

No.1/2/23-OWRD/2019

**Government of Odisha  
Odisha Water Resources Department**

**Dam Rehabilitation and Improvement Project  
Phase II and Phase III**

**HIRAKUD DAM  
PROJECT SCREENING TEMPLATE**

Pic of dam	Pic of Critical Rehabilitation Component
Pic of Foundation Gallery	Pic of Spillway/Energy Dissipating Arrangement

**Month/ Year**

**Office of Chief Engineer  
Upper Mahanadi River Basin  
Burla-201304**

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## FORM-I: PROJECT DETAILS

### 1. Project Description:

a. Project Identification Code (PIC):

*(As given in National Register of Large Dams, if applicable)*

b. Project Name:

c. River Basin

d. Sub River Basin:

e. River/Stream:

### 2. Project Location:

a. State:

b. District:

c. Earthquake Zone:

d. Survey of India Topo Sheet No.

e. Nearest City:

f. Nearest Airport:

g. Nearest Railhead:

h. Name of Immediate u/s Project:

i. Name of Immediate d/s Project:

j. Latitude/Longitude (in degrees, minutes, seconds):

Lat:     N

Long:     E

- Location/ Index Map, Catchment Area Map, Google Map of dam, Area – Capacity curves in both graphical and tabular format along with date of bathymetric survey (if carried out), Reservoir Submergence Map showing FRL and MWL contours for freeboard study of the Project are attached as Appendix-IA,IB, IC, ID and IE respectively.

### 3. Project Benefits:

a. Type of Project:

b. Irrigation Benefits, in hectares (ha):

(i) Gross Command Area (GCA):

(ii) Cultivable Command Area (CCA):

(iii) Annual Irrigation Potential (AIP):

c. Hydropower Benefits:

(i) Installed Capacity (MW):  (ii) Firm Power (MW):

(iii) Average Annual Energy Generation (MU):

d. Domestic/Municipal/Industrial Water Supply:

(i) Annual Water Supply (MCM):

(ii) Nos. of Population Benefitted (In Lakh):

e. Flood Protection:

(i) Flood Protected Area (ha):

(ii) Details of Area Benefitted (ha):

f. Details of Tourism/Recreational Facilities:

### 4. Project Ownership Details:

a. Dam Owning Agency:

b. Implementing Agency:

c. Details of Dam Incharge:

(i) Name:  (ii) Designation:

(iii) Phone No. (With STD Code):

(iv) Fax No.

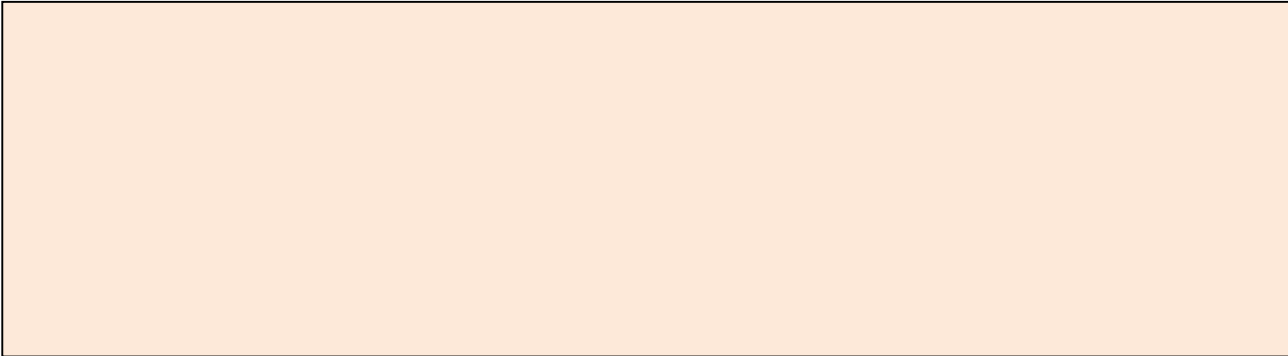
(v) E-mail:

(vi) Contact Address:

**Appendix-I A**

**LOCATION /INDEX MAP OF PROJECT**

Brief description of important features shown in map

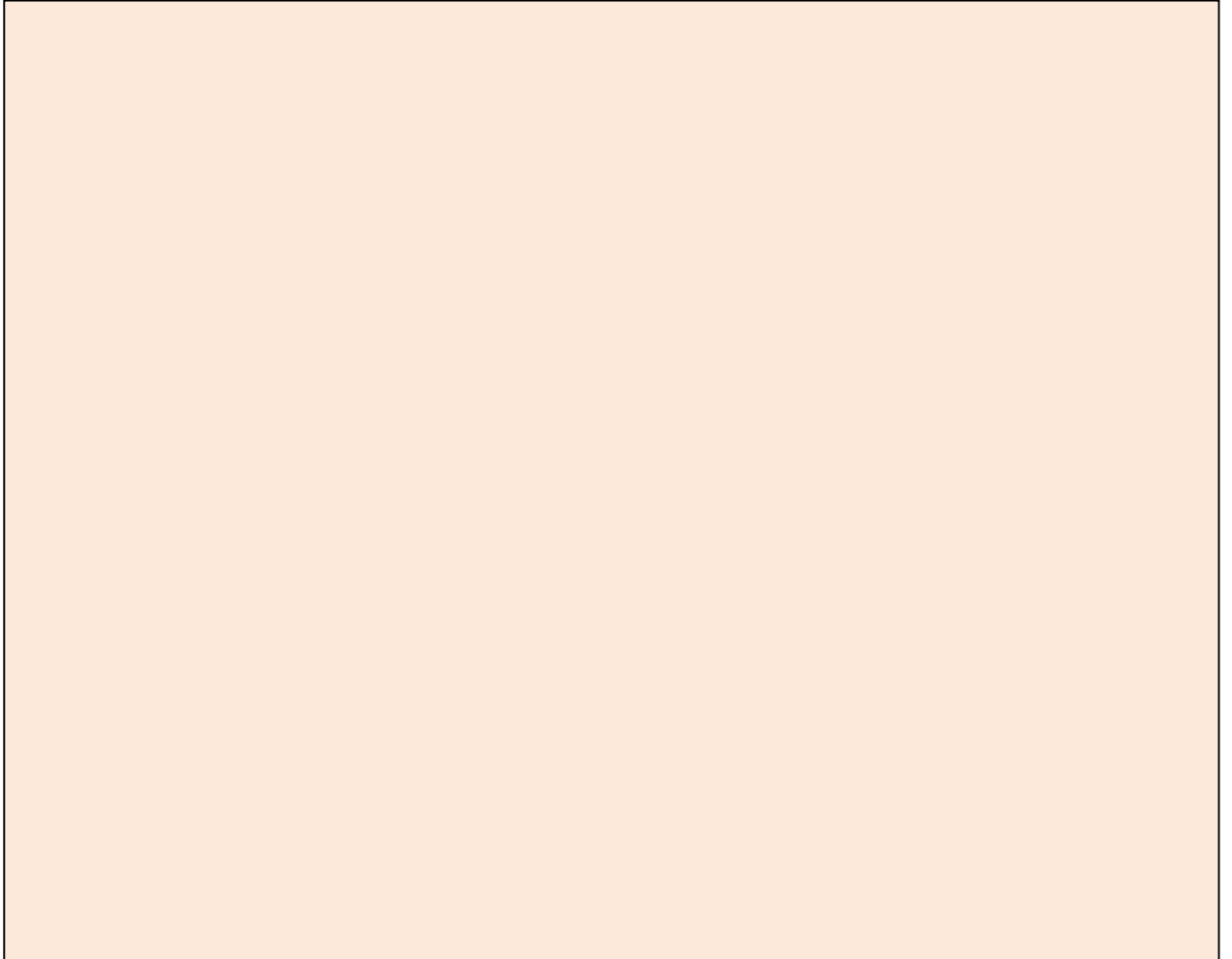


(Location Map Attached)



**Appendix-I B**

**GOOGLE MAP OF DAM ATTACHED**

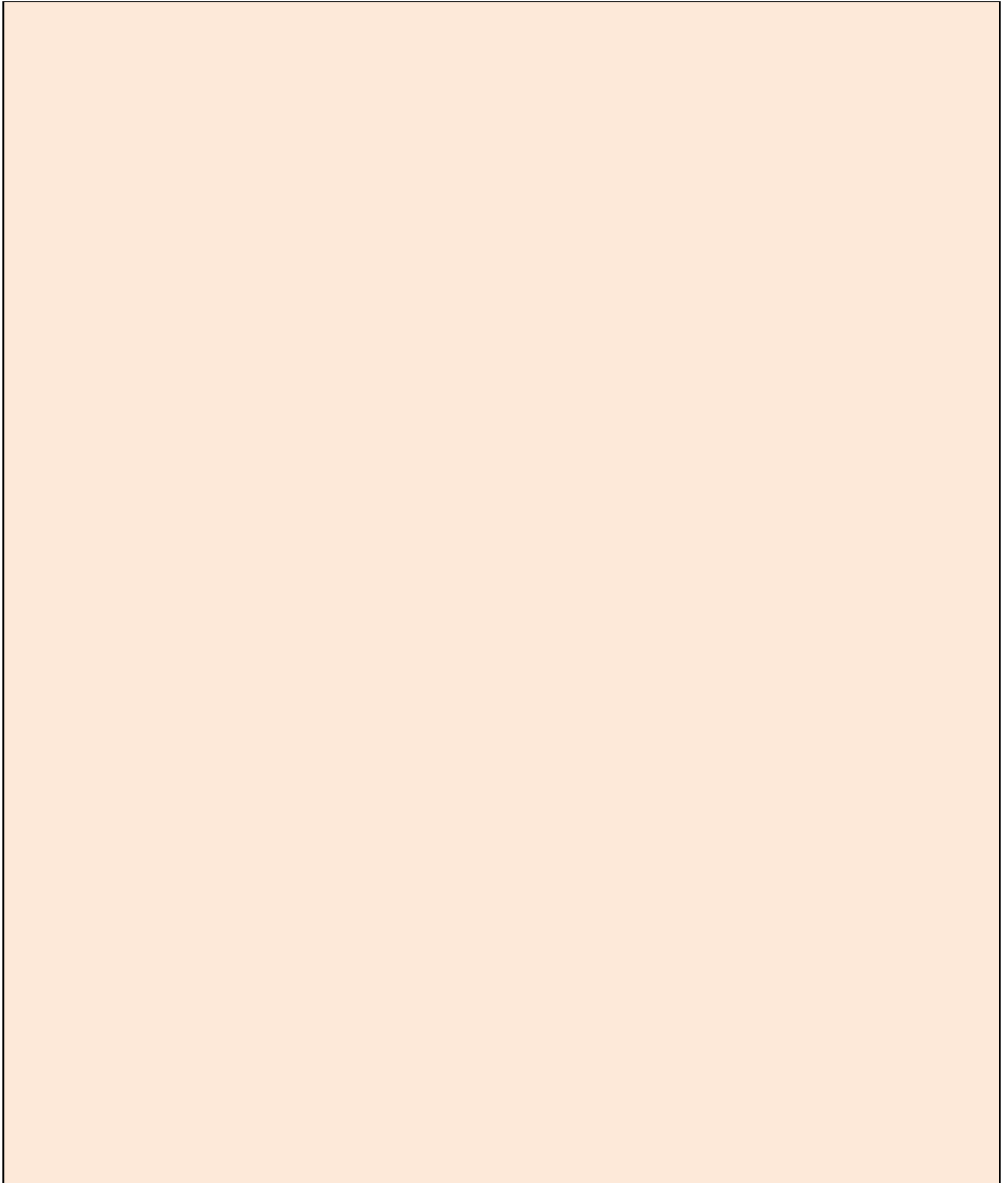




## Appendix-I C

### CATCHMENT AREA MAP OF PROJECT

Brief description of important projects on upstream, showing location of important G&D sites, weather stations, FF sites, important places, important tributaries etc...The catchment Area Map is attached.



