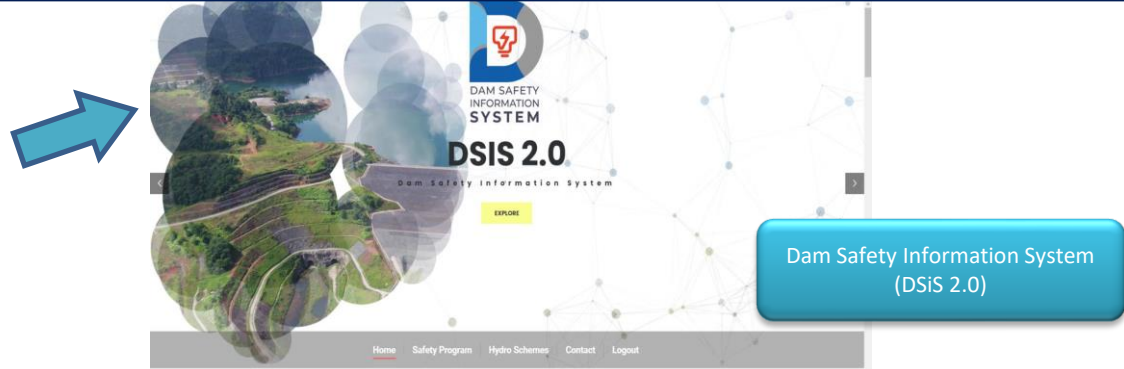


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DAM SAFETY INFORMATION SYSTEM (DSIS 2.0)



Dam Safety Information System (DSIS 1.0)
Android Apps (Version 1.0)



Dam Safety Information System (DSIS 2.0)



Android Apps (Version 2.0)

INFORMATION AVAILABLE

Dam Salient Features

Summary Results of Hydrological Analysis

Summary Results of Dam Break Modelling

Dam Break Flood Hazard Map for CDF & PMF

Summary Results of Socio Economic Analysis

Socio Economic Map for CDF & PMF

Dam Safety Emergency Response Plan for all TNB Dams

Emergency Evacuation Map (Route & Shelter)

Emergency Contact List

List of Evacuation Centre





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CONCLUSIONS

1. Responsible Dam Owner/Operator to reduce Dam failure that can lead to LOL & Catastrophic impact:

- ✓ Dam owner must take greater responsibility to effectively communicate with all stakeholders.
- ✓ Maintaine and update regularly to remain up-to-date and practical at all time.



3. A good EAP would

- ✓ Practical
- ✓ Help prevent and reduce LOL.
- ✓ Minimise the impact on the society and environment due to dam failure.



2. The main purpose of preparing EAP:

- ✓ provide a proper procedure in assisting dam personnel in executing dam emergency operation.



4. The benefit of establishing DSERP

- ✓ Create better communication and effective responses among dam owners and agencies to save lives during dam emergency occurrences.





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International Conference On Dam Safety Management and Engineering 2023 (ICDSME2023)

16 - 17 March 2023
Kuala Lumpur

Resilient Dams For Safe Communities

In Conjunction with:



13 - 16 March 2023



1st Announcement

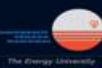
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The Energy University

JABATAN PENGAIRAN
DAN ELEKTRIK MALAYSIA

TENAGA NASIONAL
Better. Brighter.

sarawak
energy

NAHRIM

Secretariat



PROTEMP
PROFESSIONAL TEAM ENGINEERS
& SURVEYING PLANNERS

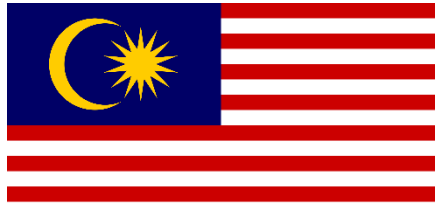
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