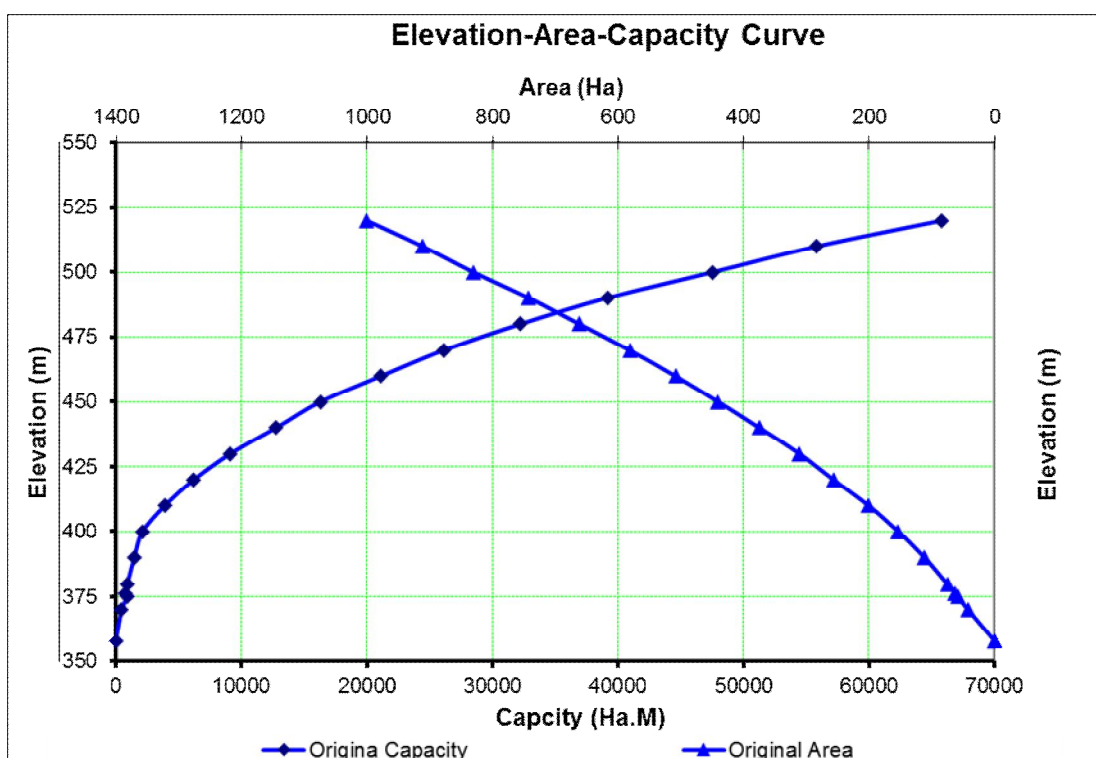
## Appendix-I D

### ELEVATION -AREA-CAPACITY CURVE (ORIGINAL AS WELL AS LATEST ONE IF ANY)

Tabular Form

Elevation (m)	Water Spread Area (x1000 sq m)	Cumulative Capacity (In Million Cubic Meter)

In case, any bathymetry done in the past, details of each bathymetry survey i.e. year, revised E-A-C Table in above Format, and Graphical Format shall be as Following for Original as well as Revised Ones.

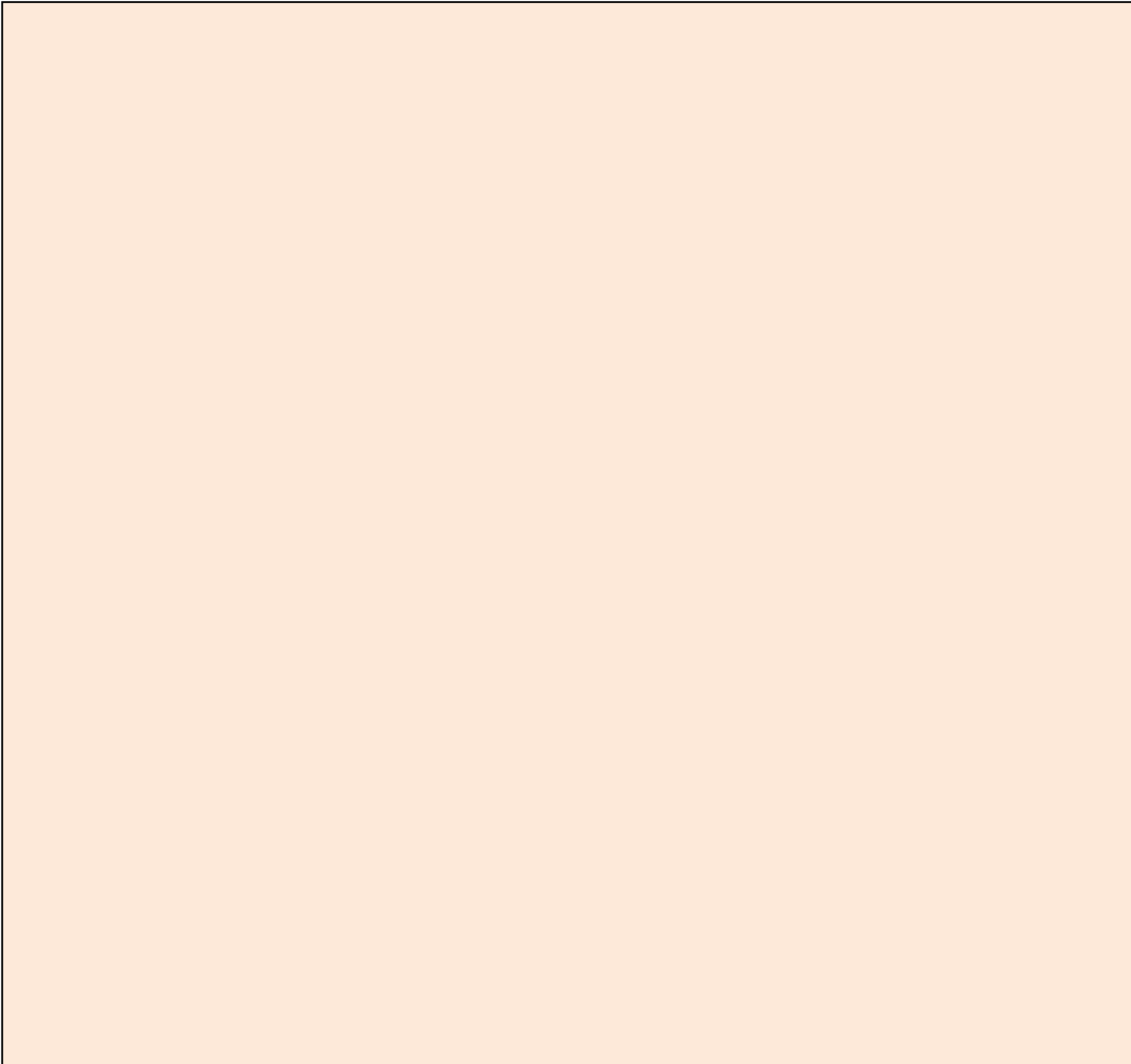


**Appendix-I E**

**RESERVOIR SUBMERGENCE MAP OF PROJECT  
(SHOWING FRL & MWL CONTOURS FOR FREEBOARD STUDY)**

Brief description may be given highlighting important issues in the reservoir rim area, as well as highlighting if any restriction exist as on date in filling the reservoir up to FRL/MWL Levels due to R&R issues or any modification of operating rule curves of reservoir due to any limitation of limited spillway design outflow, etc.

Attach the Reservoir Submergence Map showing FRL, MWL, Dam Top Elevation Contours clearly.



**FORM-II: DAM SPECIFIC DETAILS**

**1. Dam Features:**

**I. Main Dam**

- a. Type:
- b.. Total length of the Main dam (m):
- c.. Length of Embankment dam (m):
- d. Length of Masonry/Concrete dam (m):
- e. Top width of Embankment Dam (m):
- f. Top width of Masonry/Concrete Dam (m):
- g. Elevation of top of Embankment Dam (m):
- h. Elevation of top of Masonry/Concrete Dam (m):
- i. Elevation of top of Upstream Solid Parapet Wall (m):
- j. Height of Embankment Dam above Lowest River Bed Level (m):
- k. Height of Masonry/Concrete Dam above deepest foundation level (m):
- l. Lowest River Bed Elevation (m):
- m. Deepest Foundation Elevation (m):

**II. Saddle Dam**

- a. Type:
- b. Length of the Saddle dam (m):
- c. Top width of Saddle Dam (m):
- d. Elevation of top of Saddle Dam (m):
- e. Elevation of top of Upstream Solid Parapet Wall (m):
- f. Height of Saddle Dam above Lowest Bed Level in case of embankment dam or above deepest foundation level in case of concrete / masonry dam (m):

**III Main Spillway:**

- (a) Type of Spillway:
- (b) Length of Spillway (m):
-

(c) Location of Spillway:

(Central Spillway/Left Flank/Right Flank/Saddle, in addition Chainage may also be mentioned)

(d) Spillway Crest Level (m):

(e) Number of Bays:

(f) Number and thickness of Piers (m):

(g) Total Discharging Capacity at MWL ( $\text{m}^3/\text{s}$ ):

(h) Design head used for working out spillway crest profile (m):

(i) Type of Energy Dissipation Arrangement:

(j) Type of Spillway Gate:

(k) Size of Spillway Gate: Width (m)

Height (m)

(l) Type of Hoist for Spillway Gates:

(Rope Drum/ Hydraulic)

(m) Hoist Capacity of Spillway Gates (MT):

(n): Hoist Operation:

(Manual / Electrical / Remote Control)

(o) Number of Sets of Stop-logs:

(p) Number of Stop Log Units per Set & Size:

(q) Number of Gantry Crane(s) for Stop Log Gates:

(r) Gantry Crane Capacity (MT):

**IV Auxiliary Spillway:**(a) Type of Spillway: (b) Length of Spillway (m): (c) Location of Spillway: 

(Central Spillway/Left Flank/Right Flank/Saddle, in addition Chainage may also be mentioned)

(d) Spillway Crest Level (m) (e) Number of Bays: (f) Number and Thickness of Piers:  ----, --- m(g) Total Discharging Capacity at MWL ( $\text{m}^3/\text{s}$ ): (h) Design head used for working out spillway crest profile (m): (i) Type of Energy Dissipation Arrangement: (j) Type of Spillway Gate: (k) Size of Spillway Gate: Width (m)  Height (m) (l) Type of Hoist for Spillway Gates: (m) Hoist Capacity of Spillway Gates (MT): (n): Hoist Operation: 

(Manual/Electrical/Remote Control)

(o) Number of sets of Stop-logs: (p) Number of Stop Log Units per set & size: (q) Number of Gantry Crane(s) for Stop Log Gates: (r) Gantry Crane Capacity (MT): **V Fuse Plug:**(a) Location: (b) Length (m): (c) Crest Level (m): (d) Top Width (m): (e) Discharging Capacity at MWL ( $\text{m}^3/\text{s}$ ):

**VI. Sluice Arrangement (In Concrete and Masonry Dams):**(a) No. of Sluices & Sill Level (m): (b) Size of Sluice: Width (m):  Height (m):  Dia. (m): (c) Discharging Capacity of Sluice at FRL ( $\text{m}^3/\text{s}$ ): (d) Type of Service Gate: (e) Size of Service Gate: Width (m)  Height (m) (f) Type of Hoist for Service Gates: (g) Hoist Capacity of Service Gates (M.T.): (h): Hoist Operation: 

(Manual/Electrical/Remote Control)

(i) Type of Emergency Gate: (j) Size of Emergency Gate: Width (m)  Height (m) (k) Type of Hoist for Emergency Gates: (l) Hoist Capacity of Emergency Gates (M.T): (m): Hoist Operation: 

(Manual / Electrical)

**VII. Outlet works (In Embankment, Concrete & Masonry Dams):**(a) Location: (b) Number: (c) Sill level (m) (d) Size: Width (m)  Height (m)  Dia (m) (e) Discharging Capacity ( $\text{m}^3/\text{s}$ ) (f) Type of Service Gate: (g) Size of Service Gate: Width (m)  Height (m) (h) Type of Hoist for Service Gates : (i) Hoist Capacity of Service Gates (M.T): (j) Hoist Operation:(Manual/Electrical/Both) (k) Type of Emergency Gate:

- (l) Size of Emergency Gate: Width (m)  Height (m)
- (m) Type of Hoist for Emergency Gates :
- (n) Hoist Capacity of Emergency Gates (M.T):
- (o) Hoist Operation:
- (Manual / Electrical)

- All Drawings to be on A3 size or larger.
- Layout plan of dam to be attached in Appendix-IIA
- Longitudinal sections of the dam to be attached in Appendix-IIB
- Typical cross sections of the dam to be attached in Appendix-IIC



## 2. Reservoir Features:

- a. Catchment Area at Dam site (km<sup>2</sup>):  b. Maximum Water Level (m):
- c. Full Reservoir Level (m):
- d. Minimum Draw Down Level (m):  e. Dead Storage Level (m):
- f. Live Storage Capacity (Mm<sup>3</sup>):
- g. Gross Storage Capacity (Mm<sup>3</sup>) at FRL:
- h. Reservoir Spread Area (km<sup>2</sup>) at FRL:

## 3. Construction Aspects:

- a. Date of Starting the Construction (DD/MM/YYYY):
- b. Date of Completion (DD/MM/YYYY):
- c. Designing Agency:
- d. Construction Agency:
- e. Construction Cost (Rupees in Lakh):

## 4. Operational Aspects:

- a. Date of first full impoundment (MM/YYYY):
- b. Whether Pre & Post monsoon inspection being carried out:
- c. Major recommendations of dam safety inspection, along with brief status on compliance:

- d. Any operational failure in the past:
- e. Any other past dam incident:
- f. Operation and Maintenance Manual:
- Year of publication:
- g. Emergency Action Plan:
- Year of Publication:

## 5. Instrumentation Aspects:

**(Data Records and other information including pictures can be included in Appendix II-D)**

a. List of Instruments installed in the Dam:

Sl. No.	Name of Instrument	Working Status	Year of Installation	Nos of Year data available
1.	Water Level Sensor	Y/N		
2.	Plumb Bob	Y/N		
3.	Inclinometer	Y/N		
4.	Stress meters	Y/N		
5.	Strain meters	Y/N		
6.	Toe Drain	Y/N		
7.	Drain Wells	Y/N		
8.	V-Notches	Y/N		
9.	Pressure Gauges	Y/N		
10.	Accelerograph	Y/N		
11.	SCADA	Y/N		
12.	Surveillance	Y/N		
13.	Rain Gauge ORG	Y/N		
14.	Rain Gauge SRRG	Y/N		
15.	.....			

d. Summary on adequacy and justification for additional instrumentation:

### 6. List of Past Rehabilitation Works:

a. Name of Scheme (If any):

b. Period of Scheme: From

to

c. Detail of Important Rehabilitation Works Carried Out (including by state funds):

Sl. No.	Brief Item description	Year of Work	Completion Cost (Cr)

## **Appendix-II A**

### **LAYOUT PLAN OF DAM**

*(Full Drawings on A3 size)*

## **Appendix-II B**

### **LONGITUDINAL SECTION OF THE DAM**

*(Full Drawings on A3 size)*

## Appendix-II C

### TYPICAL CROSS SECTIONS OF THE DAM

- i) Embankment dam
- ii) Concrete / Masonry dam (NOF & OF Sections)
- iii) Sluice section
- iv) Section through Outlet

Brief description & attach full drawings in A3 Size

## Appendix-II D

### REPORT ON DAM INSTRUMENTATION

Enclosed: Yes/No

Summary on Instrumentation Report, it can include all details of instruments types proposed, data collection, transmission, storage, analysis, surveillance, SCADA, control system etc.



### FORM-III: HEALTH STATUS OF DAMS

(Note: Use separate forms for each dam in case of multiple dams under one project)

#### 1. Design Flood Review (In case of PMF/SPF, as approved by CWC):

- a. Original Inflow Design Peak Flood (m<sup>3</sup>/s):
- a.1. Original MWL (m):       a.2. Original Routed Outflow (m<sup>3</sup>/s):
- a.3. Maximum observed flood peak (m<sup>3</sup>/s) and date:
- b. Date of Latest Review (DD/MM/YYYY):
- c. Revised Inflow Design Peak Flood (m<sup>3</sup>/s):   
(PMF / SPF / 100 Year Flood)
- c.1. Revised MWL (m):       c.2. Revised Routed Outflow (m<sup>3</sup>/s):

Report of Design Flood Review is enclosed as Appendix III-A (along with copy of CWC approval, if applicable)

- d. Flood Routing Conducted?  Yes/No      If Yes, Attach Flood Routing Report with Calculations in Appendix III-B
- e. Attach Free Board Calculations in Appendix-III C
- f. Proposed measures to accommodate increase in design flood, attached in Appendix-III D
- g. If design flood review & flood routing is not yet done, tentative time frame for carrying out the same:  
 From:  DD/MM/YYYY      To:  DD/MM/YYYY

#### 2. Dam Safety Review Panel (DSRP) Review:

- a. Date of Latest DSRP Inspection      /  /
- b. Attach DSRP Report as in Appendix III E
- c. Key Actionable Points for Rehabilitation:



### 3. Seismic Review:

a. Seismic Zone at the time of Design:

b. Revised Seismic Zone:

c. Historical significant earthquake events in the near vicinity:  Y/N If Yes,

Event 1: Date:  Epicenter:

Magnitude:

Event 2: Date:  Epicenter:

Magnitude:

d. Details of nearest project whose site specific seismic parameter study has been approved by National Committee on Seismic Design Parameter (NCSDP):

(i) Name of Project:

(ii) Date of Approval:

(iii) Approved Parameters:

(a). Peak Ground Acceleration (PGA)

(b). Maximum Credible Earthquake (MCE):







(c). Design Basis Earthquake (DBE):





(d). Seismic Design Coefficient (Horizontal):

e. Whether need for seismic design review:  Y/N , If yes, attach in Appendix III-F

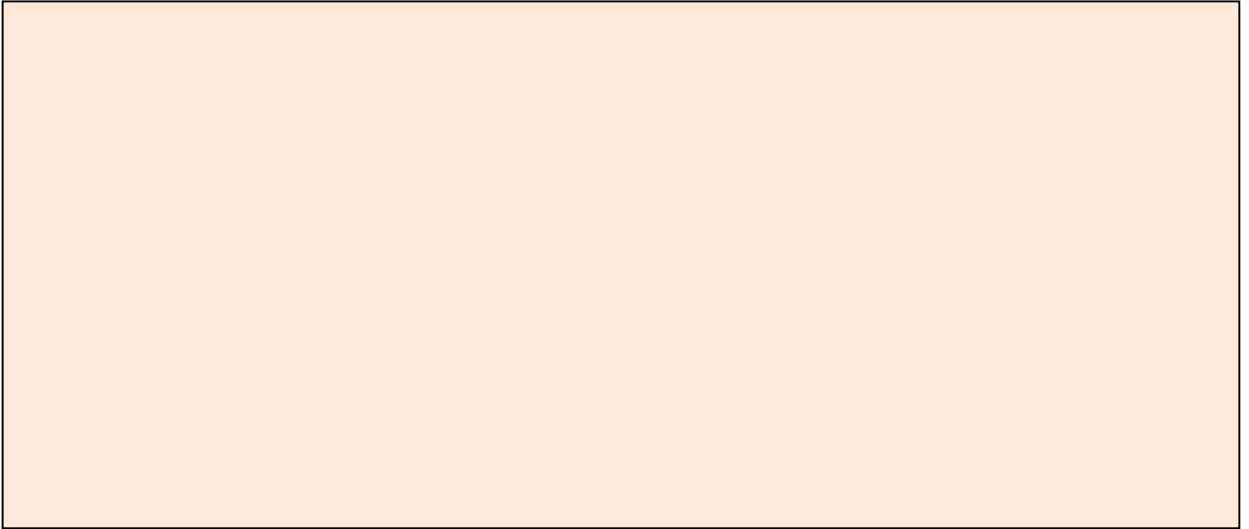
#### 4. Summary of Present Distress Condition:

SI No.	Description	Earthen	Masonry	Concrete	Composite
1.	Leakage through dam body				
2.	Excessive seepage through dam body				
3.	Excessive seepage through foundation				
4.	Leakage through contraction joints				
5.	Excessive settlement of dam body?				
6.	Clogging of Porous / Formed and foundation drains holes?				
7.	Are Porous / Formed Drains Counter - sunk plug in place on top of dam?				
8.	Are Water Seals in Place on Porous / Formed Drains in gallery?				
9.	Undesirable vegetation?				
10.	Deteriorated Concrete-Facing, Outlet, Spillway				
11.	Erosion of surfaces, slides & signs of differential movement				
12.	Are there any surface cracks?				
13.	Adequate slope protection?				
14.	Erosion of the upstream/downstream face?				
15.	Animal Burrows?				
16.	Any evidence of piping through dam body?				
17.	Any evidence of piping through foundation				
18.	Are there wet spots or areas on the downstream face, at the toe, or beyond the dam?				
19.	Spillway glacis erosion?				
20.	Can water flow into the principal spillway without difficulty, as intended when constructed?				
21.	Is the primary spillway/waste weir structure in good condition?				
22.	If there are drainage outlets, are they clear and flowing?				
23.	Is the seepage water clear or muddy?				
24.	Is there any unusual movement or cracking at or beyond the toe?				
25.	Is there any evidence of instability on the slopes around the reservoir?				
26.	Is a lot of sediment entering the reservoir, or has this happened in the past?				
27.	Are gates/stop logs/valves and other operating equipment in working condition?				
28.	Is the drainage gallery easily accessible and does it have adequate lighting facilities and safety handrails on steps?				
29.	Gate corrosion				

30.	Are Gate Seals showing signs of weathering, cracking or tearing?				
31.	Is the surface of gates and paint deteriorated?				
32.	Is the alternative power system for gate operation working properly?				
33.	Are the hydraulic hoists working satisfactorily?				
34.	Are the decking, girders and structural supports of spillway bridge, hoist bridge and catwalks structurally sound?				
35.	Is the floor of the bridge structurally sound and safe?				
36.	Is there catwalk access to gate trunions?				
37.	Is the concrete surface of the Energy Dissipation Arrangement (EDA) and d/s apron in good condition?				
38.	Is access road to dam site well maintained?				
39.	Are communication facilities available at dam site?				
40.	Whether there is a standby power supply?				
41.	Is fencing of project area required or needs to be strengthened?				
42.	Is sufficient stock of spare which needs frequent replacement maintained at the site?				
43.	Are the instruments installed properly accessible?				
44.	Are all the instruments in proper working condition?				
45.	Need for repair of instrument				
46.	Need for replacing instruments				
47.	Need for additional instruments				
48.	Need for Stability Analysis				
49.	Need for E/Q design review				
50.	Need for operational review				
51.	Need for sump/pumping arrangement to dewater Drainage Gallery				
52.	Inspection of Sluice / Outlets conducted?				
53.	Seepage through outlets / interfaces?				
54.	Is there evidence of Sluice / outlet scour?				
55.	Settlement of outlet head works?				

56.	Is there differential settlement in outlets?				
57.	Is there siltation at sluice / outlet intake?				
58.	Is there impact of siltation on discharge capacity of sluice / outlet?				
59.	Is there seepage in outlet gate wells?				

**5. Any Other Distress Conditions, if any, noted other than above:**



*(Details for each distress condition given above under separate number)*

Photographs showing details of location and nature of distress conditions are attached in Appendix-III-G

## **Appendix-III-A**

### **REPORT OF DESIGN FLOOD REVIEW**

Attach the Design Flood Review Report Review

## **Appendix III-B**

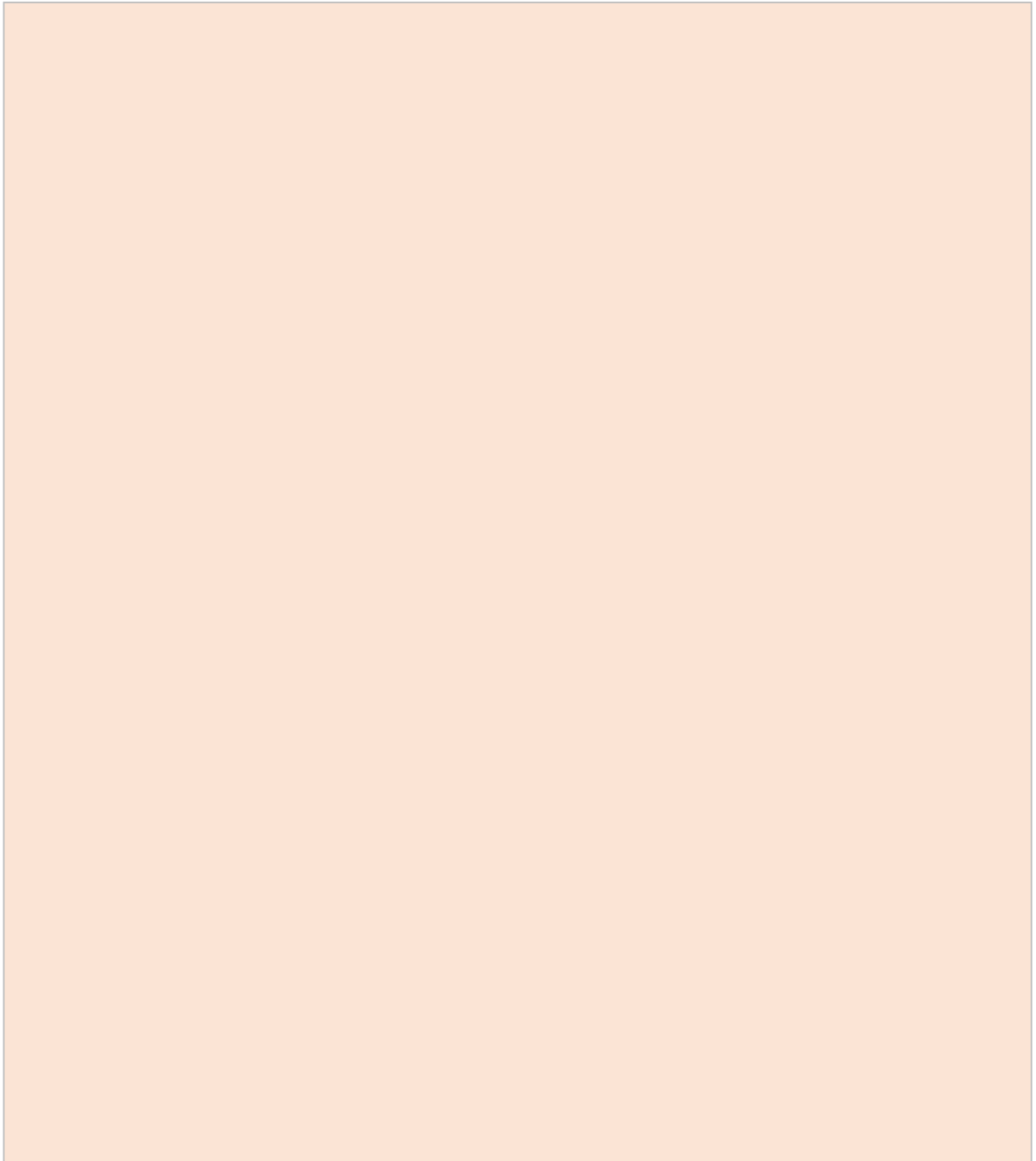
### **FLOOD ROUTING STUDIES INCLUDING SPILLWAY OUTFLOW CALCULATIONS**

Attach the Report including the excel sheet for routing and outflow calculations.

## Appendix III-C

### FREE BOARD CALCULATIONS

In case the Revised Design Flood is significantly higher than the Original one, impacting MWL in case of impinging at FRL, please check for Free Board adequacy and attach the Calculations.





## APPENDIX III-D

### PROPOSED MEASURES TO ACCOMMODATE REVISED DESIGN FLOOD

- a. Original design flood (m<sup>3</sup>/s):
- b. Revised design flood (m<sup>3</sup>/s):
- c. Percentage increase (%):

#### Proposed Rehabilitation Measures:

##### (a) Structural Measures

- Provision of U/S solid Parapet Wall
- Increasing dam height
- Additional spillway
- Fuse plug

##### (b) Non-structural Measures

- Lowering of FRL
- Modification in Operation Rule Curve
- Provision for Early Flood Warning System

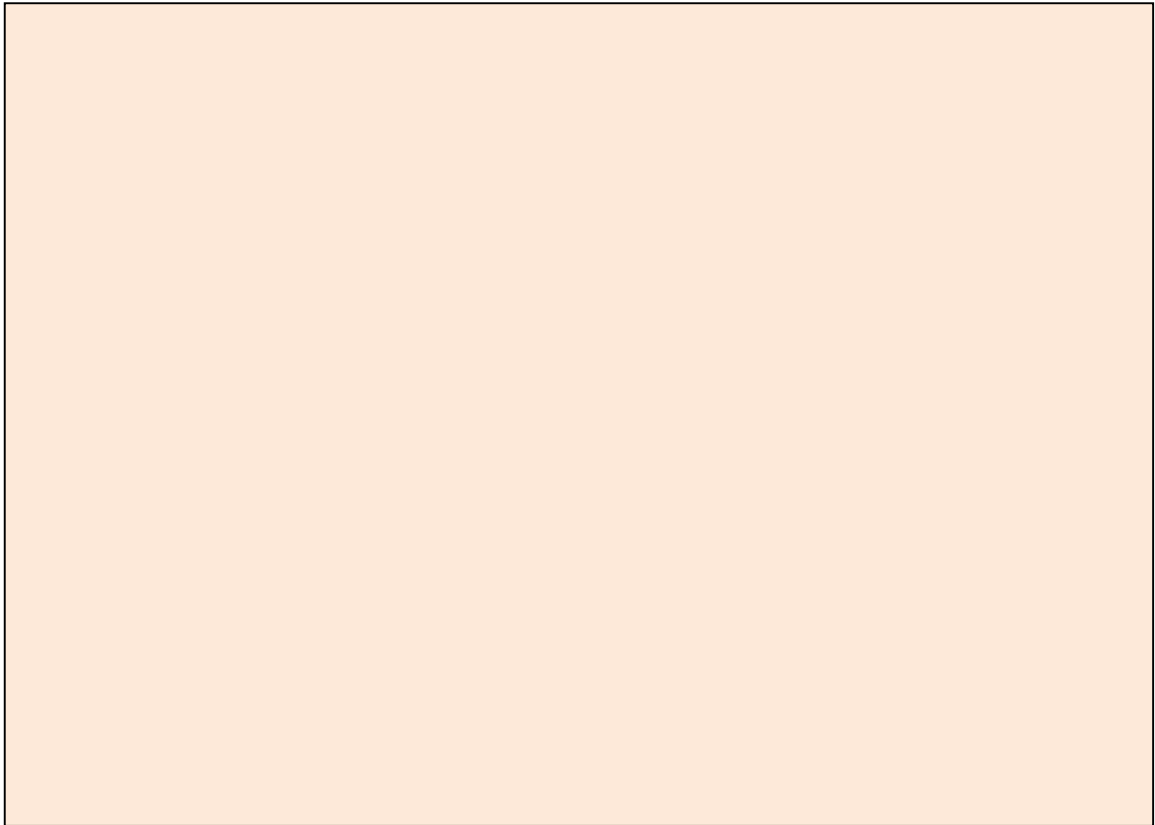
*(Attach the Report for proposed rehabilitation measures to safely pass the excess flood, including basic concept note with some basic details).*

**APPENDIX III-E**

**LATEST INSPECTION REPORT OF DAM SAFETY REVIEW PANEL (DSRP)**

(Attach the DSRP report)

Brief description of proposed Rehabilitation Works.

A large, empty rectangular box with a light orange background, intended for the description of proposed rehabilitation works. The box is outlined with a thin black border and occupies the majority of the page's vertical space below the text.

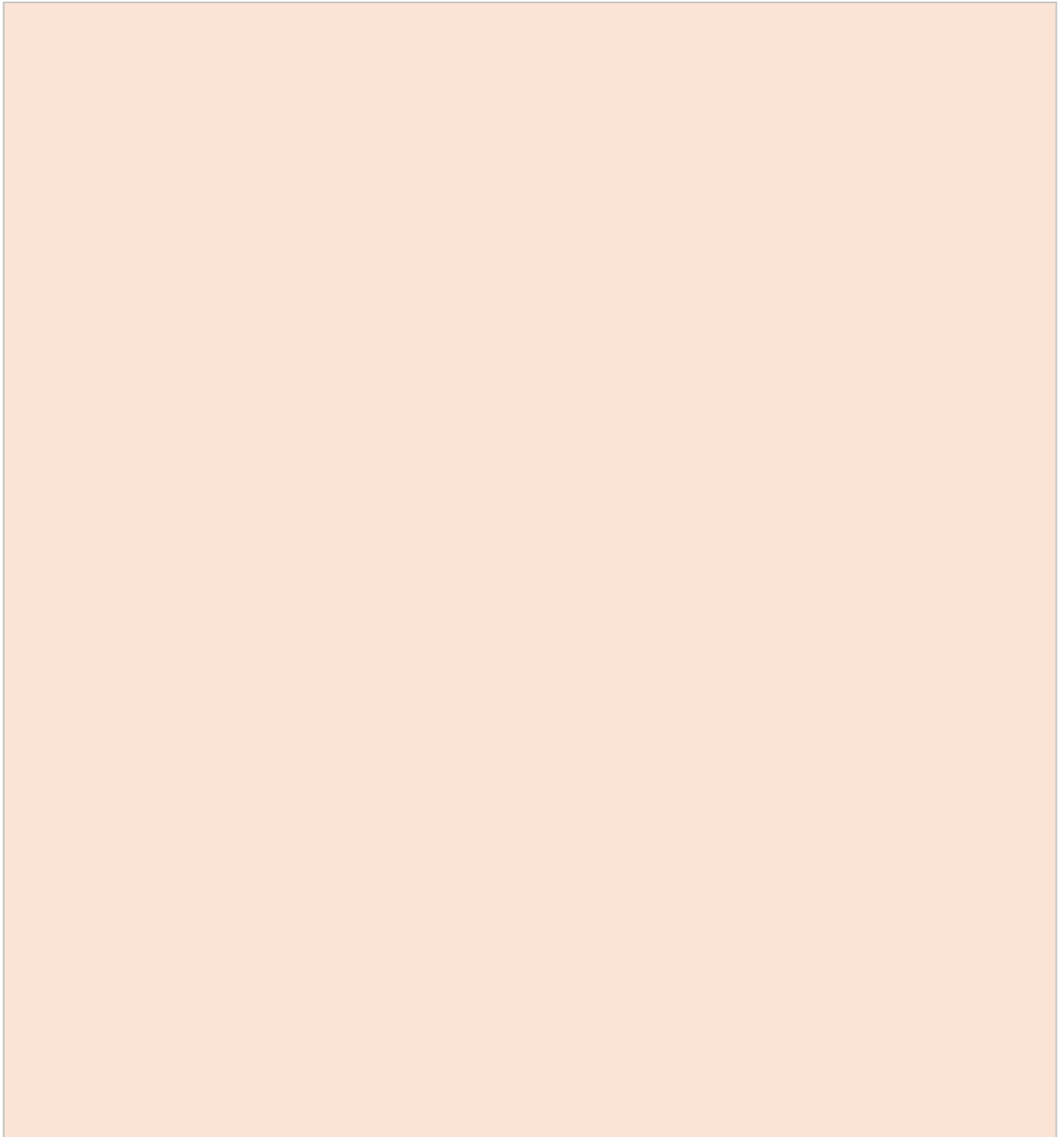
## Appendix III-F

### SEISMIC DESIGN REVIEW

In case seismic design review studies have not been completed, please leave the information blank.)

Enclosed (Yes/No):

Brief description.



## Appendix-III-G

### PHOTOGRAPHS SHOWING DISTRESS CONDITION

Each color photograph shall be of good resolution, briefly text with date, as well as problem

<b>SI No.</b>	<b>Date of Photograph</b>	<b>Description with details of location, nature of distress and other remarks</b>

(Attach photographs)

## FORM-IV: REHABILITATION PROPOSALS

(Note: Use Separate Sheet if required)

### 1. Structural Rehabilitation Works:

(List all the items identified for the structural rehabilitation: Civil/ HM/ Electrical)

### 2. Structural Measures for Ensuring Hydrological Safety:

(List out proposed structural measures such provision of U/S solid Parapet Wall, Increasing dam height, Additional spillway, Fuse plug, etc. – Civil/ HM/ Electrical)

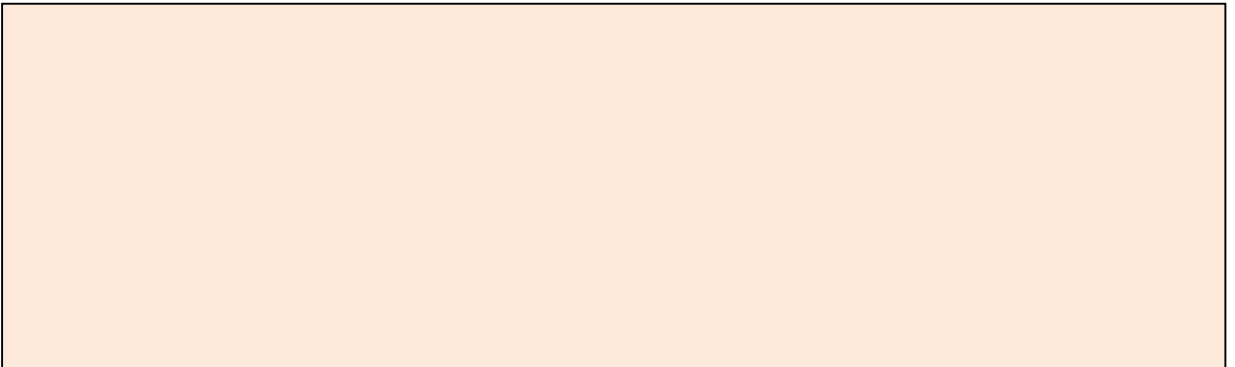
### 3. Non-structural Measures:

(List out such proposed non-structural measures as: Revision of Reservoir Operation Rules, Lowering of FRL, setting up of early flood warning system, etc..)

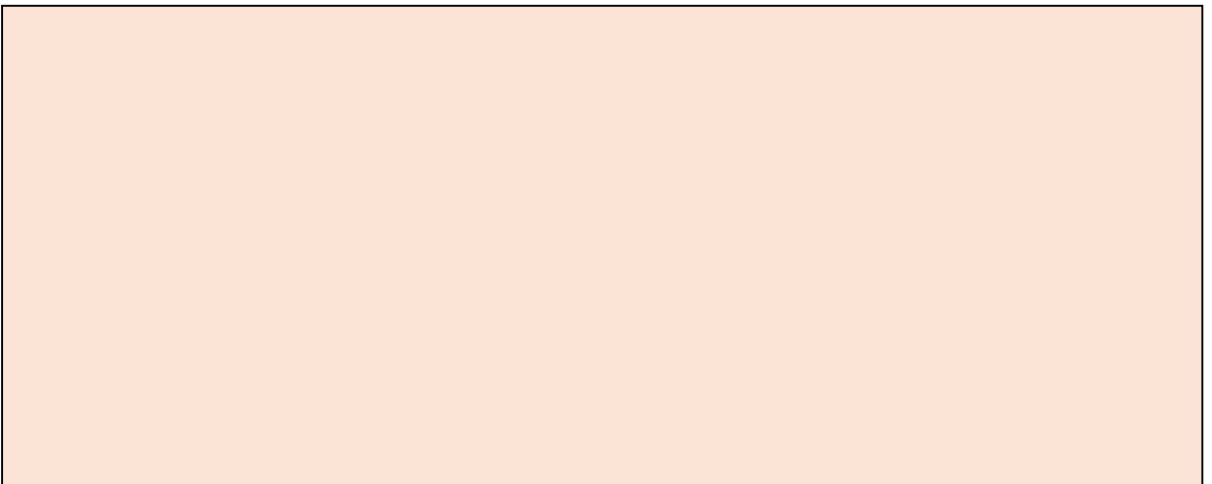
Note: EAP is not to be considered as a Non-structural Measure for accommodating the increase in design flood.

### 4. Basic Facilities Enhancement:

(List out such proposed basic facilities as: Construction and Improvement of approach roads, Construction and Improvement of Bridges and Culverts, Construction and Improvement of Fencing, Forest area / vegetation clearance, Improving office, housing and related accommodation, stockpiling of emergency materials, sirens in dam and flood plains, lighting arrangement, renovation of IB/ Guest house, public conveniences, etc.).

**5. Instrumentation, SCADA, Surveillance system, etc.:****6. Tourism/Fisheries/Hydropower Development:****7. Latest Estimated Cost of Rehabilitation Proposal (in Rs.):**

Abstract of Cost Estimate of Rehabilitation proposals attached as Appendix-IVA



## 6. ITEM WISE DETAIL OF COST



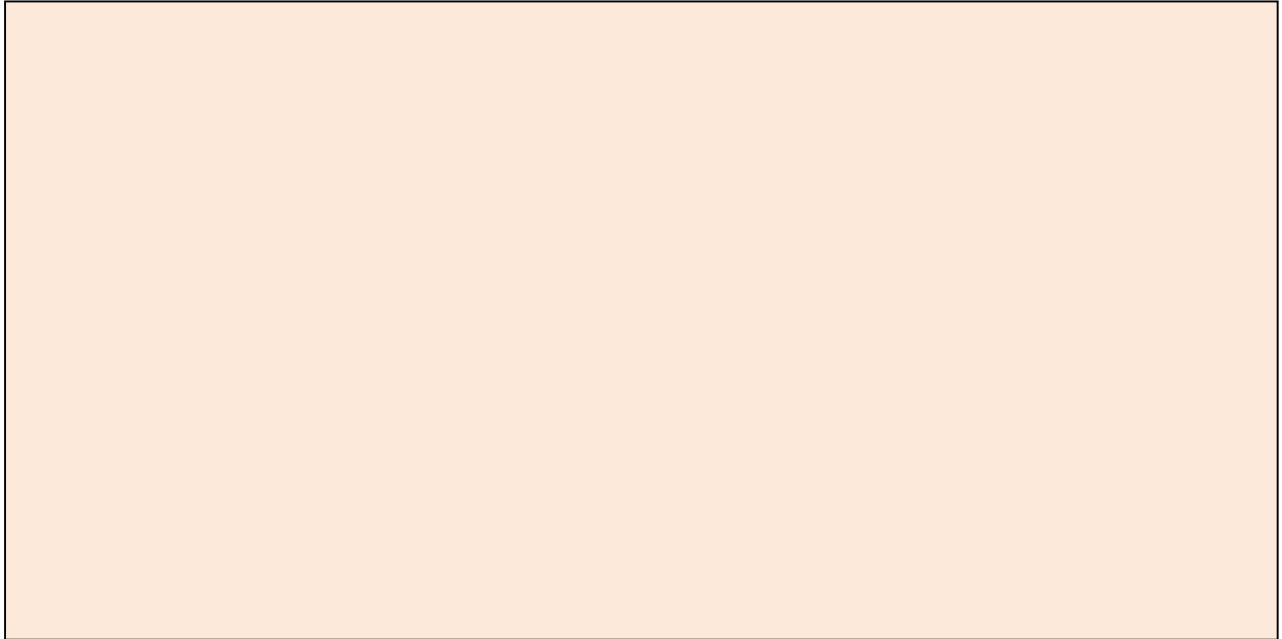
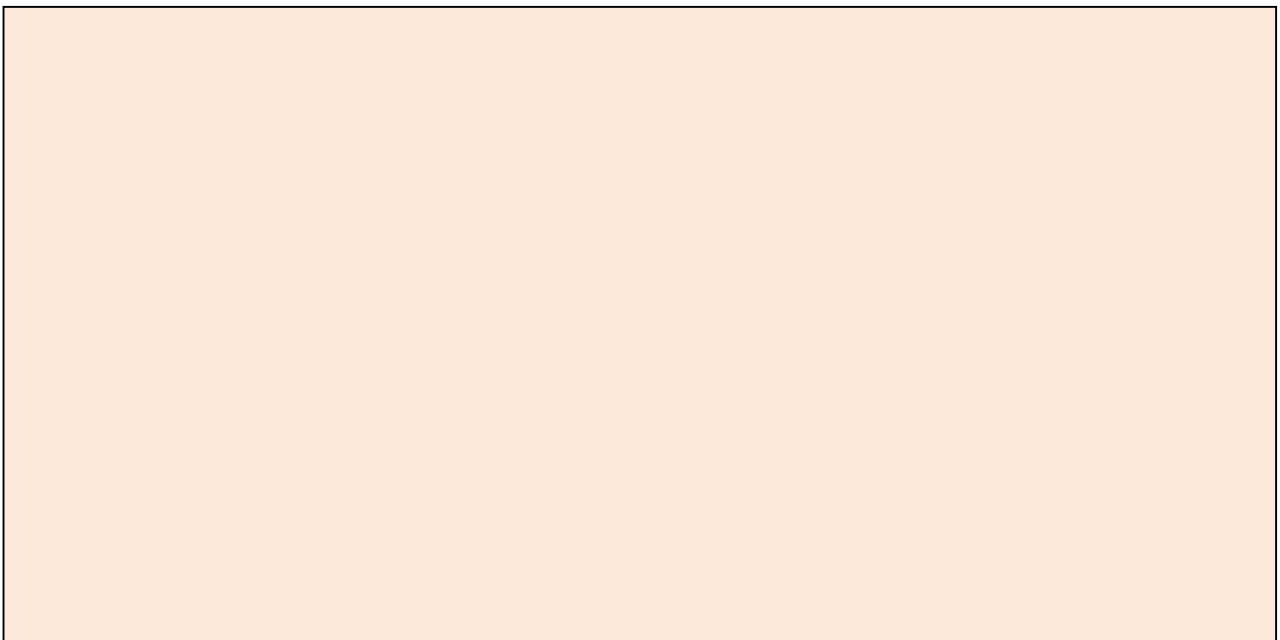
*(Abstract of cost with item wise details of works, Design & Drawings of rehabilitation of works with location is to be enclosed as Appendix-IVB)*

## APPENDIX IV-A

### Cost Estimates of Rehabilitation Proposal

<b><u>NAME OF WORK:</u></b>		
<b><u>GENERAL ABSTRACT</u></b>		
<b>SL NO</b>	<b>DESCRIPTION OF WORK</b>	<b>AMOUNT</b>
<b>1.</b>	<b>Structural Rehabilitation Works</b>	
i		
ii		
iii		
	<b>Sub Total</b>	
<b>2.</b>	<b>Structural Measures for Ensuring Hydrological Safety</b>	
i		
ii		
iii		
	<b>Sub Total</b>	
<b>3.</b>	<b>Non-structural Measures</b>	
i		
ii		
iii		
	<b>Sub Total</b>	
<b>4.</b>	<b>Basic Facilities Improvement</b>	
i		
ii		
iii		
<b>5.</b>	<b>Instrumentation, SCADA, Surveillance system, etc.</b>	
i		
ii		
iii		
	<b>SUB TOTAL</b>	
<b>6.</b>	<b>Tourism/Fisheries/Hydropower Development</b>	
i		
ii		
iii		
	<b>SUB TOTAL</b>	
<b>7.</b>	<b>Others (Investigation, Design Studies, Consultancy)</b>	
i		
ii		
iii		
	<b>SUB TOTAL</b>	
	<b>GRAND AMOUNT</b>	



**APPENDIX IV-B****(i) Item wise Detail of Costs****(ii) Design and Drawings of Rehabilitation Works**

## FORM-V: ENVIRONMENTAL AND SOCIAL MANAGEMENT FRAMEWORK (ESMF) COMPLIANCE

### 1. Project Siting

A. Is the Project adjacent to or within any of the following environmentally sensitive areas?

Environmentally Sensitive Area	Yes	No	Name/Identify	Distance from the project area
• Wildlife Sanctuary/ Bird Sanctuary National Parks/ Ecologically Protected Area/ Tiger Reserves				
• Reserved Forest Area				
• Buffer zone of protected area				
• Elephant movement Corridor				
• Designated Wildlife Migratory Route				
• Eco-sensitive zone				
• Cultural Heritage Site/ Archaeological sites				
• Others				

B. Details of Clearances required for proposed rehabilitation activities as per the table given in Appendix V-C:

S. No.	Proposed Activity	Clearance Required
1		
2		
3		
4		
5		
6		

**2. Identification of activities having potential environmental and social impact:**

**3. Whether Requirement for Specific Environment Management Plan (EMP) proposed:**

(a) If yes, tentative time frame of ESMF Study:

From:

To:

**4. Whether mitigation measures have been identified as per Attachment 1:**

, If yes Please attach as Appendix V-A

**5. Whether mitigation measures are required to be implemented by Contractor:**

, If yes, Please attach as Appendix V-B





	curtain																		
24	Provision or repair of parapet wall																		
25	Providing backing concrete to dam for stability improvement																		
26	Catchment Area Treatment (CAT) and Reservoir rim treatment																		
27	Various kind of investigations i.e. geo-technical, underwater, survey, geo-physical/sonic tomography etc.																		
28	Pre and post Bathymetry survey for de-siltation of dam or for physical modelling inputs																		
29	Development of dam tourism, water recreation facilities, incidental power, in-situ conservation of fisheries etc.																		
29	Establishment of telemetric stations, automatic weather stations and other equipments for integrated flood forecasting and reservoir operation etc.																		
30	Establishment of telemetric stations, automatic weather stations and other equipments for integrated flood forecasting and reservoir operation etc.																		
31	De-weeding of Dam body/ Reservoir																		
32	Others																		

• Fill

with A/B/C/D (A-High Risk, B-Substantial Risk, C- Moderate Risk, D-Low Risk).

- For A & B – ESIA study including RAP & R&R shall be carried out by a third party. For C – Generic mitigation measures will be applicable. For D – No action is required beyond the above screening.

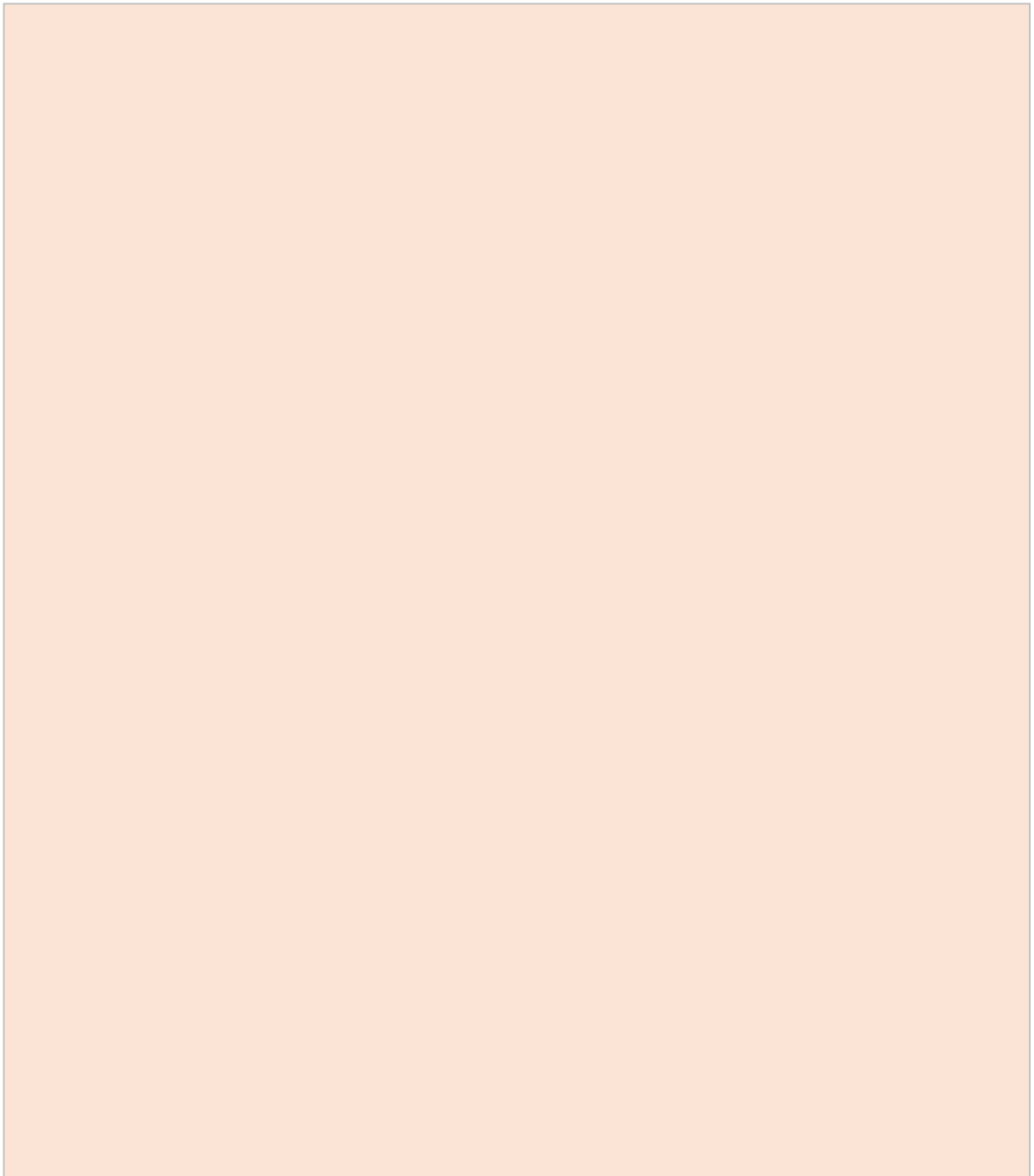
## Appendix V-A

### IDENTIFIED MITIGATION MEASURES

In case mitigation measures have not been identified, please leave the information blank.)

Enclosed (Yes/No):

Summary on mitigation measures, if any:



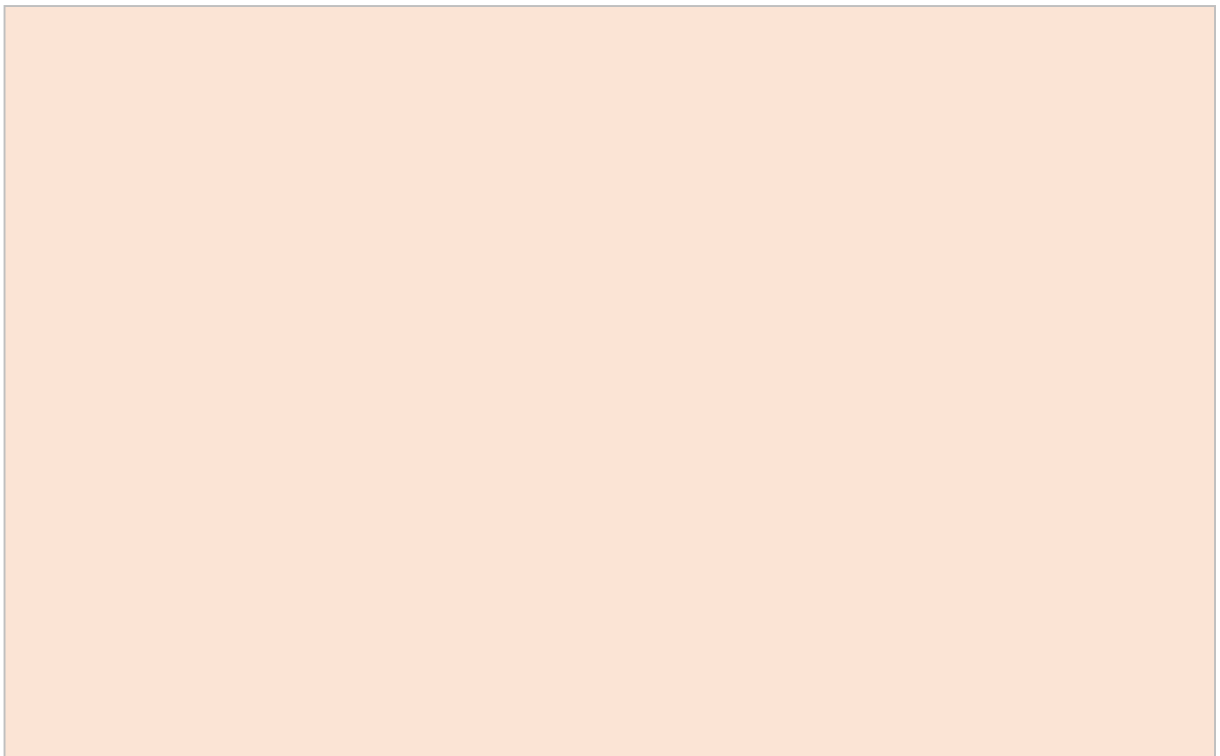
## Appendix V-B

### MITIGATION MEASURES REQUIRED TO BE IMPLEMENTED BY THE CONTRACTOR

(In case Contractor mitigation measures have not been identified, please leave blank)

Enclosed (Yes/No):

SPMU to provide a summary of mitigation measures to be implemented by contractor, if any:

A large, empty rectangular box with a light beige background and a thin black border, intended for the contractor to provide a summary of mitigation measures.



## Appendix V-C

### ACTIVITY-WISE CLEARANCES

Activity-wise Applicability of Environmental, Forest and Wildlife Clearances for Dam Rehabilitation and Improvement Works

S.N.	Types of Rehabilitation Works	Nature of Activities	Environmental Clearance	Forest Clearance	Wildlife Clearance	Remarks
1.	<b>Pointing of upstream face of masonry dams with special UV resistant mortar to control seepage.</b>	This activity is a localized activity limited to the U/S face of masonry dam. It requires grouting materials, light drills/ hand tools only with few manpower. This does not require any major equipments/batching plant/Crusher. Materials for work (cement, sand, additives etc.) are to be brought to dam top for use.	No	No	No	If a given dam is located <b>within a sanctuary area, tiger reserve or national park</b> , then permission is required from concerned department to transport construction material, manpower and equipments to dam site. Permission is supposed to be given by concerned department as it is a very essential activity to ensure the safety of dam structure and mitigate the associated risks to the downstream habitation, property and environment in the case of dam failure.
2.	<b>Treatment of dam contraction joints for damaged seals using hydrophilic materials.</b>	This activity is localized at the transverse contraction joints of the dam. This activity requires drilling of hole at the transverse contraction joints of the dam and filling with hydrophilic materials. It is normally carried out from dam top spillway crest. Requires transportation of drilling equipments to dam site and joint filler material along with few manpower	No	No	No	
3.	<b>Grouting of Masonry/Concrete dams to control seepage.</b>	This activity is confined to body of Masonry/ Concrete dam. This activity is carried out from dam top or spillway crest or from d/s face or from dam galleries.	No	No	No	
4.	<b>Reaming of porous drains</b>	This is a localized activity. It is	No	No	No	

S.N.	Types of Rehabilitation Works	Nature of Activities	Environmental Clearance	Forest Clearance	Wildlife Clearance	Remarks
	<b>and re-drilling of foundation drains.</b>	undertaken from dam top and from inspection/ foundation galleries.				
5.	<b>Replacement of rubber seals of the spillway gates, sluice gates and periodic overhauling of gate hoisting systems.</b>	It is a localized activity. Replacement of rubber seal require hand tools etc. Servicing/overhauling of gate require lubricants, painting works, transportation of materials, etc.	No	No	No	
6.	<b>Repair and replacement of spillway gates/under sluice gates or provision of additional stop log gates</b>	In the case of gate repair, it is a minor activity. In case gates are to be replaced, then it requires transportation of fabricated components of Gates/Stop logs using heavy duty cranes/trailers supply of material and gates to the dam site.	No	No	No.	
7.	<b>Repair or replacement of Gate Hoist/ Gantry Cranes</b>	Requires transportation of fabricated components of Gates/Shop logs using heavy duty cranes/trailers, and assembly and installation of gantry on dam top etc.	No	No	No	
8.	<b>Provision of automation of spillway gates and control room structures.</b>	It is a localized work. It involves transportation of construction materials, concrete mixer, etc for construction of control room. Automation of Gates require transportation of control panels and related equipments.	No	No	No	
9.	<b>Bringing the earth dam section to design section to address the stability aspect</b>	It is a minor and localized work, It requires survey works and transportation of selected earth from borrow areas, compaction equipment, etc.	No	No	No	If a given dam is located <b>within a sanctuary area, tiger reserve or national park</b> , then permission is required from concerned department to transport construction material, manpower and equipments to dam site. Permission is
10.	<b>Improvement of rip-rap, turfing on downstream face,</b>	This activity is limited to the dam body, It involves transportation of requisite	No	No	No	

S.N.	Types of Rehabilitation Works	Nature of Activities	Environmental Clearance	Forest Clearance	Wildlife Clearance	Remarks
	<b>chute drains, toe drains, rock toe and general drainage system for earthen dams</b>	materials for carrying out of these works. These works are to be carried out manually.				supposed to be given by concerned department as it is a very essential activity to ensure the safety of dam structure and mitigate the associated risks to the downstream habitation, property and environment in the case of dam failure.
11.	<b>Improvement of existing access road to dam body as well as existing access roads to different components of the dam project and dam crest railing.</b>	This activity involves transportation of construction materials, use of heavy equipments like road rollers, hotmix asphalt plant, paving machine etc.	No	No	No	
12.	<b>Providing security system to guard dam / project area.</b>	This work would be limited to project area only. It involves transportation of construction materials for fencing/security and construction of fencing to guard the dam / Project area	No	No	No	
13.	<b>Improving dam instrumentation and monitoring, SCADA and automation system of dams</b>	Involves carriage of the instruments, cables etc to project site and their installation in the project area.	No	No	No	
14.	<b>Providing additional spillway structures/fuse plugs/flush bars to take care of hydrological safety</b>	<p>Case(a) In this case, no public as well as forest land acquisition required, no R&amp;R issues involved, no change in reservoir storage, no submergence, no increase in CCA of dam project, no flow modification during lean period etc.</p> <p>Case(b) In this case, <i>some public/ forest land acquisition required, R&amp;R issues involved</i>, no change in reservoir storage, no submergence, no increase in CCA of dam project, no flow modification during lean period etc.</p>	<p>Amendment in EC is required</p> <p>As per existing statute, Environmental clearance/Amendment in EC is required</p>	No	<p>Forest Clearance required in case some forest land is to be</p> <p>Clearance from NBWL is required in case activity fall in the</p>	<ul style="list-style-type: none"> <li>If activity falls within a sanctuary area, tiger reserve or national park, then permission is required from concerned department to transport construction material, manpower and equipments to dam site.</li> <li>The proposal may involve displacement of population living in the proposed layout of newly proposed spillway or living in water</li> </ul>

S.N.	Types of Rehabilitation Works	Nature of Activities	Environmental Clearance	Forest Clearance	Wildlife Clearance	Remarks
		This is a major civil work, involving transportation of all construction materials and equipments, Hydro-Mechanical, electrical works including spill channel within the project area.		acquired	Sanctuary/ National Parks/ Tiger Reserve area	<p>way of newly proposed spill channel connecting spillway and river to dispose off the flood water. Although as per existing statute, the rehabilitation activity does not require Environmental clearance but it is a major activity, an EIA study is recommended for formulation of Environmental Management Plan for mitigating any adverse impact due to provision of Additional Spillway and Spill Channel</p> <ul style="list-style-type: none"> <li>In case EIA is to be done, the TOR may be taken from MOEF&amp;CC, or SEAC/SEIAA, as per project category.</li> </ul>
15.	<b>Raising height of dams to cater for increased design flood to address hydrological safety</b>	<p>This is a major work within the dam body involving construction activities like earthwork, concrete works, H-M works. Also transportation of construction materials and equipment is involved.</p> <p>There is no change in the storage capacity of reservoir at the FRL. This is required for free board purposes only. Also, no change in CCA, no flow modification pattern, no submergence etc.</p>	Amendment in EC will require	No	No	If activity falls within a sanctuary area, tiger reserve or national park, then permission is required from concerned department to transport construction material, manpower and equipments to dam site.
16.	<b>Repair of spillway glacis, discharge channel and energy dissipation arrangements etc.</b>	It is a activity limited to existing spillway area, energy dissipation arrangements, and discharge channel. Involves transportation of construction	No	No	No	If activity falls within a sanctuary area, tiger reserve or national park, then permission is required from concerned department to transport construction

S.N.	Types of Rehabilitation Works	Nature of Activities	Environmental Clearance	Forest Clearance	Wildlife Clearance	Remarks
		materials, equipment for undertaking the repair works, and manpower within the dam compound area.				material, manpower and equipment to dam site.
17.	<b>Survey and mapping of cracks and its remedial measures</b>	This is limited to the dam body only. Require hand tools, repair materials, and manpower.	No	No	No	
18.	<b>Dredging/ De-siltation of dam reservoirs on selective basis.</b>	This is a activity limited to reservoir water spread area. It requires boats and equipments for bathymetry, heavy equipments/carriers for removal of silt deposited in the pond/reservoir, and transportation to the approved dumping area. This activity generally is a part of maintenance to restore the original capacity of reservoir.	No Dredging and de-siltation of dams, reservoirs, weirs, barrage, river and canals for purpose of their maintenance, upkeep and disaster management is exempted from environmental clearance as per S.O.141(E) of MoEFCC dated 15 <sup>th</sup> January, 2016	No	(a) No, in case reservoir is not a declared bird sanctuary, (b) Yes, in case reservoir is a declared Bird Sanctuary	<ul style="list-style-type: none"> <li>In the de-siltation activity, a proper Feasibility Report along with Environment Management Plan to dispose the silt is required as per the Handbook for Assessing and Managing the Reservoir Sedimentation, CWC, 2019.</li> <li>NOC from State Pollution Control Board as well as concerned local authorities is required in advance for disposal site for disposal of dredged materials.</li> </ul>
19.	<b>Provision of standby DG Sets, dewatering pumps etc.</b>	These are very minor items, and their installation is limited to the dam compound only.	No	No	No	
20.	<b>Geo-membrane sealing system for upstream face treatment of dams</b>	This is a localized work. It involves transportation and storage of geo-membrane materials, equipments and manpower to the dam site.	No	No	No	If activity falls within a sanctuary area, tiger reserve or national park, then permission is required from concerned department to transport construction materials, manpower and equipments to dam site.
21.	<b>Repair of sluice outlet structures</b>	This is a localized work. It is limited to sluice outlets only, which is within dam body and overflow section of dam and	No	No	No	

S.N.	Types of Rehabilitation Works	Nature of Activities	Environmental Clearance	Forest Clearance	Wildlife Clearance	Remarks
		very minor spatial extent. It involves transportation of materials and equipments to the dam.				
22.	<b>Downstream face pointing with mortar</b>	This is a minor activity and localized work. It involves transportation of materials, equipments and manpower to the dam site. It is managed by few persons with small supporting equipments etc.	No	No	No	
23.	<b>Grouting of embankment dam (with low pressure slurry) &amp; foundation curtain</b>	This is a minor activity and localized work. It is limited to dam body only. It involves transportation of materials and equipments to the dam.	No	No	No	
24.	<b>Provision or repair of parapet wall</b>	This is a minor activity and localized work. It involves transportation of materials and equipments to the dam.	No	No	No	
25.	<b>Providing backing concrete to dam for stability improvement</b>	This is a localized but major work. It involves transportation of materials and equipments to the dam.	No	No	No	<ul style="list-style-type: none"> <li>If activity falls within a sanctuary area, tiger reserve or national park, then permission is required from concerned department to transport construction material, manpower and equipments to dam site.</li> </ul>
26.	<b>Catchment Area Treatment (CAT) and Reservoir rim treatment</b>	This activity is widespread within the dam catchment. Generally this activity is executed by Agriculture department/Forest department/ Watershed department of a given State. It involves transportation of materials and equipments for slope stabilization, check dams, sapling etc. Also this activity is very rare and exceptional in	No	No,		The proposed CAT works in forest area will be carried out by the forest department., whereas in the non forest area CAT works will be responsibility of the dam authority.

S.N.	Types of Rehabilitation Works	Nature of Activities	Environmental Clearance	Forest Clearance	Wildlife Clearance	Remarks
		the rehabilitation Project as it is done at the time of construction of a new Project.				
27.	<b>Various kind of investigations i.e. geo-technical, underwater, survey, geo-physical/sonic tomography etc.</b>	These activities are limited to dam compound only, and may require movement of experts/technician with few manpower to support the investigations etc.	No	No	No	
28.	<b>Pre and post Bathymetry survey for de-siltation of dam or for physical modelling inputs</b>	This is a specialised activity have spatial extension to cover the water spread area of reservoir upto FRL/MWL. It may require one or two motor boat alongwith necessary bathymetry equipments, and 3 to 4 supporting manpower	No	No	No	
29.	<b>Development of dam tourism, water recreation facilities, incidental power, in-situ conservation of fisheries etc.</b>	<p>(a) This is an activity which may require initial planning, survey, design and preparation of Feasibility Report requiring movement of few experts, survey team with requisite equipments etc.</p> <p>(b) The execution and implementation of dam tourism activity may require construction of some landscaping structures, opening of restaurants, public conveniences, licences to authorised agencies expert in water recreations, movement of tourist etc.</p> <p>(c) Development of high end fisheries, this activity is limited to reservoir water spread area</p>	No	No	No	If activity falls within a sanctuary area, tiger reserve or national park, then permission is required from concerned department to transport construction materials, manpower and equipments to dam site.

S.N.	Types of Rehabilitation Works	Nature of Activities	Environmental Clearance	Forest Clearance	Wildlife Clearance	Remarks
		(d) Incidental solar/hydel power, the incidental solar power is limited to dam compound only, also incidental hydel power is a very rare activity and exceptional under rehabilitation Project, and various scenarios may arise in case it is being developed during the rehabilitation project depending upon the proposal which needs to be examined accordingly	No  EC is required if Hydropower generation capacity is > 25 MW	No  No/Yes	No  No/Yes	
30.	<b>Establishment of telemetric stations, automatic weather stations and other equipments for integrated flood forecasting and reservoir operation etc.</b>	These are point activities generally do not have any spatial extent and limited to installation of equipments along with their transmission network	No	No	No	If activity falls within a sanctuary area, tiger reserve or national park, then permission is required from concerned department to transport construction manpower, equipments and any required construction material, etc to the proposed locations of these stations.
31.	<b>De-weeding of Dam body/ Reservoir</b>	This is localised activities confined to embankment & Dam body	No	No	No	This is a routine maintenance activity and dam body is cleaned regularly by removing weeds, shrubs and unwanted trees grown on the dam body including area upto the toe drains, as per the Guidelines on Safety Inspection of Dam, CWC year 2018.



## FORM-VI: IMPLEMENTATION ARRANGEMENT

### 1. Civil Works-Main Package:

(a) Work Components

--

*(Give details for each work component under separate number)*

(b) Procurement Method:

(C) Estimated Cost of Package (in Rupees):

### 2. Other Packages

Sl. No.	Description	Procurement Method	Estimated Cost (Rs.in Lakhs)
1			

### 3. Procurement of Goods:

Sl No.	Description	Procurement Method	Estimated Cost(Rs.in Lakhs)
1			
2			

#### 4. Consultancy Assignment(s):

Sl No.	Description	Procurement Method	Estimated Cost (Rs.)
1			

#### 5. Implementation Timeline:

(a) Overall Phasing of Project Implementation:

Proposed Starting of implementation (MM/DD/YYYY):     \_/\_/\_\_\_\_

Proposed Ending of implementation (MM/DD/YYYY):     \_/\_/\_\_\_\_

Implementation Duration (months) (MM):             

(b) Timeline phasing of implementation:

Sl. No.	Description	From (Month/Year)	To (Month/Year)	Status of Procurement Process
1	Civil Work – Main Package			
2	Other Packages			
3	Procurement of Goods (a) Provision for Instrumentation  (b) Provision for the inspection vehicles		/	

**FORM-VII: ADDITIONAL INFORMATION**

This section contains information of all reports such as Emergency Action Plan (EAP), Dam Break Analysis (DBA), stability analyses, design drawings, geological report, geotechnical exploration logs, test results, geophysical results, underwater explorations, and other data that is pertinent and supports the PST work proposal.

**1. Operation and Maintenance Manual**

- (a) Operation & Maintenance Manual:  , if YES,
- (b) Year of Publication:

**2. Emergency Action Plan**

- (a) Emergency Action Plan:  , if YES,
- (b) Year of Study:
- (c) Agency Conducting Study

**3. Dam Break Analysis**

- (a) Dam Break Analysis:  if YES,
- (b) Year of Study:
- (c) Agency Conducting Study:

**4. Geotechnical Investigation**

- (a) Year of Investigation:
- (b) Agency Conducting Investigation:

## 5. Geophysical Investigation

(a) Area of Study:

(b) Year of Investigation:

(b) Agency Conducting Investigation:

## 6. Stability Analysis of Dam and any other studies

(a) Area of Study:

(b) Year of Study:

(c) Agency Conducting Study

## 7. Others

(a) Area of Study:

(b) Year of Study:

(c) Agency conducting study: