Central Electricity Authority



Guidelines for Formulation of Detailed Project Reports for Pumped Storage Schemes

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INDEX

Section/ Chapter /Para No.	Contents	Page No.
Index	**Title**	**i - ii**
Section -1	**Requirement for Concurrence of Pumped Storage Schemes**	**1**
1.1	Provisions under the Electricity Act, 2003	1
1.2	Capital expenditure exceeding which Concurrence is required	1
Section -2	**Preparation of Detailed Project Report**	**2 – 73**
2.1	General	2 – 3
2.2	Intimation to CEA after allotment of the project	3
2.3	Surveys and Investigations	3 – 4
2.4	Preparation and approval of Chapters prior to submission of DPR	4 – 5
2.5	Preparation of DPR	6
2.6	Structure of Detailed Project Report	6 – 7
Chapter-I	Introduction	8
Chapter-II	Justification of project from power supply angle	8-9
Chapter-III	Basin Development	9
Chapter-IV	Inter-state aspects	9
Chapter-V	Survey & Investigation	9-10
Chapter-VI	Hydrology	10
Chapter-VII	Reservoir	10-11
Chapter-VIII	Power Potential Studies & Installed Capacity	11
Chapter-IX	Design of Civil Structures	11-12
Chapter-X	Electrical and Mechanical Designs	12 – 13
Chapter-XI	Transmission of Power and Communication facilities	13 – 15
Chapter-XII	Clearances/ Inputs	15-16
Chapter-XIII	Construction Programme & Plant Planning	17
Chapter-XIV	Project Organization	17
Chapter-XV	Infrastructural Facilities	17-18
Chapter-XVI	Environmental & Ecological aspects	18-19
Chapter-XVII	Cost estimates	19-28
Chapter-XVIII	Allocation of cost	28
Chapter-XIX	Economic Evaluation	28-29
Chapter-XX	Future Utilization of Buildings	29
Chapter-XXI	Recommendations	29
2.7	Aspects to be Appraised	29-33
2.8	Early excavation	33
Annex-1(a)	List of relevant Documents/ References	34-35
Annex-1(b)	Checklist of documents required for examining/ vetting of various aspects of DPRs of pumped Storage Projects (PSPs)	36-56
Annex-2(a)	Undertaking to be submitted by developer	57
Annex-2(b)	Abstract of Cost Estimates	58-70
Annex-2(c)	Phasing of Expenditure	71-73
Annex-2(c)(i)	Illustration for calculation of annual escalation factor	74
Annex-2(d)	Estimated cost of Project & financial package summary	75-76
Appendix		
Appendix-1	Review Mechanism for pre-DPR activities	77
Appendix-2	Power Potential Studies and Installed Capacity	78-79
Appendix-3	Suggestive Measures to Reduce to tariff of the project at DPR stage	80
Appendix-4	Measures to be adopted to avert flooding of Power House	81
Appendix- 5	Key preventive measures for disaster management in case of dam failure or sudden release of water	82

Appendix-6(a)	Checklist-1 (To be examined in HPA Division, CEA)	83-84
Appendix-6(b)	Checklist-2 (To be examined in CEA)	85
Appendix-7	Guidelines for Budgetary Support towards cost of Enabling Infrastructure i.e., roads/bridges etc.	86-106
Appendix-8	Guidelines for Budgetary Support for Flood Moderation/Storage HE Projects	107-120
Plates		
Plate-1(a),(b), (c)	Typical bar chart showing different activities to be carried out by the project authorities for preparation of Chapters/ DPR and by CEA/ CWC/ GSI/ CSMRS for approval of pre-DPR Chapters.	121-138
Plate-2 (a),(b), (c)	Typical flow chart showing different activities to be carried out by the project authorities for preparation of Chapters/ DPR and byCEA/ CWC/ GSI/ CSMRS for approval of pre-DPR Chapters.	139-144

SECTION-1

REQUIREMENT FOR COCURRENCE OF PUMPED STORAGE SCHEMES

1.1 Provisions under the Electricity Act, 2003

1.1.1 As per Section 8(1) of the Electricity Act, 2003, any generating company intending to set up a hydro generating station shall prepare and submit to the Authority for its concurrence, a scheme estimated to involve a capital expenditure exceeding such sum, as may be fixed by the Central Government, from time to time, by notification.

1.1.2 As per Section 8(2) of the Electricity Act, 2003, the Authority shall before concurring to any scheme submitted to it, have particular regard to, whether or not in its opinion,

a) the proposed river-works will prejudice the prospects for the best ultimate development of the river or its tributaries for power generation, consistent with the requirements of drinking water, irrigation, navigation, flood control, or other public purposes, and for this purpose the Authority shall satisfy itself, afterconsultation with the State Government, the Central Government, or such other agencies as it may deem appropriate, that an adequate study has been made of the optimum location of dams and other river-works.

b) The proposed scheme meets the norms regarding dam design and safety.

1.1.3 As per Section 8(3), where a multi-purpose scheme for the development of any river in any region is in operation, the State Government and the generating company shall co-ordinate their activities with the activities of the persons responsible for such scheme in so far as they are inter-related.

1.2. Capital Expenditure exceeding which Concurrence is required

1.2.1 In compliance with Section 8(1) of the Electricity Act, 2003, the Central Government vide Notification No. SO 550(E) dated 18.04.2006 modified vide Notification No. SO 490(E) dated 28.01.2014 has fixed the following limits of capital expenditure for various categories of hydroelectric schemes exceeding which the scheme is to be submitted to the Authority for concurrence:

i) ₹ 2500 crores, provided that –

a) the scheme is included in National Electricity Plan (NEP) as notified by Central Electricity Authority (CEA) and conforms to the capacity and type.

b) the site for setting up the generating station has been allocated through the transparent process of bidding in accordance with the guidelines issued by Central Govt.

ii) ₹ 1000 crores for any other scheme not covered by para i (a) and i (b) of clause.

SECTION -2

PREPARATION OF DETAILED PROJECT REPORT

2.1 General:

Pumped Storage Schemes may be classified into following three types:

(a) **On-stream pumped storage scheme**- Both reservoirs are located on any river/stream/ nallah.

(b) **Off-stream open loop pumped storage scheme**- One reservoir is located on river/ stream/ nallah. Other reservoir (off-stream reservoir) is not located on any river/ perennial stream/ perennial nallah. If off-stream reservoir is located on any non-perennial stream/ nallah, then

- Suitable provision shall be made for diversion of non-perennial stream/ nallah to its downstream and/or release of water of the non-perennial stream/ nallah to its downstream through body of dam/ barrage/ embankment etc.
- The water of rainfall yield of self-catchment of the reservoir shall be released to downstream through body of dam/ barrage/ embankment etc.
- The water for filling of reservoir/ recoupment of evaporation and re-circulation losses shall be met from a source other than the rainfall yield of catchment of non-perennial stream/ nallah

(c) **Off-stream closed loop pumped storage scheme**- None of the reservoirs is located on any river/ perennial stream/ perennial nallah. If any reservoir is located on a non-perennial stream/ nallah, then

- Suitable provision shall be made for diversion of non-perennial stream/ nallah to its downstream and/or release of water of the non-perennial stream/ nallah to its downstream through body of dam/ barrage/ embankment etc.
- The water of rainfall yield of self-catchment of the reservoir shall be released to downstream through body of dam/ barrage/ embankment etc.
- The water for filling of reservoir/ recoupment of evaporation and re-circulation losses shall be met from a source other than the rainfall yield of catchment of non-perennial stream/ nallah

The Detailed Project Report (DPR) of Pumped Storage Schemes required to be submitted to the Authority for concurrence in compliance with the requirement of Section 8 of the Electricity Act, 2003 shall be formulated by Generating Company/ Project Developer as per the guidelines laid down by the Authority considering the following:

(a) the Pumped Storage Scheme aims at best ultimate development of the river basin,

(b) the Scheme is designed for optimum benefits and does not adversely affect the operation of the upstream and downstream Hydro Electric Schemes and takes into consideration the impact of the future upstream and downstream developments in

the river basin identified at the Central and State levels.

(c) the Pumped Storage Scheme is consistent with water requirement for drinking water, irrigation, navigation, flood control or other public purposes.

(d) the Pumped Storage Scheme takes into account the progressive development of consumptive use of water and new water resources development schemes in the river basin due to which the water availability may undergo change over the period,

(e) the Pumped Storage Scheme meets the requirement of optimum location of dams and other river works.

(f) the Pumped Storage Scheme meets the norms regarding dam design and dam safety.

(g) the Pumped Storage Scheme is either included in National Electricity Plan drawn by the Authority under section 3(4) of the Act or results in conversion of power (from off-peak to peak) at reasonable tariff.

(h) the relevant chapters/ DPR is prepared after hydrological studies, essential site surveys and investigations are completed.

(i) the Generating Company/ Project Developer shall refer to the latest edition of the "Guidelines for preparation of Detailed Project Report of Irrigation & Multipurpose Schemes" published by the Central Water Commission for civil works and shall consult the relevant documents listed in **Annex – 1(a)** wherever applicable.

2.2 Intimation to CEA after allotment of the project:

In-principle Allotment/ MoU/ MoA for execution of any pumped storage scheme by State Government to Generating Company/ Project Developer shall be immediately intimated to CEA by State Government.

Approval of ToR of MoEF&CC of any pumped storage scheme by MoEF&CC to Generating Company/ Project Developer shall be immediately intimated to CEA by project developer.

If such allotted project is to be concurred by CEA under Section 8 of the Electricity Act, 2003, in such case concerned Generating Company/ Project Developer shall approach CEA within a month.

Further, if the project is to be concurred by State Government, in such case, State Government shall send letter of concurrence to CEA after concurrence of DPR of the project.

2.3 Surveys & Investigations:

After signing MoA/MoU with State Government or approval of TOR from MOEF&CC, developer shall carry out topographical survey & geological surface mapping of the project and submit the proposed layoutof the project and detailed investigation plans to CEA for appraisal and finalization. In this connection, "Guidelines for Investigations and Explorations required at Detailed Project Report (DPR) Stage of Proposed Hydroelectric Project in HimalayanTerrain" may be referred.

For off-stream projects, developer shall finalize the best location of reservoirs and submit alternate layout options (if possible) for water conductor system, power house etc for finalization of the layout.

CEA along with CWC, GSI and CSMRS shall hold 1st consultation meeting with developer to finalize the layout for which investigations are to be carried out by the developer along with detailed investigation plans to be carried out in first phase.

For projects located in non-Himalayan region and comprising of underground power house in an area with good geology or surface power house, appraisal of GSI aspects will be based on the drill hole investigations done by developer. The results of drift investigation will be required only if the data from drill holes suggest poor geology. However, developer shall start drift investigations parallel to drill hole investigations so as to save time if drift investigations are warranted by GSI due to poor geology (ascertained from data of drill hole investigations). Further, project developers shall complete drift investigations before start of the construction of the project and shall use the data of drift investigations during detailed design.

After completion of the first phase investigations, developer shall submit the results to CEA. CEA along with CWC, GSI and CSMRS shall hold 2nd consultation meeting with the developer for finalization of project layout and final phase-II investigations to be carried out by the developer.

For taking clearance on a particular aspect, developer shall submit its report/ chapter only after completing all investigations/ studies as suggested by CEA, CWC,GSI and CSMRS.

After obtaining clearances for Hydrological aspects (if any), PPS aspects, Interstate aspects (if any),GSI aspects, CSMRS aspects, FE&SA aspects and layout from HCD/HE&TD, CEA along with CWC, GSI and CSMRS shall hold 3rd consultation meeting for finalization of layout, broad salient features of the project and submission of chapters for design aspects of the project.

All efforts will be made by the developer to complete the investigations and studies as suggested by the concerned appraising group of CEA, CWC, GSI and CSMRS in time.

Developer may approach CEA, CWC, GSI & CSMRS and other agencies in case of any difficulty in finalization of any study or report/ chapter.

CEA and concerned appraising groups shall review the pre-DPR activities with the Developer quarterly for their timely completion. The review mechanism is given at **Appendix-1**. Developer shall approach CEA for holding the first consultation meeting with in a month of project allotment.

2.4 Preparation and approval of Chapters prior to submission of DPR

2.4.1 Prior to submission of DPR to the Authority for its Concurrence, the Generating Company/ Project Developer shall prepare and submit the following chapters to CEA/ concerned appraising groups for their examination/ approval –

	Chapters/ Aspects		Appraising Groups
i).	General Layout	-	HCD Dte., CWC and HE&TD/ HPP&I Div., CEA

ii).	Hydrological Aspects*	-	Hydrology Dte., CWC
iii).	Power Potential Aspects	-	HPA/ HPP&I Div., CEA
iv).	Foundation Engg. And Seismic Aspects	-	FE&SA Dte, CWC
v).	Geological Aspects		- GSI
vi).	Construction Material & Geotechnical Aspects	-	CSMRS
vii).	Inter-State Aspects*	-	ISM Dte, CWC
viii).	Transmission System (up to Pooling point)	-	PSP&A Div, CEA
ix)	Dam/Barrage Design	-	CMDD/BCD/Embankment Dte., CWC
x)	Gates / HM Design	-	Gates Design Dte., CWC
xi)	Hydel Civil Design	-	HCD Dte., CWC
xii)	E&M Design	-	HE&TD/ HPP&I Div, CEA

*Note: Clearance of Water Availability Series is not required for Off-stream closed loop type PSPs. However, clearance of design flood from CWC shall be obtained by the developer for the purpose of design of spillways.

Clearance of Inters-state Aspects is not required for Off-stream closed loop type PSPs and PSPs located in the states which don't have any downstream state.

Clearance on Instrumentation aspects is not required. For compliance with instrumentation, as per codal provisions, the developer shall submit an undertaking to incorporate the list of instruments (which will be issued separately by CEA).

2.4.2 Preparation of DPR of Pumped Storage Projects is divided into two stages.
Stage 1: Finalization of layout
Stage 2: Clearance of other design chapters

While submitting the aforementioned pre-DPR Chapters, Project Developer shall follow the checklist of documents mentioned at **Annex-1(b). Further, the chapters submitted in Stage-I for finalization of layout viz. Power Potential Studies, General Layout and Geological aspects, along with executive summary may be treated as Feasibility Report (FR)/ Preliminary Feasibility Report (PFR).**

2.4.3 After above chapters/ aspects are approved by the concerned appraising groups, the Generating Company/ Project Developer shall include the same in the DPR to be submitted to the Authority for Concurrence. Further, developer shall submit an undertaking in the format prescribed at **Annex-2(a)**.

2.5 Preparation of Detailed Project Report (DPR)

This process of preparation of Detailed Project Report (DPR) shall be completed by the Developer indicatively in a period of:

(i) 690 days from the date of allotment/ signing of MoA/MoU of the project, extendable by 180 days for reasons beyond the control of Developer for following PSPs:
   a) PSPs located in non-Himalayan region comprising of surface power house.
   b) PSPs located in non-Himalayan region comprising of underground power house in an area with good geology.

(ii) 840 days from the date of allotment/ signing of MoA/MoU of the project, extendable by 180 days for reasons beyond the control of Developer for following PSPs:
   a) PSPs located in Himalayan region.
   b) PSPs located in non-Himalayan region comprising of underground power house in an area with poor geology.

For further delay on part of Developer, State Government may make a provision for resorting to levy of a financial penalty against the developer and/ or cancellation of project allotment.

The Data collected by Developer for preparation of DPR shall be property of concerned State Government and its copy shall be made available to CEA/ CWC.

Typical bar chart showing different activities to be carried out by the project authorities for preparation of DPR and by CEA/ CWC/ GSI & CSMRS for approval of above chapters is given at **Plate-1(a), (b) & (c)**. Typical flow chart showing different activities to be carried out by project authorities before submission of DPR and pre-DPR clearances by CEA, CWC, GSI & CSMRS is given at **Plate-2 (a), (b) & (c)**.

The DPR prepared by the Generating Company/ Project Developer shall be structured in the format as described in the succeeding paragraphs.

2.6 Structure of the Detailed Project Report

The structure of DPR/ details to be included in the respective chapters of the DPR is given below. The sections of *"Guidelines for preparation of Detailed Project Report of Irrigation and Multipurpose Projects" issued by CWC* to be referred are indicated in bracket against the respective components of work.

2.6.1 DPR should include the following chapters:

Chapter -I	Introduction
Chapter –II	Justification of project from power supply angle
Chapter -III*	Basin Development
Chapter –IV*	Inter-State Aspects (As per already approved chapter/ aspect as referred under para 2.3 above)
Chapter -V	Surveys & Investigations (Section 3.4) (As per already approved chapter/ aspect as referred under para 2.3 above)
Chapter –VI	Hydrology (Section 3.5) (As per already approved chapter/ aspect

as referred under para 2.3 above)

Chapter –VII Reservoir (Section 3.7) (As per already approved chapter/ aspect as referred under para 2.3 above)

Chapter –VIII Power Potential Studies & Installed Capacity (Refer Appendix-2 of these Guidelines) (As per already approved chapter/ aspect as referred under para 2.3 above)

Chapter –IX Design of Civil Structures (Section 3.6)

Chapter –X Electrical and Mechanical Designs

Chapter –XI Transmission of Power and Communication facilities

Chapter –XII Clearances / Inputs

Examination of Cost Estimates of Pumped Storage Projects is exempted from Concurrence Process. However, following additional chapters shall be submitted by project developer to the Authority within 60 days from date of uploading the DPR on CEA portal so as to ascertain the project cost in accordance with the limit specified by the Central government from time to time. It will not be vetted by CEA/CWC.

If any project developer desires to get the cost estimates examined by CEA, the same will be examined by CEA in consultation with CWC in parallel to concurrence process.

Chapter –XIII Construction Programme & Plant Planning (Section 3.13)

Chapter –XIV Project Organization

Chapter –XV Infrastructural Facilities

Chapter –XVI Environmental & Ecological Aspects

Chapter –XVII Cost Estimates

Chapter –XVIII Allocation of Cost

Chapter –XIX Economic Evaluation

Chapter –XX Future Utilization of Buildings (Section 3.20)

Chapter –XXI Recommendations

*Note: Chapters on Basin Development and Inter-state Aspects are not required for **Off-stream closed loop type PSPs**.

Additionally, the Cost of Enabling Infrastructure/ Flood Moderation etc. (wherever applicable), which can be availed as Grant from GoI , must be vetted from the respective appraising group (CEA/ CWC).The Project developer needs to get this cost vetted before the commencement of construction of the project.

Chapter-wise detailed information to be included in the Detailed Project Report hasbeen

described hereunder.

Chapter -I INTRODUCTION

1.1 Type of the Pumped Storage Project (Off-stream closed loop, Off-stream open loop,On-stream type PSP etc.)

1.2 Location of the project area including longitude and latitude and district(s) and tehsil/ village etc.

1.3 Access by air/rail/road/ferry, sea port & other communication facilities available in area.

1.4 General climatic conditions in the project area.

1.5 General description of topography, physiography and geology of the project area.

1.6 Historical background of the project:

a) Earlier proposal/ PFR proposal, if any
b) Present proposal

1.7 Need for the project, possible options and justification for selected option.

1.8 Alternative studies carried out for various major components of the project and final choice of the project parameters.

1.9 Natural resources of the India/State.

1.10 Socio-economic aspects including tribal, backward and drought areas.

1.11 Land required for the project construction – forest land, village land and agricultural land, total area of the land being submerged.

1.12 Population affected by the project and occupation of the people affected.

1.13 Environmental aspects.

1.14 Inter State aspects

1.15 Defense angle, if any.

1.16 Cost and benefits of the scheme i.e., Cost at completion level of Civil & HM works, Electro-mechanical works, Transmission works, Interest during construction, Financing charges, Annual Design Energy, Cycle Efficiency, First year and levelized tariff excluding and including cost of pumping.

1.17 Construction Programme, i.e., PERT chart giving details of activity-wise construction programme for each of the major components of the civil, electrical and mechanical equipment

Chapter –II JUSTIFICATION OF THE PROJECT FROM POWER SUPPLY ANGLE

2.1 Details of scheme for wheeling/ evacuating power and scheme for drawing of power needed for pumping mode from green energy.

2.2 Resources for power development in the India/state.

(i) Coal resources
(ii) Nuclear resources
(iii) Hydro resources
(iv) Renewable resources

2.3 Available generating capacity in the India/State from different sources

2.4 Peak load and energy requirement in future in all India/state up to the likelydate of project completion.

2.5 Likely addition to generating capacity in future in the all India/ State indicating power supply position with & without the project under consideration and improvement in the grid-balancing in view of high scale RE penetration.

Chapter -III BASIN DEVELOPMENT

3.1 The course of the river

3.2 Power potential of the river basin and stages of development

3.3 Whether trans-basin diversion of waters involved

3.4 Fitment of the scheme in the overall basin development

3.5 Fitment of the scheme in the power potential assessment studies carried out by CEA

3.6 Effect of future upstream/downstream developments on the potential of proposed scheme

Chapter -IV INTER-STATE ASPECTS

(As per already approved chapter/ aspect as referred under para 2.3 above)

4.1 States/Countries traversed by the river

4.2 Distribution of catchment in States/Countries and yields from the catchment of state/ countries concerned.

4.3 Effect of the following on the project:

a) Inter-state agreement on sharing of waters, sharing of benefits and costs, acceptance of submergence in the upstream state(s), if any.

b) Inter-state adjudication, if any

c) Inter-State aspects of territory, property etc. coming under submergence, oustees rehabilitation, compensation etc.

d) Any other aspect of the project involving inter-state problems

4.4 Existing riparian use, quantum of water presently utilized, commitments for ongoing projects, plans for future development, balance share of the state/country and proposed utilization by this project. (Discuss relevant items both for upstream and downstream usages)

Chapter -V SURVEY & INVESTIGATION (Section 3.4)

5.1 Topographical surveys of river, reservoir, head works, colony layout, head race tunnel/channel, power house, switchyard, surge shaft, tail race tunnel/channel, adits, penstock etc. considering different water levels

5.2 Archaeological surveys in the reservoir area.

5.3 Mineral surveys in the reservoir areas.

5.4 Right of way surveys for the reservoirs. These shall cover survey for right of approach roads, which may be claimed by owners to various structures above FRL.

5.5 Communication surveys

5.6 Geology & geo-technical features (As per already approved chapter/ aspect as referred under para 2.3 above)

5.7 Seismicity (As per already approved chapter/ aspect as referred under para 2.3 above)

5.8 Foundation investigations of different structures/components of the project indicating boreholes details, soil/rock strata etc. (As per already approved chapter/ aspect as referred under para 2.3 above)

5.9 Construction materials investigations (As per already approved chapter/ aspect as referred under para 2.3 above)

5.10 Hydrological and meteorological investigations.

Chapter -VI HYDROLOGY (Section 3.5)

(As per already approved chapter/ aspect as referred under para 2.3 above)

6.1 Hydrological inputs for the project planning

6.2 Effect of project development on hydrologic regime.

6.3 Hydrological studies for water availability, design flood, design flood levels, diversion flood, sedimentation etc.

Chapter –VII RESERVOIR (Section 3.7)

(As per already approved chapter/ aspect as referred under para 2.3 above)

7.1 Catchment area, annual run-off, submergence, suitability of soil/rock, dead storage level

7.2 Sedimentation data and studies

7.3 Fixation of storage and reservoir levels, {maximum water level (MWL), full reservoir level (FRL), minimum draw down level (MDDL)}, flo od cushion etc.

7.4 Life of reservoir in years with basis

7.5 Capacities at MWL, FRL, MDDL, Dead Storage level etc. at project planning stage and after 25, 50, 75 and 100 years or more of operation

7.6 Water tightness of the reservoir

7.7 Annual losses (month-wise) (evaporation, seepage etc.)

7.8 Flood absorption on regular/flash flood

7.9 Effect on subsoil water tables in the adjoining areas upstream and downstream of the dam

7.10 Seismic characteristics and effects due to construction of dam

7.11 Reservoir rim stability

7.12 Length of Reservoir and Area of submergence

7.13 Land acquisition

7.14 Recreation facilities

7.15 Pisci-culture

7.16 Other facilities, if any

7.17 Need and recommendations for soil conservation measures in the catchment.

Chapter –VIII POWER POTENTIAL & INSTALLED CAPACITY
(Refer Appendix-2 of these guidelines)

(As per already approved chapter/ aspect as referred under para 2.3 above)

8.1 Type of scheme – daily or weekly regulated

8.2 Studies carried out for optimization of storage capacity, FRL, MDDL etc. of upper and lower reservoirs.

8.3 Studies carried out for optimization of installed capacity and number of units.

8.4 Operating criteria of the project in generating and pumping mode, availability of pumping energy for pumping operations over the years

8.5 Cycle efficiency of the scheme

8.6 Pumping Power Arrangement (Capacity, source etc.)

8.7 Reservoir filling mechanism (onetime filling and annual recoupment of losses)

Chapter –IX DESIGN OF CIVIL STRUCTURES (Section 3.6)

9.1 Structures & layout (As per already approved chapter/ aspect as referred under para 2.3 above)

9.2 General

(i) Head works - site and vicinity

(ii) Reasons for choice of the layout of the project adopted.

(iii) Type of structure – dam (Concrete gravity Dam/Roller compacted Dam/GFRD/CFRD etc. etc.)/ embankment etc.

(iv) Layout of dam and spillway / barrage / weir / appurtenants / auxiliary works and power house, reasons for choice of site.

9.3 Geology, seismicity and foundations (As per already approved chapter/ aspect as referred under para 2.3 above)

9.4 Alternative studies carried out for selection of site and type of structures / dam/ embankment/ barrage / weir, regulators, water conductor system, power house etc.

9.5 Choice of final layout of all the major components of the project and reasons – with details

9.6 Design flood and sedimentation studies

9.7 Free board

9.8 River diversion arrangements – choice of design flood with hydro-graphs

9.9 Construction materials (As per already approved chapter/ aspect as referred under para 2.3 above)

9.10 Details of Model of studies

9.11 Design of dam / barrage / weir/embankment

9.12 Design of intake, desilting arrangement, power channel/tunnel, balancing reservoir / fore-bay, surge shaft, penstocks, power house, switchyard

9.13 Details of instrumentation for various structures

The chapter shall include structural and hydraulic design calculations for dam, spillway gates and energy dissipation arrangements, outlets – regulators, river sluices, intake structures, surge shafts, power house etc. Essential structural calculations shall be furnished. For stability analysis, loading diagrams considering various conditions of water level, earthquake and other forces/stresses considered shall be included.

Chapter –X ELECTRICAL AND MECHANICAL DESIGNS

10.1 Type of Machine
(Reversible Pump turbine with Fixed Speed Generator Motor/ Reversible Pump turbine with Variable Speed Generator Motor/ Ternary Set with Separate Pump and Turbine and fixed speed generator Motor)

10.2 Pump/ Turbine

(i) Type

(ii) Operating heads & outputs

(iii) Specific speed and synchronous speed

(iv) Setting of pump turbine

(v) Speed & pressure rises

(vi) Efficiencies

10.3 Generator/ Motor

(i) Type of generator/motor

(ii) Outputs, power factor, generation voltage

(iii) Class of insulation

(iv) Type of cooling

(v) Generator inertia

(vi) Starting method

(vii) Type of Converter (VSI/ Full Converter/Static Excitation)

(viii) Efficiencies

10.4 Generator – transformer connections

10.5 Main Inlet Valve

10.6 Surge Protection & Neutral Earthing System

10.7 Supervisory Control and Data Acquisition System

10.8 Penstock Valves, if any

10.9 Main Step-up Transformer

10.10 Switchyard Equipment

10.11 Single-line Scheme

10.12 Control & Protection Equipment

10.13 Auxiliary Mechanical Services

(i) EOT Crane for Powerhouse

(ii) EOT Crane for GIS, if any

(iii) EOT Crane for Penstock Valve House, if any

(iv) Electrical lifts and elevators

(v) Workshop equipment

(vi) Test Laboratory

(vii) Telemetry

(viii) Ventilation & air conditioning

(ix) Fire protection

(x) Cooling water

10.14 Auxiliary Electrical services

(i) Unit Auxiliary Transformers

(ii) Station Service Transformers

(iii) A.C. auxiliary services

(iv) D.C. auxiliary service.

(v) Control and Power Cables

(vi) DG Sets

10.15 Transport limitations

(i) Maximum limiting dimensions (L x W x H) of packages for transport

(ii) Maximum limiting weight of the package which can be transported

The design calculations wherever required shall be included.

Chapter –XI TRANSMISSION OF POWER AND COMMINUCATION FACILITIES

11.1 Transmission of power (up to pooling point) –

Central Electricity Regulatory Commission (Connectivity and General Network Access to the inter-State Transmission System) Regulations 2022, stipulates the following:

Para 12.1:

"In case Connectivity grantee is a generating station or a captive generating plant or a standalone ESS, the dedicated transmission lines shall be established, operated and maintained by such Connectivity grantee".

The specifications for dedicated transmission line may be indicated by CTUIL while granting connectivity.

11.2 Following points may be included in the chapter on Transmission of Power and Communication Facilities for such projects who are required to build dedicated transmission line:

(i) Whether the Pumped Storage Project wants to get connected to ISTS or the State Transmission System (Name of the state in case of the State Transmission System). Connectivity to ISTS or intra-state transmission system would be governed by relevant regulations.

(ii) The voltage level of the transmission line and nearest Pooling station /substation

(iii) Whether the nearest Substation or pooling station is ISTS or state owned. Also, whether margins are available at their switchyard for accommodating the generation connectivity.

(iv) Transmission line configuration, i.e. the conductor used and the type of towers utilized.

(v) For Forest & Crop compensation, the percentage of area covered with respect to the line length, may be provided.

(vi) Switchyard coordinates needs to be provided.

(vii) Commissioning Schedule of Generator/ transmission line may be specified.

(viii) For Projects with capacity greater than 50 MW, generating units should be capable of operating in synchronous condenser mode.

(ix) Whether the project is to be built in different phases/stages, the details of the same may be provided.

(x) The developer needs to specify the beneficiaries (if any), nearest STU/CTU of the project along with quantum of power so that necessary augmentation/ strengthening for transfer of power could be implemented.

(xi) If the generation project is to be connected to ISTS, the project developer has to approach CTUIL to seek connectivity as per CERC regulations at least five years before the anticipated commissioning of the project. The transmission system for the project would be firmed up after grant of connectivity.

(xii) The implementing agency for the construction of the connectivity lines from the generation switchyard to the grid points may be specified.

11.3 Transmission of power

(i) Consent / Agreement signed between the Generating Company and the purchaser(s) (State utility or other buyers)

(ii) Letter of Consent from the appropriate Transmission utility to provide evacuation system

(iii) Details of the existing and proposed transmission system

(iv) Target date of completion of the proposed system

(v) Letter of Comfort from the Transmission Company to enter into a back to back agreement with the promoter covering risk in case of default/ delay in commissioning by either of the parties.

11.4 Telecommunication aspects

Chapter –XII CLEARANCES / INPUTS

12.1 Authenticated Copies of the following Documents/Certificates/Clearances (if available) may be submitted to CEA for concurrence.

- Letter from the Registrar of Companies indicating that the company has been registered as a Generating Company under the Companies Act, 2013
- Article of Association indicating that generation is one of the objectives of the Company
- Letter from Competent Government authorizing the company to establish, own and operate generating power plant. The letter must contain the following
  - Location of Project-State, District, Taluka, Tehsil, Village, longitude and latitude.
  - Capacity of the power plant
- Land availability certificate from State Revenue Authorities
- Water availability certificate from State Irrigation Department/ concerned agency
- Clearance of Ministry of Jal Shakti / Central Water Commission as the case may be. In case of inter-state aspects, necessary clearance from concerned authority
- Status of Environmental and Forest clearance from Ministry of Environment & Forests, Government of India
- Defence clearance (if applicable)
- Consent / Agreement signed between the Generating Company and the purchaser(s) (State utility or other buyers). In case of CPSU project, the willingness for absorption of power by the beneficiary States/ UTs
- Recommendation of the State Govt. on the project cost in case of private projects.
- Any other Statutory clearance from Ministries / Departments / Organizations for the specific aspects of the project, wherever required in the proposed project
- Letter of Comfort from the Transmission Company to provide evacuation system, details of the proposed system and completion schedule.
- Letter of Comfort from the Transmission Company to enter into a back to back agreement with the promoter covering risk in case of default/ delay in commissioning by either of the parties.
- Following clearances from different appraising groups in CEA/ CWC/ GSI/ CSMRS :

i).	General Layout	-	HCD Dte., CWC and HE&TD/ HPP&I Div., CEA
ii).	Hydrological Aspects	-	Hydrology Dte., CWC
iii).	Power Potential Aspects	-	HPA /HPP&I Div., CEA
iv).	Foundation Engg. and Seismic Aspects	-	FE&SA Dte, CWC
v).	Geological Aspects	-	GSI
vi).	Construction Material Aspects	-	CSMRS
vii).	Inter-State Aspects	-	ISM Dte., CWC
viii).	Transmission System (up to Pooling point)	-	PSP&A Div, CEA
ix)	Dam/Barrage Design	-	CMDD/BCD Dte, CWC
x)	Gates / HM Design	-	Gates Design Dte, CWC
xi)	Hydel Civil Design	-	HCD Div, CEA
xii)	E&M Design	-	HPP&I/ HE&TD Div, CEA

12.2 The DPR shall contain checklists in the beginning of the DPR as given at **Appendix-6(a)** and **Appendix-6(b)**.

Chapter –XIII - CONSTRUCTION PROGRAMME & PLANT PLANNING (Section 3.13)

13.1 PERT chart giving details of activity-wise construction programme for each of themajor components of the civil, electrical and mechanical equipment

13.2 Bar charts showing the construction programme quantity-wise, item-wise and year-wise target of construction

13.3 Key materials planning

13.4 Executing agencies for major works – departmental/contractor

13.5 Various alternatives for construction programme and proper justification of adopted programme

13.6 Plant/equipment planning

13.7 Programme for construction of tunnel / channel shall include :

(i) Excavation of tunnel/channel – cycle time to be given

(ii) Lining of tunnel

(a) Overt
(b) Invert

Chapter –XIV PROJECT ORGANISATION

14.1 Proposed set up for the project

14.2 Proposed organization for construction period, Number of staff and expenditure (year-wise)

(i) For civil works

(ii) For electrical and mechanical works

(iii) Administrative & financial set up

(iv) Others

14.3 Proposed organization for Pre-construction period

14.4 Consultants

Chapter –XV INFRASTRUCTURAL FACILITIES

15.1 Access road
(i) Roads to the project
(ii) Roads in the project area

15.2 Rail head

15.3 Port facilities, (as applicable)

15.4 Construction power requirement

15.5 Power supply facilities

15.6 Telecommunication facilities required during construction and after completion of

the project

15.7 Project colonies / buildings

15.8 Workshops

15.9 Drinking water facilities

15.10 Others

Chapter –XVI ENVIRONMENTAL & ECOLOGICAL ASPECTS

16.1 Status of Environmental clearance

All Pumped Storage Schemes require environmental clearance from MoEF&CC before being taken up for construction. Various information and environmental action plans to be incorporated in the DPR should be as per the latest "Guidelines for Environmental Impact Assessment of River Valley Projects" issued by MoEF&CC. Environmental clearance related aspects such as status of ToR of MoEF&CC/ site clearance, EIA/EMP studies, public hearing, environmental clearance etc. shall be included in the DPR.

16.2 Status of Forest clearance

In case, construction of pumped storage project involves diversion of forest land, forest clearance would also be required under Forest (Conservation) Act. The case for forest clearance should be submitted to MoEF&CC through State Forest Authorities as per Forest (Conservation) Rules and Guidelines issued by MoEF&CC in this regard from time to time. Details of forest land involved and status of its clearance shall be included in the DPR.

16.3 Cost of proposed remedial & mitigative measures

The cost of the proposed remedial and mitigative measures, if any, to protect the environment must be included in the cost estimates of the project. Mitigative measures may include:

- Rehabilitation measures
- Compensatory afforestation
- Disaster management plan
- Restoration of land in construction areas by filling, grading etc. to prevent further erosion
- Control of aquatic weeds in submerged areas to provide improved habitat for aquatic life
- Measures to salvage/rehabilitation of any rare or endangered species of flora and fauna found in the affected areas
- Enforcement of anti poaching laws
- Measures to prevent forest fires, over grazing of areas etc.
- Establishment of fuel depots etc.
- Public health measures

- Catchment Area Treatment
- Environmental and ecological studies
- Details about Net Present Value of forest land

16.4 Information regarding wildlife sanctuary likely to be affected and status of clearanceof project from National Board of Wild Life

Chapter –XVII COST ESTIMATES

17.1 The Cost Estimates of the project shall be framed at Completion level. Zero Date of the project shall be framed considering sufficient time for pre-construction activities.

In case of projects being developed by CPSUs, revised cost sanctions at completion level for cost variations due to quantity changes (including additions/ alterations/extra items), under estimation and time overruns shall be capped at 10% of Original sanctioned cost.

17.1(a) The Civil Cost Estimates of the project shall be prepared as per "Guidelines for preparation of estimates for the river valley projects" issued by CWC and Indian Standard IS: 4877 "Guide for Preparation of Estimate for River Valley Projects".

Wherever any specific stipulation is made in these guidelines (IS: 4877), these shall take precedence over what is stipulated in CWC guidelines.

17.1 (b) The cost estimates at Completion level shall be framed by escalating the present day cost (considering the latest WPI/CPI indices) using the average annual escalation factor.

Average annual escalation factor for proposed zero date to completion level may be calculated by averaging the annual escalation for each year prior to present day cost level, for the period equivalent to difference of present day price level and COD. Illustration for calculation of annual escalation factor of E&M works is given at **Annex-2(c)(i).** Similar method may be followed for civil, miscellaneous and transmission works.

17.2 The estimates of Pumped Storage Scheme shall be divided under the heads as indicated at **Annex-2(b)**

17.2(a) The estimates of Civil Works of Pumped Storage Scheme shall be divided under the following heads as indicated at **Annex-Civil**.

1. Direct Cost

I. Works

A - Preliminary

B - Land

C - Works

J - Power Plant Civil Works

K - Buildings

M - Plantation

O - Miscellaneous

P – Maintenance during construction

Q - Special T&P

R - Communications

X - Environment and ecology

Y - Losses on stock

Total I-Works

II. Establishment

III. Tools and Plants

IV. Suspense

V. Receipt and Recoveries

Total (A) - Direct Cost

2. Indirect Cost

i. Capitalization of Abatement of Land Revenue

Total (B) - Indirect Cost

Total Cost (A+B)

17.2(b) Cost of Electro-Mechanical Works (Details as per Annex-E&M)

17.2(c) Cost of Miscellaneous Works (Details as per Annex-Misc)

Cost towards miscellaneous items like, security, helicopter service, setting up of ITI, etc. if required, may also be included in the total estimated cost of the project.

17.2(d) Cost of Transmission System works (up to Pooling Point) (Details as per Annex-TS)

17.3 Preparation of Estimates

17.3.1 The capital cost of a project includes all cost associated with surveys and investigations, design, construction and maintenance during construction period of the project.

17.3.2 For preparation of cost estimates of civil works, the unit costs of labour, materials and equipment necessary to perform the work designated in the various pay- items for the proposed construction shall be determined. Current unit cost shallbe used in all estimates and price level of the project estimate shall be mentioned.

17.3.3 The analysis of rates for various items shall be worked out taking into consideration the cost of materials, carriage-handling-storing, labour and shareof machines involved in executing various items of the work and overheadcharges.

17.3.4 The quantitative assessment of material requirement shall be adopted from authentic books/publications or through independent calculations based on the data available at site or other projects. The unit cost of various materials may be taken as those prevalent in the State/ region. The appropriate cost for freight, unloading, cartage, storage, inspection and testing should also be included.

17.3.5 The wages of workers are periodically revised by the State under the statutory labour laws. Daily wage rates, therefore, shall be taken as those prevalent in the State at the time of formulation of the project.

17.3.6 For working out the use rates of machinery, the norms for life, depreciation, repair provision etc. shall be adopted as recommended by the latest CWC Guide Book on use rate, hire charges and transfer value of equipment and spare parts. Priceof various equipment should be taken on the basis of recent quotations/ price listof such equipment. All taxes and freight charges should be taken into consideration while arriving at the cost of equipment at site.

17.3.7 Provision for contingencies and work-charged establishment is generally considered up to 3% and 2% respectively of the works' cost and provided in the detailed works estimates prepared on the heads of items rates and quantities of works to be executed. These percentage provisions should not be considered on lump-sum items.

17.3.8 Mention shall also be made regarding communication facilities available, terrain through which the roads are passing (hilly, plain etc.), type of road (Black top, water bound macadam, murum, kacha etc.).

17.4 Preparation of detailed Estimates of Cost (I -Works)

17.4.1 A- Preliminary

The provision under this head covers the works relating to various investigations, Surveys, Model tests, ecological studies etc. This should be based on the actual cost likely to be incurred and should not exceed 2% of the total cost of I-Works.

17.4.2 B-Land

The provisions under this head covers Acquisition of land, rehabilitation & resettlement including compensation for property, Interest charges, Solatium charges, demarcation & measurement charges etc. The provision should be made as per actual.

17.4.3 C- Works

The provisions under this head is intended to cover the costs of the Head works viz. Dam, spillway, energy dissipation works, desilting arrangement, outlets (irrigation, power, water supply and scour sluices), pick up weir, barrage, head regulators, etc.

17.4.4 J- Power plant civil works

Important items to be considered under this head are listed below:

17.4.4.1 **Intake structures**

i) Excavation
ii) Foundation treatment
iii) Cement concrete for foundation, piers and abutments
iv) Masonry/concrete for guide walls of approach channel
v) Concrete for trash racks including raking arrangement

vi) Gates with auxiliary equipment
vii) Reinforcement steel
viii) Instrumentation etc.

17.4.4.2 **Head Race / Tail Race Tunnels (including cut and cover section)**

i) Excavation
- Open cut
- Tunnel including temporary supports

ii) Rock bolts
iii) Permanent support, ventilation
iv) Drainage
v) Cement concrete for lining
vi) Steel lining
vii) Drilling and grouting
viii) Gates and ancillaries, where required
ix) Reinforcement steel
x) Instrumentation

17.4.4.3 **Head Race channel and Tail race channel**

i) Excavation
ii) Embankment
iii) Lining with cement concrete in bed and sides with drainage pipes and valves
iv) Pucca works
- Cross Drainage(s)
- Escape(s)
- Bridge(s)
- Meter flume
- Balancing tank

v) Instrumentation

17.4.4.4 **Surge shaft**

i) Excavation
ii) Cement concrete lining
iii) Drilling and grouting
iv) Miscellaneous items such as masonry, guiniting, steel lining, ladder, bolts etc.
v) Reinforcement steel
vi) Instrumentation

17.4.4.5 **Penstock**

i) Excavation
ii) Cement concrete for
- Bed
- Anchor blocks
- Intermediate supports

iii) Steel pipes for
- Stiffner
- Reducers
- Bends
- Wye pieces
- Penstock valves

iv) Instrumentation

17.4.4.6 **Power House**

i) Excavation
ii) Concrete for foundation, sub-structure, super structure and supports for turbines and generators
iii) Masonry/concrete for super-structure and other necessary items for building work
iv) Scroll casing / Generator barrel
v) Draft tube
vi) Bulkhead gates, crane and hoisting equipment
vii) Power-house crane
viii) Miscellaneous items such as anchor bolts, grouting etc.
ix) Instrumentation

17.4.5 K – Buildings

The provisions under this head covers the Residential / Non-residential buildings, Office buildings, Testing laboratories, Workshops, Other Service Buildings, Community Centre etc. The provision shall be made as per the actual requirement.

17.4.6 M – Plantation

The provisions under this head covers the plantation programme including Gardens etc. required for beautification as considered necessary downstream of Dam and appurtenances around Power House and other important structure.

The provision should be made on lump sum basis keeping in view the experience of other projects.

17.4.7 O – Miscellaneous

a). The provisions under this head covers the capital cost & maintenance of Water supply, Sewage disposal and drainage works, Recreation, Medical, Fire fighting equipment, Inspection vehicles, School bus, Pay van, Visit of dignitaries, Welfare works etc. The provision, under this head shall be 3 % of the cost of I-Works limited to ₹ 60 crores

b). Cost of construction power/ electrification & its maintenance shall be examined and provided separately based on the estimates submitted by the Generating Company/ Project Developer (Details as per Annex-Construction Power).

17.4.8 P - Maintenance during Construction

The provisions under this head covers the cost of maintenance of all works during the construction period. The provision should be 1% of the total cost under the heads of C-Works, J-Power House Civil Works and K-Buildings.

17.4.9 Q – Special T&P

The provisions under this head covers the Drilling & Grouting equipment, Transport, Compaction, Electrical equipment, Construction Plant & Earth Moving equipment and other Miscellaneous equipment. Since the projects are presently being executed through limited contracts package and is the responsibility of the contractorto arrange for such equipment. A token provision of ₹ 3-4 crores under this head may be adequate to provide for essential equipment not covered under contract package.

17.4.10 R - Communication

The provisions under this head covers the construction of main approach roads, quarry roads, temporary or permanent river crossing, Railways, Bridges,connecting roads, water ways and airstrip/helipad.

The major items on this account shall be supported by sub estimates. The provisions shall be made in consultation with the concerned authorities.

Ministry of Power vide OM dated 08.03.2019 in principle accorded approval for providing budgetary support through the budgetary grant of Ministry of Power for funding of flood moderation component for storages HE Projects and enabling infrastructure for hydropower projects i.e. roads /bridges. This support shall be applicable for the projects starting construction after notification of this OM. The limit of this grant for such roads and bridges would be as follows:

a) ₹ 1.5 crore per MW for the projects up to 200 MW

b) ₹ 1.0 crore per MW for the projects above 200 MW

The detailed guidelines for availing grant of enabling infrastructure and Flood moderation component has been issued by MoP vide OMs dated 28.09.2021 and amended vide OM dated 28.01.2022. These guidelines are enclosed as Appendix-(5) and (6). Developer shall refer to the latest version of these guidelines as amended from time to time for availing grant/ budgetary support for enabling infrastructure and flood moderation component.

17.4.11 X- Environment and Ecology

This sub-head generally covers the provisions for items like, compensatory afforestation, catchment area treatment, establishment of fuel depot, salvage / rehabilitation of any rare or endangered species of flora and fauna, control of aquatic weeds, public health measures to control water or soil borne diseases, Restoration of land, seismological measures etc. The provisions shall be as per actual requirement.

17.4.12 Y- Losses on stock

The provision under this sub-head is generally made at 0.25% of the total cost of C-Works, J-Power Plant Civil Works and K-Buildings only.

17.5 Establishment

The provision under this head covers all the expenses/salaries of manpower of project developer deployed at project site, share of expenses of corporate office, audit and account charges etc. Establishment cost during construction of Pumped Storage Projects shall be as pernorms given below depending on concentration/ scatteredness of works, length of gestation period and other factors:

17.5.1 Definitions of Concentrated Works/ Scattered Works and Gestation Period:

- Concentrated Works –

  Dam/ Barrage/ Embankment/ Weir etc. and Power House located at different places involving HRT/ tunnels not more than 5 km in length or total approach road length not more than 10 km.

- Scattered Works –

  Dam/ Barrage/ Embankment/ Weir etc. and Power House located at different places involving HRT/ tunnels more than 5 km in length or total approach road length more than 10 km.

- Gestation Period (given in Concurrence Letter)

  - Projects involving construction period up to 6 years.

  - Projects involving construction period more than 6 years.

17.5.2 Norms for establishment cost for different slabs of cost of works of projects having **concentrated works and gestation period not more than 6 years** :

i). Civil Works:

Cost of Civil Works (I-B)	**Norms for Establishment cost of civil works**
Up to ₹ 750 Crores	8%
> ₹ 750 Crores up to ₹ 1500Crores	₹ 60.00 Crores plus 4.00% of cost exceeding ₹ 750 Crores
> ₹ 1500 Crores up to ₹ 3000 Crores	₹ 90.00 Crores plus 3.00% of cost exceeding ₹ 1500 Crores
> ₹ 3000 Crores up to ₹ 6000 Crores	₹ 135.00 Crores plus 2.00% of cost exceeding ₹ 3000 Crores
> ₹ 6000 Crores	₹ 195.00 Crores plus 1.00% of cost exceeding ₹ 6000 Crores

These norms would be termed as Basic Establishment Cost for Civil Works (BEC-C) for reference.

ii). E&M Works (¾ of norms of Civil Works):

Cost of E&M Works (Equipment cost with taxes & duties plus transport, handling & insurance and erection & commissioning)	**Norms for Establishment cost of E&M Works**
Up to ₹ 750 Crores	6%
> ₹ 750 Crores up to ₹ 1500 Crores	₹ 45.00 Crores plus 3.00% of cost exceeding ₹ 750 Crores
> ₹ 1500 Crores up to ₹ 3000 Crores	₹ 67.50 Crores plus 2.25% of cost exceeding ₹ 1500 Crores
> ₹ 3000 Crores up to ₹ 6000 Crores	₹ 101.25 Crores plus 1.50% of cost exceeding ₹ 3000 Crores
> ₹ 6000 Crores	₹ 146.25 Crores plus 0.75% of cost exceeding ₹ 6000 Crores

These norms would be termed as Basic Establishment Cost for E&M Works (BEC-E) for reference.

17.5.3 Norms for additional provisions of establishment cost in projects having **Scattered Works and/or Gestation Period more than 6 years** :

i). Civil Works :

- Scattered Works : Additional 1% of BEC-C per km for HRT/ tunnels length more than 5 km or total approach road length more than 10 km.
- Gestation Period more than 6 years : Additional 10% of BEC-C per year for the period more than 6 years.

ii). E&M Works :

- Gestation Period more than 6 years : Additional 7.5% of BEC-E per year for the period more than 6 years.

17.5.4 The charges for in-house Design and Engg. services shall be limited to 25% of Basic Establishment Cost (Civil and E&M).

Foreign consultancy shall be limited by in-house D&E ceiling and covered under sub-head "A-Preliminary" in addition to other provisions.

17.5.5 Establishment charges shall be supported by organization chart of manpower proposed to be deployed for the project execution/ implementation.

17.5.6 In case of EPC/ Turnkey mode of execution of project, the actual cost depending on the scope of EPC shall be shifted to works and balance shall be taken for Developers own Establishment. Since the decision regarding type of contract & scope of EPC is not known at the DPR stage, the same shall be adjusted as per actual at RCE stage/ completion cost stage.

17.6 Tools & Plants

The provisions under this head covers survey instruments, camp equipment, office equipment and other small tools. A token provision of ₹ 3-4 crores under this head may be adequate.

17.7 Suspense

The net provision under this minor head will be "NIL" as all the outstanding suspense accounts are expected to be cleared by adjustment to appropriate heads on completion of the project.

17.8 Receipts & recoveries on capital account

This head is meant to account for estimated recoveries by way of resale or transfer of temporary buildings and special T&P. Miscellaneous receipts like rentcharges of buildings, electricity charges etc. should also be accounted for under this head.

The recoveries on account of temporary buildings may generally be taken at 15% of the cost unless a higher recovery is anticipated due to some special reason such as tubular construction, vicinity to city/village/town industrial undertakingetc. Such special reasons should be indicated in the report. The recoveries on account of special T&P should be indicated as explained in the sub-head Q- Special T&P. Credit on account of resale of electrical installations, water supply fittings etc., after execution of the project, if anticipated, should also be shown under the head.

17.9 Indirect charges

17.9.1 The complete estimate for a project besides including all anticipated direct charges should further include the indirect charges, i.e. the amount required to cover the capitalisation of abatement of land revenue on the area occupied by the works. (Charges for capitalization of abatement of cost of land revenue are generally calculated at either 5% of the culturable land cost or 20 times of the annual revenue lost.

17.10 Power Plant and Electro – Mechanical System

17.10.1 The provisions under this head cover the Electro-mechanical equipment for the power plant, and associated substation under the sub-heads indicated in **Annex-E&M** "Abstract of Cost Estimates of Electro-Mechanical Equipment".

17.10.2 The provision should be realistic and be based on the current orders and latest market rates. The price levels stating month/year for which the rates are applicable should be indicated.

17.10.3 The cost may be indicated in foreign currency(ies) (fc) applicable for the imported equipment and in Indian rupees (INR) for indigenous Equipment . The total cost may be given as sum of Foreign Component (equivalent in INR) and Domestic Component (INR)

17.10.4 The GST, transportation & insurance, erection & commissioning, contingencies, establishment and T&P may be taken as per 'Abstractof cost estimates'. However, care may be taken that overheads likeestablishment, contingencies, etc. may not be repeated in cost of civil works.

17.10.5 The rate of GST, custom duty and freight & insurance may be taken as per prevailing rates at the time of submission of DPR/ Documents.

17.10.6 In case of mega hydroelectric projects, benefits if available as per the policy may be considered.

17.11 Cost of Miscellaneous Works:

The provisions under this head cover the Miscellaneous works (if any) under the sub-heads indicated in **Annex-Misc** "Cost Estimates of Miscellaneous Works".

The provision should be realistic and be based on the current orders and latest market rates. The price levels stating month/year for which the rates are applicable should be indicated.

The cost may be indicated in foreign currency(ies) (fc) applicable for the imported equipment and in Indian rupees (INR) for indigenous Equipment. The total cost may be given as sum of Foreign Component (equivalent in INR) and Domestic Component (INR). The GST, transportation & insurance, erection & commissioning, contingencies,establishment and T&P may be taken as per 'Abstractof cost estimates'. However, care may be taken that overheads like establishment, contingencies, etc. may not be repeated in cost of civil works.

The rate of GST, custom duty, freight & insurance may be taken as per prevailingrates at the time of submission of DPR/ Documents.

17.12 Cost of Transmission System Works (up to Pooling point):

The provisions under this head cover the Transmission System (up to Pooling point) under the sub-heads indicated in **Annex-TS** "Abstract of Cost Estimates of Transmission System works (up to Pooling point)".

The provision should be realistic and be based on the current orders and latest market rates. The price levels stating month/year for which the rates are applicable should be indicated.

The cost may be indicated in foreign currency(ies) (fc) applicable for the imported equipment and in Indian rupees (INR) for indigenous Equipment. The total cost may be given as sum of Foreign Component (equivalent in INR) and Domestic Component (INR). The GST, transportation & insurance, erection & commissioning, contingencies, establishment and T&P may be takenas per 'Abstract of cost estimates'. However, care may be taken that overheads like establishment, contingencies, etc. may not be repeated in cost of civil works.

The rate of GST, custom duty, freight & insurance may be taken as per prevailing rates at the time of submission of DPR/ Documents.

Chapter –XVIII ALLOCATION OF COST

18.1 The details in respect of allocation of cost for each component of the Multipurpose Project shall be based on the cost cleared by Technical Advisory Committee of MoJS. The details in this regard may be clearly spelt out under this Chapter.

18.2 In case of projects involving flood moderation, it may clearly be indicated whether the cost of flood moderation as cleared by CWC shall be borne by the concernedbeneficiary State/ MoJS/MoP.

Chapter –XIX ECONOMIC EVALUATION

19.1 Phasing of expenditure half yearly as per **Annex-2(c).**

19.2 Interest during construction (IDC)

19.3 Conversion Charges at Ex-Bus (with IDC)

19.4 Sale rate of energy including cost of input power (with IDC)

19.5 Sensitivity Analysis

19.6 Comparison of cost of generation with alternate source of generation in the State/Region

19.7 Project estimated cost and financial package summary shall be submitted as per **Annex-2(d).**

Calculations shall be carried out as per the tariff order of the Appropriate Regulatory Commission.

Suggestive Measures to Reduce to tariff of the project at DPR stage are attached at ***Appendix-3***

Chapter –XX FUTURE UTILISATION OF BUILDINGS (**Section 3.20)**

20.1 Details of buildings to be constructed to meet peak requirements of the project

20.2 Departmental requirement of buildings after completion of the project

20.3 Requirement of the buildings by other agencies

20.4 Utilization of surplus buildings

Chapter –XXI RECOMMENDATIONS

20.1 Economic justification of the project

20.2 Socio-economic and other benefits

2.7 Aspects to be appraised

i. Hydrology: An accurate assessment of the hydrology at the project site is required in on-stream and off-stream open loop pumped storage scheme to determine designed flood and diversion flood estimation for designing spillways, diversiontunnels etc.. Appraisal of the project hydrology includes water availability studies, design flood estimation, diversion flood estimation and sedimentation studies for estimating the life of the project.

ii. Hydro Power Planning: Power potential studies shall be carried out to determine the installed capacity, number and size of units, generating energy, pumping energy and cycle efficiency.General layout of the Scheme whether it fits into the overall basin development plan or not is also examined.

iii. Dam/ Embankment/ Barrage/ Weir etc. and Head Works: Design and safety of the dam/ embankment/ barrage/ weir etc. and appurtenant works are examined.

iv. Hydraulic Structures/ Hydel Civil Design: Techno- economic evaluation of water conductor system and power house comprising of intake, de-silting arrangement, head race tunnel, surge shaft, pressure shaft/ penstock, tailrace tunnel/ channel and the type/ layout and dimensions of the power house is made to ensure that the surveys and investigations carried to finalize the layout & designs are adequate, layout is optimum & is evolved after evaluation of various alternatives; project components are safe, planning & design has been carried out utilizing state of the art technology and relevant standards.

v. Geology: Geology of the project components is appraised to ensure that detailed geological mapping & geophysical surveys have been done, drilling/ drifting carried out and structural features viz. thrusts, folds/faults have been studied in detail to delineate problems during construction.

vi. Electro-Mechanical Design: Design & layout of turbine-generator sets, main step-up transformer, auxiliary equipment in the power house and switchyard / gas insulated switchgear room etc. are appraised.

vii. **Design of Transmission System (up to pooling point):** Design of transmission system (up to pooling point) is appraised.

viii. **Justification of the Project:** The Authority examines the need/ justification of the project from anticipated power demand (both energy and peak) and reasonability of tariff of energy generation.

ix. **Construction Material and Geotechnical aspects:** Appraisal of the quantity of the local construction material available at project site/ quarries and the properties of rock/ soil for foundation of the structures is carried out.

x. **Inter-State aspects:** The inter-State aspects are examined in consultation with CWC/ Ministry of Jal Shakti, which provide necessary suggestions to the Authority.

xi. **Clearance from Defense Angle:** If a pumped storage scheme involves defense aspects, clearance of the project from Ministry of Defense is required.

xii. **Clearance from MoEF&CC:** Development of Pumped Storage Schemes may have adverse impact on environment and ecology viz. deforestation, loss of bio-diversity including disappearance of rare species of animals and plants, soil erosion, faster rate of reservoir sedimentation, socio-economic implications, relocation andrehabilitation of people, increased seismic risk, change in aquatic system, climatic change, change in flow regimes downstream of the dam and outbreak of diseaseetc.

The Environment Impact Assessment and Environment Management Plans are to be prepared by the Generating Company / Project developer and submitted to MoEF&CC. The same are examined by MoEF&CC and cleared if found satisfactory. In case the project involves diversion of forest land, clearance is also required from forest angle from MoEF&CC under the Forest Conservation Act. For the schemes involving wild life sanctuary/ national park, recommendations/ approval of Indian Board of Wild Life is necessary.

Information on rehabilitation and resettlement aspects of the project viz. villages / families / persons affected, details of R&R Plan and its approval by MoEF&CC is also required.

Information on tribal population affected and status of clearance under Forest Rights Act/ from Ministry of Social Justice & Empowerment/ State Government is also necessary, if tribal population is affected.

Examination of Cost Estimates of Pumped Storage Projects is exempted from Concurrence Process. However, following additional aspects shall be submitted by project developer to the Authority within 60 days from date of uploading the DPR on CEA portal so as to ascertain the project cost in accordance with the limit specified by the Central government from time to time. It will not be vetted by CEA/CWC. If any project developer desires to get the cost estimates examined by CEA, the same will be examined by CEA in consultation with CWC in parallel to concurrence process

Additionally, the Cost of Enabling Infrastructure/ Flood Moderation etc. (wherever applicable), which can be availed as Grant from GoI , must be vetted from the respective appraising group (CEA/ CWC).The Project developer needs to get this cost vetted before the commencement of construction of the project.

xiii. Construction Methodology and Machinery: Appraisal of the construction methodology and equipment used in the project construction.

xiv. Cost Estimates

a) Cost Estimates of Civil Works: After the designs of various works are frozen, the quantities of various components of civil works are checked for correctness. Analysis of rate of main works like excavation, concreting, RCC works, stripping, filling, grouting etc. based on hourly use rates of equipmentis done and the estimated cost of civil works proposed in the DPR is finalized.

b) Cost of Electro-Mechanical Works: For appraisal of cost estimates of E & M Equipment/ Works, estimated cost is assessed based on cost data of similar equipment/ works in other projects for which concurrence have been accorded recently by CEA or orders have been placed recently or budgetary offers etc.

c) Cost of Miscellaneous Works: For appraisal of cost estimates of Miscellaneous Works, like security services, helicopter services, if required, setting up of one ITI, if required, etc., the estimated cost is assessed based on cost data of similar works/ services in other projects for which concurrencehave been accorded recently by CEA or orders have been placed recently or budgetary offers etc.

d) Cost Estimates of Transmission of Power and Communication Facilities (up to pooling point): For appraisal of cost estimates of Transmission of Power and Communication Facilities (up to pooling point), estimated cost is assessed based on Schedule of rates, cost data of similar equipment/ worksin other projects for which concurrence have been accorded recently by CEA or orders have been placed recently or budgetary offers etc.

xv. Construction Schedule: Activity-wise, item-wise and year-wise targets/ schedule of construction for each of the major components of works as per detailed PERT Chart are examined.

xvi. Financial and Commercial Aspects: Financing and financial analysis of the project including financial package, interest during construction, financial charges and tariff are examined.

2.7.1 For accord of Concurrence, the appraising groups in CEA/ CWC/ GSI/ CSMRS would examine following aspects/ chapters:

Sl. No.	Chapters/Aspects	Appraising Groups / Directorate/Division		
		CWC	CEA	OTHERS
Pre-DPR Stage				
1	Hydrological*	Hydrology	-	-
2	Geological	-	-	GSI
3	Foundation Engg. and Seismic	FE&SA	-	-
4	Power Potential	-	HPA/HPP&I	-
5	Project General Layout and Planning	HCD	HE&TD/ HPP&I	-
6	Construction Material & Geotechnical	-	-	CSMRS
7	Inter- State*	ISM	-	-
8	Design of Transmission Works up to Pooling Point	-	PSP&A	-
9	Dam/Barrage Design	CMDD/BCD	-	-
10	Gates / HM Design	Gates Design	-	-
11	Hydel Civil Design	HCD	-	-
12	E&M Design		HE&TD/ HPP&I	

*Note: Clearance of Water Availability Series is not required for Off-stream closed loop type PSPs. However, developer shall obtain the clearance of design flood from CWC for design of spillways.

Clearance of Inters-state Aspects is not required for Off-stream closed loop type PSPs and PSPs located in the states which don't have any downstream state.

Clearance on Instrumentation aspects is not required. For compliance with instrumentation, as per codal provisions, the developer shall submit an undertaking to incorporate the list of instruments (which will be issued separately by CEA).

Additionally, the Cost of Enabling Infrastructure/ Flood Moderation etc. (wherever applicable), which can be availed as Grant from GoI , must be vetted from the respective appraising group (CEA/ CWC).The Project developer needs to get this cost vetted before the commencement of construction of the project.

2.7.2 For pumped storage schemes, the Authority shall examine the technical viability consistent with the provisions of the Act.

2.7.3 If any project developer desires to get the cost estimates examined by CEA, the appraising groups in CEA/ CWC would examine following aspects/ chapters in parallel to concurrence process:

Sl. No.	Chapters/Aspects	Appraising Groups / Directorate/Division	
		CWC	CEA
1	BoQ of E&M Works		HE&TD
2	Cost of E&M and Misc Works		HPA
3	Phasing of E&M and Misc. works		HPA
4	Cost of Transmission Works up to Pooling Point		PSPA
5	Phasing of Transmission Worksup to Pooling Point		PSPA
6	Construction Power aspects		HPA
7	Plant Planning	CMC	
8	Civil quantities		CD
9	Construction Schedule		CD
10	Civil Cost	CA–HWF	
11	Phasing of Civil Works		CD
12	Financial & Commercial aspects		F&CA

2.8 Early Excavation:

Permission to start early excavation may be granted by CEA only after finalization of layout of the project by CEA/CWC/GSI/ CSMRS after geological investigations are completed by the project developer. Further, there shall be no adverse comments of appraising groups on geology/ design aspects of the project for issuing permission for early excavation. Excavation works for buried penstock, surface power house, foundation for Dam/ Embankment are only covered under the permission for early excavation. No other construction activities including any underground works are to be allowed prior to concurrence.

Project Developer shall apply to CEA for permission to start early excavation prior to concurrence of CEA. CEA shall grant permission for early excavation subject to following conditions:

i) Any excavation work carried out prior to CEA concurrence is at the cost and consequence risk of the developer

ii) Project developer would intimate the date of start of early excavation activities

iii) Project developer would be solely responsible for loss of men and material, if any.

iv) Due permissions/ clearances from all concerned authorities shall be obtained by project developer before carrying out any excavations. Necessary safety and support measures required during excavation shall be ensured by project developer.

v) The project site would be restored to its original condition by project developer, in case the project is abandoned for any reason, whatsoever, at a later date.

vi) Developer shall provide access to the officers of CEA/CWC/GSI/ CSMRS to verify whether activities carried out by developer are restricted only to works allowed under the permission for early excavation.

Annex –1(a)

List of relevant Documents/ References

1. The Electricity Act, 2003.
2. The Companies Act, 2013.
3. Forest Conservation Act, 1980 and Notifications/Resolutions by MoEF&CC.
4. "Guidelines for preparation of DPRs of Irrigation and Multipurpose Projects" issued by CWC.
5. "Guidelines for preparation of project estimates for major irrigation and multipurpose project" issued by CWC.
6. National Electricity Plan notified by CEA
7. Indian Electricity Sector – Widening Scope for Private Participation-Issued by Ministry of Power.
8. Policy on Hydro Power Development issued by Ministry of Power
9. Guidelines for "Investigation of major irrigation and hydro-electric projects" issued by CWC.
10. Guidelines for Investigations and Explorations required at Detailed Project Report stage of Proposed Hydroelectric Project in Himalayan Terrain.
11. CBIP – Technical Report No.19 "Life of Reservoir (1977)"
12. IS 5497 : Guide for topographical surveys for river valley projects
13. IS 4890 : Method for measurement of suspended sediment in open rivers
14. IS 13216 : Code of practice for geological explorations for reservoir sites.
15. IS 4186 : Guide for preparation of project report for river valley projects.
16. IS 4877 : Guide for preparation of Estimate for River Valley Projects.
17. IS 5477 (Part 1-4) : Methods for fixing the capacities of reservoirs.
18. IS 6939 : Method for determining evaporation from reservoirs.
19. IS 7323 : Guidelines for operation of reservoirs.
20. IS 13028 : Guidelines for overall planning of river basin.
21. IS 7560 : Guidelines for allocation of cost among different purposes of river valley projects.
22. IS 4247 : Code of practice for structural design of surface hydel power stations.
23. IS 12837 : Guidelines for selection of hydraulic turbines for medium and large hydro-electric power houses
24. IS 12800 : Guidelines for selection of turbines preliminary dimensioning & layout of surface hydroelectric power houses.
25. IS 10635 : Freeboard requirement in Embankment dams- Guidelines
26. IS 12169 : Criteria for small Embankment Dams
27. IS 9429 : Drainage system for Earth & Rockfill Dams
28. IS 8237 : Code of practice for protection of slope for Reservoir Embankment
29. IS 7894 : Code of practice for Stability analysis of Earth dams
30. IS 8826 : Guidelines for Design of large earth and Rockfill Dams
31. IS 11293 : Guidelines for design of Grout curtains
32. IS 8414 : Guidelines for Design of Under-seepage control measures for Earth and Rockfill dams
33. IS 6066 : Pressure Grouting of Rock foundations in River Valley Projects Recommendations

34. IS 11293 : Guidelines for design of Grout curtains
35. IS 12182 : Guidelines for Determination of effects of sedimentation in planning and performance of Reservoirs
36. IS 6512 : Criteria for Design of solid Gravity dams
37. IS 10137 : Guidelines for selection of spillways and energy dissipators
38. IS 7365 : Criteria for hydraulic design of bucket type energy dissipators
39. IS 11223 : Guidelines for fixing spillway capacity
40. IS 6934 : Recommendations for hydraulic design of high ogee overflow spillways
41. IS 5186 : Design of Chute and side channel spillways
42. IS 11527 : Criteria for Structural design of energy dissipators and spillways
43. IS 12966 : Code of Practice for Galleries and other openings in Dams
44. IS 13551 : Structural design of Spillway pier and crest- Criteria
45. IS 12720 : Criteria for structural design of Spillway training walls and Divide walls
46. IS 10135 : Code of practice for Drainage system for Gravity dams, their foundation and abutments
47. IS 11772 : Design of drainage arrangements of Energy dissipators and training walls of Spillways- guidelines
48. IS 11485 : Criteria for hydraulic design of Sluices in concrete and Masonry dams
49. IS 7720 : Criteria for investigation, planning and layout of Barrages and Weirs
50. IS 6966 : Hydraulic design of Barrages and Weirs-Guidelines
51. IS 11130 : Criteria for Structural design of Barrages and Weirs
52. IS 13623 : Criteria for choice of Gates and Hoists
53. IS 10210 : Criteria for design of hydraulic hoists for Gates
54. IS 5620 : Recommendations for structural design criteria for low head Slide Gates
55. IS 6938 : Design of Rope drum and Chain hoists for Hydraulic Gates-Code of practice
56. IS 11855 : Guidelines for Design and use of different types of rubber seals for hydraulic gates
57. IS 13591 : Criteria for design of Lifting beams
58. IS 15466 : Rubber seals for Hydraulic gates
59. IS 4623 : Recommendations for structural design of Radial Gates
60. IS 4880 : Code of practice for Design of tunnels conveying water
61. IS 9761 : Hydropower Intakes- Criteria for Hydraulic design
62. IS 5878 : Code of practice for construction of tunnels
63. IS 4721 : Code of practice for Drainage and dewatering of Surface/Underground Hydroelectric Power stations
64. IS 9120 : Guidelines for Planning, layout and design of cavities in Underground Hydroelectric Power stations
65. IS 7916 : Open Power channels- code of practice
66. IS 4720 : Code of practice for ventilation of Surface Hydel Power stations
67. IS 7396 : Criteria for hydraulic design of surge tanks
68. IS 12967 : Analysis of hydraulic transients in Hydroelectric and pumping plants- Code of practice
69. IS 11625 : Criteria for hydraulic design of Penstocks
70. IS 10430 : Criteria for Lined canals and guidance for selection of type of Lining

Note: The above listed documents are available either free or as priced documents from the concerned Govt. Department / Agencies/ Govt. publishers. Latest versions of the above references may be referred.

Annex – 1(b)

Checklist of Documents required for examination/ vetting of various aspects of DPRs of Pumped Storage Projects (PSPs)

Stage 1: Checklist for Layout Finalization Chapters:

S.No.	Chapter	
1.	Power Potential Studies (HPA)	
2.	Geological aspects (GSI) Stage-I	
3.	General Layout Aspects	Hydel Civil Design aspects (HCD)
		Dam/Barrage Design aspects (CMDD/Embankment/BCD)
		E&M Design (HE&TD)

Stage 2 : Checklist for Pre-DPR Chapters:

S.No.	Chapter
1.	Hydrology (Hydrology Dte.)#
2.	Geological aspects (GSI) Stage-II
3.	Foundation Engineering and Seismic Aspects (FE&SA)
4.	Construction materials Aspects (CSMRS)
5.	Inter-State Aspects (ISM-Dte.) #
6.	Transmission System (PSPA)
7.	Dam/Barrage Design aspects (CMDD/Embankment/BCD)
8.	Gates / HM Design (Gates design Dte.)
9.	Hydel Civil Design Aspects (HCD)
10.	E&M Design (HE&TD)

Note: Clearance of Water Availability Series is not required for Off- stream closed loop type PSPs. However, clearance of design flood from CWC shall be obtained by the developer for the purpose of design of spillways.

Clearance of Inters-state Aspects is not required for Off- stream closed loop type PSPs and PSPs located in the states which don't have any downstream state.

Checklist for DPR Chapters:

S. No.	Chapter
1.	Construction Power Aspects
2.	Bill of Quantities of Civil & HM works
3.	Construction Program and Plant Planning aspects
4.	Construction Schedule
5.	Cost of Civil &HM works
6.	Cost Estimates of Electro-mechanical works
7.	Financial and Commercial Aspects
8.	Legal Aspects

Stage 1: Checklist for Layout Finalization Chapters:

1. Power Potential Studies Chapter:

Sl. No.	Description	Remarks (Yes/ No/ Not Applicable)
1	MoU/ MoA with State Government	
2	Letter of Confirmation of Levels (FRL & TWL) from state government for reservoirs located on rivers/ streams/ perennial nallah	
3	Operating levels (FRL & TWL) of Upstream & downstream projects to reservoirs on rivers/ streams/ perennial nallah, if any	
4	Terms of reference issued by MoEF&CC for preparation of EIA/ EMP report, if any	
5	Letter of allotment of water from State Government for first time filling of the reservoirs and recoupment of losses	
6	Area-elevation-capacity curve of both reservoirs	
7	Operating levels of existing reservoirs, if any	
8	Operating Rule Curve of the existing reservoir in case the reservoir is multipurpose reservoir	
9	Tentative efficiency of the Turbine-Generator set and Pump- Motor set	
10	Tentative head losses in water conductor system of the project in both generating and pumping modes	
11	Tentative cost at completion level and tentative levelized tariff	
12	Tentative salient features of the project	
13	Google Map / Earth – KMZ files and Digital Elevation Model (DEM) showing layout/ overview of the project	
14	Excel sheets for optimization of reservoir capacities and Power Potential Studies of the project	

2. Geological Chapter Stage-I:

Sl. No.	Geological inputs	Remarks (Yes/ No/ Not Applicable)
A. Map/Plan/layout and geological sections		
1	Topographical Map/ Base Map of SOI (Scale 1:50,000) of area for reference of location along with layout of studied alternatives for project.	
2	River Basin Map showing locations of existing and all identified hydro projects including PSPs immediately upstream and downstream of the present proposed project.	
3	Regional Geological Map of GSI (Scale 1:50,000) of area with layout of studied alternatives for project.	
4	Seismotectonic Map of area prepared by GSI.	
5	Lineament Map and Geomorphological Map (Scale 1:50,000).	
6	Landslide Susceptibility Map (Scale 1:50,000) of area prepared by GSI, specially for Hilly regions if available.	
7	Detailed Geological map (Scale 1:10,000) with layout of alternatives studied.	
8	Tentative geological sections along proposed Dam/Barrage/Embankment axis, Water conductor system, longer axis of powerhouse cavern or surface powerhouse pit, construction adits, assess tunnels etc. on the basis of surface geology. The scale of geological sections will depends on scale of detailed mapping carried out for proposed structures at this stage.	
9	Geological exploration plan.	
10	Geological plan with locations of quarries identified for construction material and cross sections of quarries for construction material.	
Note	The maps and geological sections should be legible, have bar scale also and be produced at true scale.	
B. Text Part of Geological aspect/chapter		
1	The geological aspect/chapter of report (to be discussed in 1st consultation meeting at CEA) may contain: Introduction,	
2.	Location & accessibility to the Project area,	
3.	Regional geological set up,	
4.	Seismicity of the area,	
5.	Alternatives considered or studied with table of comparison between alternatives including all aspects of study,	
6.	Previous work carried out at site, if any,	
7.	Project site Geology (in reference to the traverses taken and detailed mapping),	
8.	Subsurface exploration (if any at this stage),	
9.	Geological and geotechnical appraisal of all proposed project components (based on maps and data available, sections prepared at this stage and subsurface explorations, if any), including geological vulnerable features likely to be encountered at the project site, stereoplots in terms behaviour of discontinuities assessed and orientation of proposed structures.	

10.	Proposals or plan worked out for sub-surface explorations by way of boreholes to be drilled, drifts to be made etc., and to assess engineering properties of rock mass by way of in-situ and laboratory tests etc.	
11.	Availability of construction material (may be discussed adequately at this stage)	
12.	Conclusions and Recommendations. Note: The salient features of the project may be attached as annexure in last of the chapter.	

3. General Layout Aspects:

I. Hydel Civil Design aspects (HCD):

S. No.	Description	Hard copy	Soft copy	Remarks (Yes/ No/ Not Applicable)
1	Topographical survey of project area covering all components in each alternative in scale not exceeding 1:5000	A2 size	PDF	
2	Alternative Layout Studies should necessarily include : i. Brief discussion on various alternative layouts (including water conductor system / powerhouse complex) ii. Preliminary designs/analyses/discussions related to dimensioning/location of structural components (such as diversion structure, intake, desilting chambers, tunnels, pressure shafts / penstocks, surge arrangement and transient analysis, powerhouse complex, reservoir filling mechanism etc) in each of the alternative which is impactful in deciding a layout. iii. Techno-economic comparison of all the alternatives clearly indicating major differences in salient features, their pros and cons along with tentative cost and tariff shall be provided and included in the report. iv. Layout/s proposed for Phase-I investigations clearly mentioned in report with justification	A4 size	PDF and/or Excel	
3	Drawings related to Alternative Layout Studies: i. Surface geological mapping for all alternatives as per the scale indicated by GSI (geological L-section) ii. Layout with all alternatives marked on the contour plan (contour interval not exceeding 5 m) and L-section of all alternatives	A2 size	PDF	Information available at Sl no. 2.A.3, 2.A.7 & 2.A.8
4	Salient Features of the layouts proposed for Phase I investigations	A4 size	PDF	
5	Detailed Investigation plan for layouts proposed for Phase I investigations	A2 size	PDF	Information available at Sl no. 2.A.9
6	For Layouts proposed for Phase I investigations, discussion based on geological surface mapping with specific emphasize to location of various components	A4 size	PDF	Information available at Sl no. 2.A.8
7	For layouts proposed for Phase-I investigations, preliminary design calculations, analyses and discussions should necessarily include the following: i. Head loss calculations for both generation & pumping mode ii. Hydraulic design (including submergence) of both intakes (upper and lower) and their trash rack	A4 size	PDF & excel	

	iii. Economical diameter calculations for HRT, TRT & pressure shaft considering both mode of operations iv. Hydraulic transient studies for all modes of operations for complete water conductor system which clearly brings out the requirement and dimensioning of proposed surge arrangements (surge shaft, orifice, surge caverns etc.). In case of multiple surge tanks, surge studies should include the stability of the system v. Hydraulic design of approach channel & tail race channel for all modes of operation vi. Steel liner designs vii. Powerhouse dimensioning and orientation viii. Rock (vertical and lateral / minimum) cover requirements for HRT, TRT, pressure tunnels, surge shafts/caverns, UG powerhouse complex ix. Designs/discussions related to silt management/desilting mechanism (if required)	A4 size	PDF and software file	
	x. Discussions/designs related to first filling of reservoir, if applicable	A4 size	PDF and software file	
	xi. Layout specific 2D analyses for powerhouse caverns and tunnels for weak rockmass/shallow cover	A4 Size	PDF and software file	
	xii. Layout specific preliminary Wedge analysis for tunnels & caverns as per expected joint properties of rockmass	A4 Size	PDF and software file	
	xiii. Layout specific stability analyses for extensive slopes (intakes, surface powerhouse, outfalls) as per the expected rockmass			
8	For layouts proposed for Phase-I investigations, drawings (indicating NSL/rockline/chainages/ dimensions etc) should necessarily include the following: i. General project layout including adits ii. Plan and L-section of Intake and Trash Rack Structure (upper and lower) iii. L-section of water conductor system iv. Plan and L section of surge shaft/cavern v. Representative drawings of rock support systems in surge shaft/cavern, HRT, TRT vi. L-sections, plans at various levels and cross sections of Powerhouse/Transformer Caverns vii. Slope stabilization at backslopes of intake and surface powerhouse viii. Plan and L-section of TRT Plan and L-section of Desilting Structures (if applicable) ix. Plan and L-section of Approach Channel and Tail Race Channel x. Layouts showing arrangements for first filling of reservoir as applicable	A2	PDF	

If developer preferred layout/s undergoes any change, developer shall revise and re-submit the calculations, drawings, salient features unless otherwise waived off by the appraising agency due to change being inconsequential.

All relevant provisions of IS codes/Guidelines/established practices may be followed at the time of preparation of PFR.
Above list may not be treated as exhaustive and appraisal agency may request the developer for additional details, if required.

II. Dam/Barrage Design aspects (CMDD/Embankment/ BCD):

Sl. No.	Description	Remarks (Yes/ No/ Not Applicable)
1.	Alternate studies on locations of upper and lower reservoirs	Information available at Sl no. 3.I.2
2.	Alternate studies on type of dams for both upper and lower reservoir	
3.	Fixation of various levels – FRL, MDDL, MWL and Top of the Dam along with Freeboard calculations.	
4.	Alternate plans/ Planning of Spilling arrangement , reservoir drawdown (Empty) etc.	
5.	Planning of Diversion Arrangement	
6.	Hydrological studies duly approved from HSO, CWC	
7.	Approval of GSI for layout clearance	
8.	Geological Mapping and Geological Plans & Cross sections of Dams based on Geological mapping.	
9.	Proposed Investigations Plan including Reservoir Rim Studies and water tightness.	
10.	i. Water allocation approval ii. Initial filling plan iii. Distance between existing reservoir to proposed reservoir on the same nala/ stream reach, river as per applicable Guidelines	

III. E&M Design (HE&TD):

Sl. No.	Description	Remarks (Yes/ No/ Not Applicable)
1.	General Layout Plan	
2.	Layout of all floors of Power House	
3.	Type of PSP (On-stream/Off stream)	
4.	Type of Machine (Fixed/Variable)	
5.	Head losses in water conductor system of the project both in Generation and Pumping Mode	Information available at Sl no. 3.I.7
6.	Operating water levels of Upstream & downstream reservoirs including Highest Flood Level (HFL) in case of Off stream (Open loop) / On-stream	
7.	Power House Dimensioning calculations as per relevant IS	
8.	Single Line Diagram.	
9.	Efficiency of the Turbine, Generator & Pump and Motor along with Cycle efficiency calculation	
10.	Write-up on all E&M Equipment and their ratings (including Electrical and Mechanical auxiliaries)	

Stage 2 : Checklist for Pre-DPR Chapters:

S.No.	Chapter
1.	Hydrology (Hydrology Dte.)
2.	Geological aspects (GSI) Stage-II
3.	Foundation Engineering and Seismic Aspects (FE&SA)
4.	Construction materials Aspects (CSMRS)
5.	Inter-State Aspects (ISM-Dte.)
6.	Transmission System (PSPA)
7.	Dam/Barrage Design aspects (CMDD/Embankment/BCD)
8.	Gates / HM Design (Gates design Dte.)
9.	Hydel Civil Design Aspects (HCD)
10.	E&M Design (HE&TD)

1. Hydrology aspects:

Sl. No.	Description	Remarks (Yes/ No/ Not Applicable)
1	Location coordinates of the storage structures	
2	Google Earth KMZ files or shapefiles showing layout/ overview of the project, catchment area and water spread area.	
3	Rainfall data of nearest rainfall station (preferably more than one, if available).	
4	Salient features such as gross capacity, live storage capacity, height of the dam, FRL, MDDL, river bed level, elevation area capacity curve, silt rate, etc.	
5	Detailed calculation (with source of data mentioned) for water availability used in the analysis.	
6	Detailed calculation (with source of data mentioned) for design flood study used in the analysis.	
7	Detailed calculation (with source of data mentioned) for evaporation study used in the analysis.	
8	Detailed calculation (with source of data mentioned) for diversion flood (if any) used in the analysis.	
9	Detailed calculation (with source of data mentioned) for sedimentation study used in the analysis.	
10	New zero elevation	

All the calculations may be submitted in hard copy and soft copy.

2. Geological Chapter Stage-II:

Sl. No.	Geological inputs	Remarks (Yes/ No/ Not Applicable)
A. Map/Plan/layout and geological sections		
1	Topographical Map/ Base Map of SOI (Scale 1:50,000) of area for reference of location along with layout of studied alternatives for project.	
2	River Basin Map showing locations of existing and all identified PSPs and HEPs immediately upstream and downstream of the present proposed project.	
3	Regional Geological Map of GSI (Scale 1:50,000) of area with layout of finally selected alternative for project.	
4	Seismotectonic Map of area prepared by GSI.	
5	Lineament Map and Geomorphological Map (Scale 1:50,000).	
6	Landslide Susceptibility Map (Scale 1:50,000) of area prepared by GSI, specially for Hilly regions if available.	
7	Detailed Geological map (Scale 1:10,000) with layout of all alternatives.	
8	Detailed Geological map (Scale 1:2000/1:1000) of major project components of final selected layout i.e, Reservoirs, WCS, PH, Surge shaft/TRT/TRC and axillary tunnels etc.	
9	Geological sections along proposed Dam/Barrage/Embankment axis, Water conductor system, longer axis of powerhouse cavern or surface powerhouse pit, construction adits, assess tunnels etc. on the basis of surface and subsurface sub-surface investigations. The scale of geological sections will depend on scale of detailed mapping carried out	

	for proposed structures.	
10	Geological exploration plan.	
11	Geological maps and sections of quarries identified for construction material.	
Note	The maps and geological sections should be legible, have bar scale also and be produced on true scale.	
B. Text Part of Geological aspect/chapter		
1	The geological aspect/chapter of report may contain: Introduction,	
2	Location & accessibility to the Project area,	
3	Regional geological set up,	
4	Seismicity of the area,	
5	Alternatives considered or studied with table of comparison between alternatives including all aspects of study,	
6	Previous work carried out at site, if any,	
7	Project site Geology (in reference to the traverses taken and detailed mapping),	
8	Subsurface exploration: It should incorporate geological logs of bore holes along with permeability data, logs of trenches and pits, 3-D geological logs of drifts, if any, geophysical survey etc	
9	Reservoir competency studies in case of natural slopes surrounding the reservoir along with maps and sections.	
10	Geological and geotechnical appraisal of all proposed project components (based on surface and sub-surface investigations carried out), including geological vulnerable features likely to be encountered at the project site, analysis of Geological Structural Data, stereoplots in terms behaviour of discontinuities assessed and orientation of proposed structures.	
11	Engineering properties of rock mass by way of in-situ and laboratory tests etc.	
12	Availability of construction material (to be discussed adequately),	
13	Conclusions and Recommendations. NOTE: 1. Any other study report carried out by the developer during the appraisal of S & I stage etc. 2. The salient features of the project may be attached as annexure in last of the chapter.	

3. Foundation Engineering and Seismic Aspects:

Sl. No.	Description	Remarks (Yes/ No/ Not Applicable)
1	Plan showing different alternatives of the project and rationale behind selecting a particular alternative.	Information available at Sl. no. 2.B.5
2	Salient features of the proposed project including the existing projects, if any.	Information available at Sl. no. 2.B.12
3	General geology of the project area along with geological maps as per the BIS codes.	Information available at Sl. no. 2.A.3
4	Proposed geological investigation plan during pre-DPR stage and complete investigation report in the DPR.	Information available at Sl. no. 2.A.10, 2.A.9 & 2.B.8
5	After finalization of the axis and layout of the project, the project authority may submit the site-specific seismic design parameters report as per the NCSDP guidelines to FE&SA directorate for its appraisal (in-house as well as from members of NCSDP) and further approval from NCSDP.	
6	Report on assessment of GLOF at the project location, if any. (For Himalayan region)	

4. Checklist of documents, studies, and other necessary information to be included in the Pre-DPR chapter of Construction materials of Pumped Storage Projects.

The developer shall invariably provide a brief write up on project features, type of dam, dam components, geology of the area, summary of bore hole logging data etc.

Concrete

1. Report the estimated requirement of coarse aggregate (i.e wearing and non-wearing surfaces) and fine aggregate (i.e natural and crushed) for making concrete based on IS 383: 2016(Reaffirmed 2021). The requirement of concrete shall be evaluated based on available design of various structural components of the proposed project.
2. Report identified quarries viz. rock, river bed materials etc., and marked the following details in the location plan:
    - Geological Mapping of the area
    - Location of quarries and designation
    - Lead from the project site
    - Quarry area acquired for production of aggregate
    - Availability of aggregate after considering losses as per CWC guidelines (i.e 38% extra)
    - Number of representative samples collected from each quarry with designation.
    - If another project proposed to use the same quarry then provide the allocation.
3. All the representative samples shall be tested for its physical and mechanical properties as per IS/ASTM standards. The following test results shall be submitted for review:

    Coarse Aggregate

    a) Specific gravity
    b) Water absorption

c) Aggregate Crushing Value
d) Aggregate Impact Value
e) Aggregate Abrasion Value
f) Soundness
g) Potential alkali silica reactivity test (Mortar Bar Method as per ASTM C 1260) /Alkali carbonate test
h) Petrographic Examination

Fine aggregate

a) Sieve analysis (Fineness Modulus, Zone)
b) Materials finer than 75-micron
c) Organic impurities
d) Specific gravity
e) Soundness
f) Potential alkali silica reactivity test (Mortar Bar Method as per ASTM C 1260) /Alkali carbonate test.
g) Petrographic Examination

4. Report the muck material availability and usable aggregates produced. The complete investigation of the excavated material at this stage is not possible; hence project authorities shall keep excavated material as standby at this stage. During the construction, excavated material generated must be thoroughly investigated as per relevant standards for finding its suitability and also comply with the specification requirements of IS 383: 2016 (Reaffirmed 2021) before use in the project.
5. Number of representative samples shall be as perIS: 2430 (Methods for sampling of aggregates for concrete) or at least two samples from geological discernible strata from the quarry area considered for production of aggregate.
6. Identify source of mixing and curing water. The following tests shall be carried as per IS: 3025 /IS: 456 and test results shall be submitted for review.

a) Acidity
b) Alkalinity
c) Organic
d) Inorganic
e) Sulphates (as SO3)
f) Chlorides (as Cl)
g) Suspended Matter
h) pH Value

Rock

Geological explorations shall be carried out for gravity dams and overflow structures in order to evaluate geological and geo-mechanical characteristics of dam foundations and abutments, as per guideline laid down in IS: 15662
Further below mentioned laboratory and field tests are required in general to evaluate the DPR. The type and nature of test shall depend upon the project features and number of samples shall depend on nature of rock encountered.

Laboratory Tests

- Unconfined compressive strength (IS 9143)

- Modulus of elasticity and Poisson's ratio (IS: 9221)
- Density. Specific gravity and water absorption. (IS:13030)
- Slake durability index (IS: 10050)
- Shear and compressional ultrasonic velocities (IS:10782)
- Shear strength of infilling material
- Swelling pressure index
- Joint stiffness test
- Shear strength parameters cohesion 'c' and angle of friction 'ϕ' of intact rock (IS: 13047)
- Tensile strength of intact rock (IS:10082)
- Point Load strength index (IS: 8764)

In-Situ Test (in the drift or trench at foundation level)

- Shear strength parameters (cohesion and friction angle) of rock mass, discontinuities and interfaces. (IS:7746)
- Modulus of deformation (IS: 7317) either by plate loading tests or by Goodman jack / borehole jack tests on rock mass.
- Seismic wave velocity
- Bearing capacity test

For Underground Structures like Tunnels, shafts and Powerhouse etc.

- In-situ stresses (Principal Stresses)-Magnitude and direction (in drill hole)
- Stress-deformation properties: May be carried out during pre-construction stage in case of rock cover exceeding 50m and in good quality rocks.
- Geophysical tests like seismic refraction, electrical resistivity imaging, crosshole tomography etc wherever necessary depending upon site specific conditions.

In addition to above tests the following tests shall be conducted

- Permeability and groutability tests (IS: 5529 and IS: 6066)

<u>Soil</u>

Depending upon the type of the structure, soil investigations are to carried out in respect of foundation of the dam and appurtenant structure and borrow area investigations for the use of soil as constructional material of embankment, coffer dam and other related structures

Foundations Investigations:-

- Bore hole log should consists information on water table, description of strata, soil classification, Log, size of hole, sample details (sample depth, sample type, field no, etc.). Permeability values and SPT values.
- Mechanical Analysis - IS: 2720-4
- Atterberg Limits - IS:2720-5
- Classification - IS:1498
- Insitu Density and natural Moisture Content - IS:2720-29
- Specific Gravity - IS:2720-3
- Triaxial Shear (Consolidated Undrained - With pore water pressure measurement) - IS:2720-13
- Direct Shear test (Soil) - IS:2720-13

- Direct Shear test (Soil containing Gravel) - IS:2720-39
- One Dimensional Consolidation - IS:2720-15
- In-situ Permeability - IS 5529-2
- Standard Penetration Test - IS:2131
- Soil Dispersivity Identification Tests
  - Crumb Test - (ASTM D6572)
  - SCS Double Hydrometer Test - (ASTM D4221)
  - Pin Hole Test - (ASTM D4647)
  - Pore Water Extract Analysis - (ASTM D4542)
- Chemical Analysis
  - pH - IS: 2720-26
  - Total Soluble Salts - IS:2720-21
  - Calcium Carbonate - IS:2720-23
  - Water Soluble Sulphate - IS:2720-27
  - Water soluble Chlorides
  - Organic Matter. - IS:2720-22

The geotechnical investigations shall comply all requirements of IS: 1892.

Borrow Area Investigations:-

The borrow area investigations shall be carried out on soil as construction material for the proposed embankment, coffer dam and other allied structures as per relevant BIS standards.

- Mechanical Analysis - IS:2720-4
- Atterberg Limits - IS:2720-5
- Differential Free Swelling Index - IS:2720-40
- Shrinkage Limits - IS:2720-6
- Standard Proctor Compaction - IS:2720-7
- Specific Gravity - IS:2720-3
- Triaxial Shear (Consolidated Undrained With pore water pressure measurement) IS:2720-13
- One Dimensional Consolidation - IS 2720 - 15
- Laboratory Permeability (Soils) - IS:2720-17
- Laboratory Permeability (Soil containing Gravel) - IS:2720-36
- Direct Shear test (Soil) - IS:2720-13
- Direct Shear test (Soil containing Gravel) - IS:2720-39
- Unconfined Compressive Strength - IS:2720-10
- Soil Dispersivity Identification Tests
  - Crumb Test - (ASTM D6572)
  - SCS Double Hydrometer Test - (ASTM D4221)
  - Pin Hole Test - (ASTM D4647)
  - Pore Water Extract Analysis - (ASTM D4542)
- Chemical Analysis
  - pH - IS 2720-26
  - Total Soluble Salts - IS:2720-21
  - Calcium Carbonate - IS:2720-23
  - Water Soluble Sulphate - IS:2720-27

- Water soluble Chlorides
- Organic Matter. - IS:2720-22

In addition, the construction material should satisfy the requirement of IS: 1498

Filter Material Investigations:
The filter material should be tested as per relevant BIS standards as below and shall satisfy the requirement of IS: 9429.

- Mechanical Analysis - IS:2720-4
- Atterberg Limits - IS:2720-5
- Relative Density - IS:2720-14
- Filtration Media-Sand and Gravel - IS:8419-1
- Filter Analysis - IS:9429

Rockfill

International Commission on Large Dams (ICOLD):

As per the guidelines of International Commission on Large Dams (ICOLD), large dams are classified based on the height of dam, reservoir capacity, quantity of construction material and dam length. If the height of dam is 15.0 m or more, it is mandatory to carry out the field and laboratory investigations on rockfill materials for finding their suitability to use in the construction of proposed rockfill structures viz. guide bunds, dykes, coffer dams, dams etc.

National Register for Large Dams 2019 prepared by CWC:

As per the National Register for Large Dams 2019 prepared by CWC, if the height of above rockfill structures vary from 10.0 m to 15.0 m, investigations on rockfill materials are required as per the following criteria:

i. Length of crest of the dam is not less than 500 metres OR
ii. Capacity of the reservoir formed by the dam is not less than one million cubic metres OR
iii. The maximum flood discharge dealt with by the dam is not less than 2000 cubic metres per second OR
iv. The dam has specially difficult foundation problems OR
v. The dam is of unusual design

To study and understand the stress-strain-volume change behavior, evaluation of shear strength parameters and deformability & permeability characteristics of rockfill materials which are very important for the safe and economical design of the proposed rockfill structures, following field and laboratory tests/investigations are to be conducted on rockfill materials.

- Field grain size distribution test to evaluate an average prototype grain size distribution curve. Derivation of modeled gradation curves and determination of quantities of various fractions of modeled rockfill material required for laboratory testing.
- Relative density test for determining the minimum and maximum dry densities.
- Large size triaxial shear tests to study the stress-strain-volume change behaviour and evaluate the shear strength parameters i.e. angle of shearing resistance, □ and cohesion, c required for designing the proposed dams.

5. Inter-State Aspects:

Sl. No.	Description	Remarks (Yes/ No/ Not Applicable)
1.	Exact location like (latitude & longitude), Taluka, Districts, State of the reservoirs.	
2.	Name of the river and river basin (inter-State or intra-State) where proposed PSP/HEP is located.	
3.	State / countries traversed by the river.	
3A.	Legible copy of Index Map of the proposed PSP/HEP showing reservoirs, Power house location, name of the river and inter-State River basin and inter-State boundary (if it is nearby).	
4.	Distribution of catchment in States / countries and yields from the catchment of the State / country concerned.	
5.	Are there any International/ Inter-State issues involved'? If so, have these issues been identified and present status of agreement or tribunal decision indicated specially in respect of (a) Sharing of water (b) Sharing of cost (c) Sharing of benefits (irrigation, flood control, power etc.) (d) Acceptance of the submergence by the upstream state(s) (e) Acceptance by the upstream state(s) of compensation of land coming under submergence (f) Settlement of oustees (g) Any other NOTE:- If there is no agreement state the present position against each of the above item.	
6.	Effect of the following on project & of the project on the following: (a) Interstate/International agreement on sharing of waters, sharing the benefits and costs, acceptance of submergence in the upstream state(s)/ country(s) etc., if any. (b) Inter-State / International adjudication, if any. (c) Inter-State / International aspect of territory, property, etc. coming under submergence, project affected people, rehabilitation, compensation, etc. Prior concurrence of other country(ies) /other State(s) where territory/property is affected by the project should be obtained and appended in the DPR. (d) Existing and sanctioned projects (to the extent the information on existing & sanctioned projects can be obtained with reasonable efforts). (e) Any other aspect of the project involving Interstate/International problems.	
7.	Existing riparian use, quantum of water presently utilised, commitments for ongoing projects, plans for future development, balance share of the State/country and proposed utilisation by this project. (Discuss relevant items both for upstream and downstream usages).	
8.	Whether operation and regulation of the project conform to the stipulation made in the Tribunal award/agreement and also the mechanism for such operation.	
9.	In case of addition/alterations for existing project involving submergence in other States and additional utilisation of water, concurrence of the concerned States is to be included.	

10.	Calculation details of consumptive utilization (annual evaporation loss and Seepage loss (with views of Geological Survey of India) from the reservoir) need to be included in the Chapter.	
11.	Source of water to meet the consumptive requirement (evaporation loss and seepage loss (if any)) of the project and for initial filling of reservoirs is to be clearly mentioned. If the source is an existing reservoir, then its complete details along with salient features, original planned utilization and approval status by TAC of DoWR, RD&GR of MoJS, GoI etc. need to be included.	
12.	Government Order (G.O.) of concerned State Government is required mentioning their permission to utilize the finalized quantity of water required towards annual consumptive use and initial filling of reservoirs from the specified source. The letter should clearly give break up of utilisation by the State (existing, ongoing and future) against the State's share allocated by any Tribunal / Agreement in that particular river basin. If project proponent proposes to make use of an existing reservoir of the concerned State, explicit permission of the State to project proponent for doing so should be included in the report. Further concerned State should also certify that existing / committed uses from the existing reservoir will not be affected if the reservoir is used for PSP purposes by the project proponent.	

Note: In certain cases, project developers are not sure whether a particular River is an inter-State River or not. For the purpose of above statement, any river basin is said to be an inter-State River basin, if its drainage area is located in more than one State and river finally outfalls in an ocean or a big water body. Any river basin which has drainage area in more than one State but outfalls into another river is considered as inter-State sub-basin of that inter-State River basin. In this regard, it may be noted that any project located in an Inter- State River basin, is deemed to have inter-State ramification and is required to be examined from inter-State angle. Any project which is located on a river or in its catchment / drainage area, which flows entirely in one State but is part of an Inter- State River basin / sub-basin shall also involve inter-State ramification and be required to be examined from Inter-State angle.

6. Transmission System:

Checklist		**Remarks (Yes/ No/ Not Applicable)**
Detail of Step-up transformer	Transformer rating	Information available at Stage-I, Sl. No. 3.III.10
	Transformer configuration and number of transformers	
	Adequacy of transformers in generating mode and Pumping mode	
	Spare transformer in case of single phase units	
Detail of Switchyard	Bus scheme	
	No. of bays and details	
	Bus coupler	
	Bus sectionalizer, if required	
	Rating of bus reactor (if required) /provision of space for future reactor bay	
	SLD of switchyard	
Details of Dedicated line	Voltage level of transmission line	
	Type of conductor and line configuration	
	Length of line	
	N-1 compliancy	

Connectivity with the Grid	Point of inter-connection	
	Status of connectivity (whether applied or not)	
	Correspondence with CTU/STU for connectivity (attach details)	
Other Information	Synchronous condenser mode operation	
	Peak power requirement in pumping mode and plan to meet the same	
	Phase-wise commissioning schedule	
	Other Details (if any)	

In addition to the above, following information should be included in the Final DPR Chapter related to transmission:

a. Coordinates of Switch yard
b. Type of switchyard (Indoor/outdoor/GIS/AIS)
c. Rating of Switchyard equipment
d. Details of Interconnection between Switchyard and pothead yard viz. GIL/Cable, size, current rating, length
e. Whether Transmission system under of scope of developer or STU/CTU, If system under the scope of developer - Details of the cost estimates along with Phasing
f. Phase wise Commissioning schedule

7. Dam/Barrage Design aspects:

Sl. No.	**Description**	**Remarks (Yes/ No/ Not Applicable)**
1.	General Layout Planning, including layout of Dam and reservoir	
2.	Finalization of Parameters FRL, MDDL, MWL and Top of the Dam	
3.	Flood routing and Free board calculation	
4.	Hydraulic design of spillway and energy dissipation arrangement,	
5.	Details of diversion arrangement and their design	
6.	Freezing of choice of Dam type	
7.	Views of GSI on dam type selection	
8.	Geo-technical investigation Results, Logs, Maps etc.	
9.	Stability Analysis for Earthen Dam, Concrete Dam (OF & NOF), Barrage etc.	
10.	Slope Stability wherever applicable such as hill slope (between upper and lower reservoir) etc.	
11.	Construction material survey and approval of CSMRS	
12.	i. Approval of FE&SA Directorate if applicable. ii. otherwise, seismic studies.	
13.	All relevant drawings such as plans, cross sections along with Geological details etc.	
14.	Emergency Action Plan (including Dam Break Analysis) for both upper and lower dam	

8. Gates / HM Design:

Sl. No.	Description	Remarks (Yes/ No/ Not Applicable)
A	General description containing the following;	
1	Purpose/ Location of the gate	
2	Size and type of gate (such as radial gate, stoplog gate, vertical lift gate etc).	
3	Location of Skin plate for vertical gates (Upstream/ Downstream).	
4	Type of sealing arrangement (such as cladded or plain rubber).	
5	Operating Conditions for the gate (Balanced/ unbalanced).	
6	Type and capacity of hoisting arrangement (such as rope drum hoist, gantry crane, hydraulic hoist, EOT crane etc.).	
7	Provision for inspection & maintenance of hydro-mechanical equipment and its embedded parts.	
8	Provision of Air vent, if required	
9	Anchorage arrangement of the radial gate.	
10	preliminary sizing of gate components	
B	Bill of Quantity	
C	Relevant general arrangement drawings including the following but not limited to;	
1	Tentative pivot point of hoisting arrangement of hydraulic hoist for radial gate.	
2	Tentative Groove size for the gate	

9. Hydel Civil Design Aspects:

S. No.	Description	Hard copy	Soft copy	remarks
A	Investigation/Test results/Borehole logs for various components	A4 / A2 size	PDF	
B	The updated design/analyses of all the components with tested Rock mass properties as follows:	A4 size	PDF, excel & software files	
	i. Detailed surge and transient studies for all modes of operations for complete water conductor system as per opening and closing time (to be later confirmed by the respective CEA of the developer) justifying the selected layout as per pressure rise in transient conditions			
	ii. Rock support system for underground components (HRT, TRT, pressure shaft, surge shaft/caverns/pump house/adits/desilting mechanism)			
	iii. Lining design of underground components (HRT, TRT, pressure shaft, surge shaft/caverns/pump house/adits)			
	iv. Hydraulic Design of both intakes (upper and lower) and trash rack			
	v. Hydraulic designs related to desilting mechanisms (if applicable)			

	vi. Designs related to approach and tail race channels (hydraulics, lining design etc)			
	vi. Analyses for finalization of orientation of powerhouse based on joint sets & in-situ stress results			
	vii. Detailed Steel liner /penstock design			
	viii. Power House structural design along with software files			
	ix. 2D stress analysis for powerhouse, transformer, surge shaft/caverns			
	x. 2D stress analysis for Tunnels in weak rock mass/Shallow cover			
	xi. Wedge analysis for underground powerhouse caverns			
	ix. Slope stability analysis of Intake, surface Powerhouse and outfall etc. as per the tested rock mass properties / strata			
	x. Hydraulic designs/analyses related to approach and tail race channel			
	x. Numerical study / CFD for flow at intakes			
C	Updated civil and applicable geological drawings (indicating NSL/rockline/chainages/ detailed dimensions etc.) of all components should necessarily include the following:	A2	PDF	
	i. Layouts including adits - separate drawings for general project, upper and lower reservoirs			
	ii. L-section of water conductor system			
	iii. Plan and L-section of Intake (upper and lower)			
	iv. Plan and L-section of Trash Rack Structure/Panel (upper and lower)			
	v. Plan and L section of surge shaft/cavern			
	vi. Drawings of rock support systems and lining details in underground components (HRT, TRT, pressure tunnels, surge shaft/cavern, powerhouse, transformer cavern, pump house)			
	vii. Steel liner of penstocks/pressure shafts			
	viii. L-sections, plans at various levels and cross sections of Powerhouse/Transformer Caverns			
	ix. Slope stabilization at back-slopes of intake, surface powerhouse, outfall			
	x. Plan and L-section of HRT, Pressure tunnels, TRT			
	xi. Plan and L-section of Desilting Structures			
	xii. Plan and L-section Approach Channel and Tail Race Channel			
	xiii. Layouts showing arrangements for first filling of reservoir as applicable			

10. E&M Design:

Sl. No.	Description	Remarks (Yes/ No/ Not Applicable)
1.	General Layout Plan	
2.	Layout of all floors of Power House inclusive of X- section and L- Section, Layout and sectional drawing of switchyard/pothead yard	
3.	Power Potential Study/ Installed Capacity duly vetted by concerned Division of CEA.	
4.	Type of PSP (On-stream/Off stream)	

5.	Type of Machine (Fixed/Variable) with detailed justification	
6.	Max. & Min. Head losses in water conductor system of the project both in Generation and Pumping Mode duly vetted by CWC	
7.	Operating water levels of Upstream & downstream reservoirs	
8.	Highest Flood Level (HFL) in case of Off stream (Open loop) / On-stream	
9.	Power House Dimensioning calculation as per relevant IS	
10.	Single Line Diagram of project and SLD of HT & LT System.	
11.	Reactive Power requirement with details of shunt reactor	
12.	Number of outgoing feeders/bays with power evacuation voltage level.	
13.	Efficiency of the Turbine, Generator & Pump and Motor along with cycle efficiency calculation	
14.	Power Factor of the Generator and Motor	
15.	Limits of Pressure rise and speed rise as per relevant IS	
16.	Provision of Synchronous Condenser Mode (if applicable)	
17.	Write-up on Operation Flexibility and Hydraulic Short Circuit	
18.	Write-up on all E&M Equipment and their ratings (including Electrical and Mechanical auxiliaries)	
19.	Salient feature related to E&M design	
20.	Transport Limitation to transport the Heaviest Equipment to the Project site	
21.	Escape Route/tunnel and Flood/Fire safety provisions, wherever applicable.	
22.	List of applicable IEC/IS/ IEEE/ANSI etc.	

An approved copy of E&M chapter is required for vetting of BoQ of E&M works of the Project

Annex – 2(a)

Undertaking by Project Developer

To whomsoever it may concern

Ref. No: **Date:**

This is to certify that the chapters of Detailed Project Report of the …….. Pumped Storage Project in …… district, …… state, bearing DPR ID no. …… on DPR Approval Process Monitoring System, submitted by M/s. ……, is aligned with the pre-DPR chapters on various aspects approved by the appraising groups of CEA, CWC, GSI and CSMRS. Further, observations provided by the appraising groups have been duly incorporated in the DPR.

Signature of CEO (in case of Private Company) / Director (in case of PSU)

Name:
CIN No.
Address:
Email:
Contact No.:
Seal:

Annex-2(b)

Abstract of Cost Estimates

Name of Project:

Present Price level : _____
Zero Date : _____
Construction Period : _____
FE Rate : _____

i) Cost estimates at Present Price Level:

Item	Indian Component	Foreign Component		Total
	(₹ Lakhs)	fc	(Eqvt. in ₹ Lakhs)	
1. Cost of Civil Works (As per Annex-Civil)				
2. Cost of Electro-Mechanical Works (As per Annex-E&M)				
3. Cost of Miscellaneous Works (As per Annex-Misc)				
4. Cost of Transmission System Works (up to pooling point) (As per Annex-TS)				
Total Cost of Works (Hard Cost) (1+2+3+4)				
IDC & FC				
Total Project Cost including IDC & FC				

fc : Foreign Currency

ii) Cost estimates at Completion Level:

Item	Indian Component	Foreign Component		Total
	(₹ Lakhs)	fc	(Eqvt. in ₹ Lakhs)	
1. Cost of Civil Works (As per Annex-Civil)				
2. Cost of Electro-Mechanical Works (As per Annex-E&M)				
3. Cost of Miscellaneous Works (As per Annex-Misc)				
4. Cost of Transmission System works (up to pooling point) (As per Annex-TS)				
Total Cost of Works (Hard Cost) (1+2+3+4)				
IDC & FC				
Total Project Cost including IDC & FC				

fc : Foreign Currency

Average Annual Escalation Factor during pre-construction and construction period:

1. **Civil Works : ----------%**
2. **E&M Works : ----------%**
3. **Misc Works : ----------%**
4. **Transmission System Works----------%**

Annex-Civil

Abstract of Cost Estimates of Civil Works

Name of Project: **Present Price level : _____**

Item	Amount (₹ Lakhs) at Present Price Level	Amount (₹ Lakhs) at Completion Level
i). Direct Cost		
I- Works		
A- Preliminary		
B- Land		
C-Civil Works		
J- Power Plant Civil Works		
K-Building		
M-Plantation		
O-Miscellaneous		
P-Maintenance during Construction		
Q-Special T & P		
R-Communication		
X-Environment & Ecology		
Y-Losses on stock		
Total (I- Works)		
II. Establishment		
III. Tools And Plants		
IV. Suspense		
V. Receipt And Recoveries		
Total (Direct Cost)		
ii). Indirect Cost		
a). Capitalization of Abatement of Land Revenue		
Total (Indirect Cost)		
Total Cost Civil Works(i+ii)		

Note : 1. Head-wise cost of civil works to be furnished in annex forms as per "Guidelines for preparation for project estimates for River Valley Projects" issued by CWC.

2. The details of civil works under sub-heads shall be given in Annex and numbered in similar way of main head. For example, Annex giving details of works under sub-heads of main head "C-Works" shall be numbered as Annex- C(1), Annex-C(2), etc.

Annex-Construction Power

_____ H.E. Project (_____ MW)
(Abstract of Cost Estimates of Construction power)

Construction Power Peak demand _____ kW

Sl. No.	Description	Unit	No. of units	Unit Cost (₹. Lakh)	Amount (₹. Lakh) ____ PL
A.	**Construction Power Arrangement**				
1	____ KV Transmission line	km			
2	Distribution transformers, Substation, Switchgear and spares etc. as per SLD				
3	**Total cost of Construction Power Arrangement - Ex works (1+2)**				
4	Total cost of Construction Power Arrangement for Non-works (Street lighting, office buildings, staff colony etc.)				
	Effective cost of construction power arrangements (for Construction Works and Non- Works) (3+4)				
B	**Energy Charges for Construction Works**				
1	Energy required for construction in 1st year	Lakh Units			
2	Energy required for construction in 2nd year	Lakh Units			
3	Energy required for construction in 3rd year	Lakh Units			
4	Energy required for construction in 4th year	Lakh Units			
5	Energy required for construction in 5th year	Lakh Units			
6	**Total Energy for construction (1+2+3+4+5)**	**Lakh Units**			
7	Unit rate of electricity from DG sets*	₹. /kWh			
8	Unit rate of Electricity from Grid (incl. fixed and demand charges, if any)	₹. /kWh			
9	Average cost of Power considering __% Grid Power and ___% DG power	₹./kWh			
	Energy charges for Construction Works) (6*9)				
C	**Energy Charges for Non-Works (5 to 10% of B)**				

* Calculation of Unit rate of electricity from DG sets shall be done as per method mentioned in latest edition of *"Guide Book on Use Rate Hire Charges and Transfer value of equipment and Spare parts"* of CWC (sample table given below)

Calculation of Unit rate of Electricity from DG set

	DG Set Capacity (kVA)			
	Rate of DG (per kVA)			
(i)	Cost of Equipment (₹.)			
(ii)	Life in Hours			
(iii)	Life in Years			
(iv)	No. of Working Shifts			
(v)	Annual Schedule Production Hours			
A	**Ownership Cost (Depreciation) :**			
(vi)	Yearly Depreciation in ₹ with reference to life in years [0.9*(i)/(iii)]			
(vii)	Yearly Depreciation in ₹ with reference to life in hours [0.9*(i)*(v)/(ii)]			
(viii)	Average Yearly Depreciation in ₹ [Average of (vi) & (vii)]			
(ix)	**Hourly Depreciation in ₹ of Equipment [(viii)/(v)]**			
B	**Repair and Maintenance :**			
(x)	R&M Charges in ₹ @120% of cost of Equipment per hour [1.20*(i)/(ii)]			
C	**POL Charges :**			
(xi)	Diesel Consumption in litre per hour			
(xii)	Cost of One Litre of Diesel in ₹			
(xiii)	Cost of hourly fuel consumption in ₹ by Equipment [(xi)*(xii)]			
(xiv)	Lubricant consumption in litre/hour			
(xv)	Cost of One Litre of Lubricant in ₹			
(xvi)	Cost of hourly lubricant consumption in ₹ by Equipment [(xiv)*(xv)]			
(xvii)	Sundry & Miscellaneous in ₹ @10% of R&M Charges [0.1*(x)]			
(xviii)	**POL Charges per Hour in ₹ [(xiii)+(xvi)+(xvii)]**			
D	**Labour Charges :**			
		No.	Monthly Rate (₹)	Hourly Rate (₹)
(xix)	Foreman [No.*Monthly Rate*12/(v)]			
(xx)	Operator [No.*Monthly Rate*12/(v)]			
(xxi)	Mechanic [No.*Monthly Rate*12/(v)]			
(xxii)	Electrician [No.*Monthly Rate*12/(v)]			
(xxiii)	Helper [No.*Monthly Rate*12/(v)]			
(xxiv)	Watchman [No.*Monthly Rate*12/(v)]			
(xxv)	Direct Charge for Labour [(xix)+(xx)+(xxi)+(xxii)+(xxiii)+(xxiv)]			
(xxvi)	Indirect Charges @55% for semi-skilled/ unskilled workers [0.55*{(xxiii)+(xxiv)}]			
(xxvii)	Indirect Charges @80% for skilled workers [0.8*{(xix)+(xx)+(xxi)+(xxii)}]			
(xxviii)	**Total Labour Charges per Hour [(xxv)+(xxvi)+(xxvii)]**			
(xxix)	**Hourly Use Rate of Equipment in ₹ [(ix)+(x)+(xviii)+(xxviii)]**			
(xxx)	**Hourly unit generation(kWh) considering Power factor as 0.8**			
	Unit Electricity rate (₹/kWh) [(xxix)/(xxx)]			

Annex-E&M

_____Pumped Storage Project (_____MW)
(Abstract of Cost Estimates of Electro Mechanical Works)

Price level: _____
FE Rate : _____

Sl. No.	Item Particulars	Cost of Equipment, Services, Overheads and Taxes & Duties				
		Indian Component	Foreign Component		Total	
		(₹ Lakhs)	(fc)	(Eqvt. in ₹ Lakhs)	At Present Price level (₹ Lakhs)	At Completion level (₹ Lakhs)
1.	**Preliminary – Annex – S(1)** **GST (as applicable) on 1**					
	Sub-Total (Preliminary)					
2.	**Generating Plant and Auxiliaries** a) Generating Units and Associated Accessories – **Annex –S(2)** b) Auxiliary electrical equipment for power station – **Annex –S(3)** c) Auxiliary mechanical equipment and services for power station- **Annex–S(4)** **d) GST (as applicable) on 2 (a), 2(b) & 2 (c)** e) Transportation, handling and Insurance charges @ 6% of 2 (a),(b) & (c) f) **GST (as applicable) on 2 (e)** g) Erection and commissioning charges @ 8% of 2(a), (b), (c) & (d) excluding spares h) **GST (as applicable) on 2 (g)**					
	Sub-Total (Generating Plant and Equipment)					
3	**Switchyard and Pothead Yard Equipment & Services** a) Substation equipment, auxiliary equipment and service of switchyard **- Annex –S(5)** b) **GST (as applicable) on 3 (a)** **c)** Transportation, handling and insurance charges @ 6% of 3 (a) d) **GST (as applicable) on 3 (c)** e) Erection and commissioning charges @ 8% of 3 (a) excluding spares. f) **GST (as applicable) on 3 (e)**					
	Sub-Total (Substation Equipment, Auxiliary Equipment and Service of Switchyard)					
4	Contingencies @ 1% on items 2 & 3					
5	Tools and Plants @0.5% of item 2, & 3					
6	**Sub-Total (Item 1 to 5)**					
7	Establishment (As per para 16.5 of Chapter XVI)					
	GRAND TOTAL (6+7)					

fc : Foreign Currency

Annex – E&M(1)

_____Pumped Storage Project (_____MW)
Cost Estimates of Electro Mechanical Works
(Preliminary Works)

Price level: _____
FE Rate : _____

Sl. No.	Item Particulars	Quantity	Rate (₹/ fc)	Services Cost				Total	
				Indian Component (₹ Lakhs)	Foreign Component (fc)	Foreign Component (Eqvt. in ₹ Lakhs)	Total (₹ Lakhs)	At Present Price Level (₹ Lakhs)	At completion level (₹ Lakhs)
1	2	3	4	5	6	7	8=5+7	9	10
1	Design & Consultancy Charges								
2	Model Testing for Turbine								
	Total								

fc : Foreign Currency

Annex – E&M(2)

_____Pumped Storage Project (_____MW)
Cost Estimates of Electro Mechanical Works
(Generating Units and Associated Accessories)

Price level: _____
FE Rate : _____

Sl. No.	Item Particulars	Quantity	Rate (₹/ fc)	Equipment Cost				Custom Duty		Total	
				Indian Component (₹ Lakhs)	Foreign Component (fc)	Foreign Component (Eqvt. in ₹ Lakhs)	Total (₹ Lakhs)	Rate (%)	Amount (₹ Lakhs)	At Present Price Level (Rs Lakhs)	At Completion Level (₹ Lakhs)
1	2	3	4	5	6	7	8=5+7	9	10=8x9	11=8+10	12
1	a) Turbine-Generator units ____ MW, ____ RPM, ____ m head, 0.85 p.f, .___ kV complete with allied equipment such as MIV, Governor, AVR, excitation system etc. b) Cooling water system comprising pump sets, valves, piping, etc. c) Drainage and Dewatering systems d) HP & LP Compressed Air System including pipes and valves e) Spares @ 5% on item 1(a) to 1(e) (including one spare runner)										
2	___ kV, ___ A Isolated Phase Bus Duct/ Segregated Phase Bus Duct for Generator-Transformer Connection including LAVT, NGT & ICT, Surge Protection & Neutral Earthing system										
3	Supervisory Control and Data Acquisition System (SCADA)										
4	Unit Control & Protection Panels										
5	___ kV, ___- A, Generator Circuit Breaker (if provided)										
6	Lubricating oil & Governor oil for first filling										
7	Pressure Shaft Valve (___ m dia)										
8	Spares @ 3 % on items 2 to 7										
	TOTAL										

fc : Foreign Currency

Annex – E&M(3)

_____Pumped Storage Project (_____MW)

Cost Estimates of Electro Mechanical Works

(Auxiliary Electrical Equipment for power station)

Price level: _____

FE Rate : _____

Sl. No.	Item Particulars	Quantity	Rate (₹/ fc)	Equipment Cost				Custom Duty		Total	
				Indian Component (₹ Lakhs)	Foreign Component (fc)	Foreign Component (Eqvt. in ₹ Lakhs)	Total (₹ Lakhs)	Rate (%)	Amount (₹ Lakhs)	At Present Price Level (Rs Lakhs)	At Completion Level (₹ Lakhs)
1	2	3	4	5	6	7	8=5+7	9	10=8x9	11=8+10	12
1.	Step up Transformer (Rating __kV, __MVA, ___ Phase, _____Type)										
2.	Unit Auxiliary Transformer (Rating __kV, __MVA, _____Type)										
3.	Station Service Transformer (Rating __kV, __MVA, _____Type)										
4.	HT/LT AC Switchgear for power supply to PH complex, Pothead yard, BFV and Dam site										
5.	DC Batteries, Battery charging equipment, D.C. Distribution Board with D.C. switchgear (Rating __V, ___AH & __V & ___AH)										
6.	Diesel generating set (Rating ___ kV, ____kVA) (In addition to construction power)										
7.	Control & Power cables										
8.	Cable Racks, Trays, Supporting Structure and Accessories										
9	CCTV, Surveillance System & Telecommunication Equipments										
10.	Ground Mat & Earthing for Dam, PH complex and Pothead yard										
11.	Illumination of PH complex, BFV house chamber, Pothead yard and Dam site										
12	Electrical Workshop										
13.	Electrical Test Lab & Testing Equipments										
14	**Sub-Total (items 1 to 9)**										
15.	Spares @ 3% on items 14										
	TOTAL										

fc : Foreign Currency

Annex – E&M(4)

_____Pumped Storage Project (_____MW)

Cost Estimates of Electro Mechanical Works

(Auxiliary Mechanical Equipment and Services for power station)

Price level: _____

FE Rate : _____

Sl. No.	Item Particulars	Quantity	Rate (₹/ fc)	Equipment Cost				Custom Duty		Total	
				Indian Component (₹ Lakhs)	Foreign Component (fc)	Foreign Component (Eqvt. in ₹ Lakhs)	Total (₹ Lakhs)	Rate (%)	Amount (₹ Lakhs)	At Present Price Level (Rs Lakhs)	At Completion Level (₹ Lakhs)
1	2	3	4	5	6	7	8=5+7	9	10=8x9	11=8+10	12
1.	Electrical Overhead Traveling crane for PH (Capacity____ T)										
2.	Electrical Overhead Traveling crane for GIS (Capacity____ T)										
3	Electrical Overhead Traveling crane for BFV House (Capacity____ T)										
4.	Electric lifts and elevators										
5.	Fire fighting equipment with storage tanks, pipes, pumps, valves etc.										
6.	Heating, Ventilation and Air conditioning										
7.	Potable Water Supply for PH complex and Pothead yard										
8.	Oil handling equipment with pipes, valves, tanks, purifiers										
9.	Workshop machines and equipment										
10	**Sub-Total (Item 1 to 8)**										
11	Spares @ 3% for item No.10										
	TOTAL										

fc : Foreign Currency

Annex – E&M(5)

_____Pumped Storage Project (_____MW)

Cost Estimates of Electro Mechanical Works

(Switchyard and Pothead Yard Equipment & Services)

Price level: _____

FE Rate : _____

Sl. No.	Item Particulars	Quantity	Rate (₹/ fc)	Equipment Cost				Custom Duty		Total	
				Indian Component (₹ Lakhs)	Foreign Component (fc)	Foreign Component (Eqvt. in ₹ Lakhs)	Total (₹ Lakhs)	Rate (%)	Amount (₹ Lakhs)	At Present Price Level (Rs Lakhs)	At Completion Level (₹ Lakhs)
1	2	3	4	5	6	7	8=5+7	9	10=8x9	11=8+10	12
1.	__ kV Pothead yard/ Switchyard equipment including coupling capacitors, wave traps, LAs etc.										
(a)	___ kV, ___ A, Circuit breaker										
(b)	Isolator/Pantograph with/without earthing blade (Rating __kV)										
(c)	Current transformers (Rating __KV)										
(d)	Potential transformers /CVT (Rating __kV)										
(e)	Lightning arrestors (Rating ___kV)										
(f)	Post Insulator & VT										
(g)	Wave traps (Rating ___kV)										
2	___ kV GIS Bays										
3	___ kV XLPE Cable/ GIB (Gas Insulated Bus Duct)										
4	___ Phase, ___, MVAR, ___ kV, _____ Type Shunt Reactor										
5	Bus conductors, hardware and isolators										
6	Protection Panel for Bus, Line and Reactor										
7	D.C. battery, charger and associated equipment										
8	Fire protection System										
9	PLCC Equipment										
10	Gantry, Foundation for structures & miscellaneous civil works for other equipment, like Shield wire, Insulators, Lightning Masts										
11	Fencing and security										
12	**Sub-Total (1 to 7)**										
13	Spares @ 3% for items 12										
	Total										

fc : Foreign Currency

Annex – Misc

_____Pumped Storage Project (_____MW)
Cost Estimates of Miscellaneous Works

Price level: _____
FE Rate : _____

Sl. No.	Item Particulars	Quantity	Rate	Services Cost				GST		Total	
			(₹/ fc)	Indian Component (₹ Lakhs)	Foreign Component (fc)	Foreign Component (Eqvt. in ₹ Lakhs)	Total (₹ Lakhs)	Rate (%)	Amount (₹ Lakhs)	At Present Price Level (Rs Lakhs)	At Completion Level (₹ Lakhs)
1	2	3	4	5	6	7	8=5+7	9	10	11=8+10	12
1	**Security Services**										
2	**Helicopter Services, if required**										
3	**Setting up of Industrial Training Institute, if required ***										
	Total (Miscellaneous Works)										

fc : Foreign Currency

* : As per CEA recommendation dated 08.10.2009

Annex-TS

_____Pumped Storage Project (____MW)

Abstract of Cost Estimates of Transmission System Works (up to pooling point)

Pricelevel:_____

FE Rate : _____

S. No.	Description	Amount at Present Price Level (₹ Lakhs)	Amount at Completion Level (₹ Lakhs)
1	Line and Termination Bay (including spares) (as per Annex-TS(1))		
2	Transportation and handling charges		
3	Erection, Testing and Commissioning Charges (excluding spares)		
4	**Sub-Total(1,2 &3)**		
5	Contingency on 4		
6	Tools & Plant on 4		
7	**Sub-Total(4,5 &6)**		
8	GST on 7		
9	Establishment Charges		
10	Forest & Land Compensation		
11	Crop & Tree compensation		
	Total		

Annex-TS(1)

Cost of Transmission line (up to Pooling Point) and Terminating Bays

Price level:_____

FE Rate : _____

S.No	Description	Unit	Qty	Rate (₹ Lakhs)	Amount (₹ Lakhs)
					qty*rate
1	Transmission line	Kms		**A**	
2	Terminating Bays	No			
3	Spares for above				
	TOTAL				

CALCULATION SHEET FOR DETERMINATION OF A (cost of transmission line)

Base Cost of Transmission Line	
Add y% for line less than 100 km	
Add z% for completion of 24 months	
Add for OPGW & communication	
TOTAL	**A**

Annex –2(c)

PRESENT DAY AND COMPLETED COST
(Phasing of Expenditure of Hard Cost)

Name of the Project : **Capacity :_____MW**

Present Price level : _____

Zero Date : _____

Construction Period : _____

FE Rate : _____

1. Civil Works :

Average Annual Escalation Factor : _____%

(₹ Lakhs)

Sl. No.	Item	Present day Cost	Expenditure incurred till date	Anticipated expenditure up to zero date	6-Monthly phasing						Cost at Completion level
					6	12	18	24	30	……	
	Escalation Factor										
	i) DIRECT COST										
	I- WORKS										
	A- Preliminary										
	B- Land										
	C-Civil Works										
	J- Power Plant Civil										
	K-Building										
	M-Plantation										
	O-Miscellaneous										
	P-Maintenance										
	Q-Special T & P										
	R-Communication										
	X-Environment & Ecology										
	Y-Losses on stock										
	TOTAL (I- WORKS)										
	II- Establishment										
	III- Tools and Plants										
	IV- Suspense										
	V- Receipt and recoveries										
	TOTAL (DIRECT COST)										
	ii) INDIRECT COST a) Capitalized value of abatement of land revenue										
	TOTAL (INDIRECT COST)										
	TOTAL (CIVIL COST)										

2. E&M Works :

Average Annual Escalation Factor (Indian Component) : _____%
Average Annual Escalation in FE Rate (Foreign Component) : _____%

(₹ Lakhs)

Sl. No.	Item	Present day Cost	Expenditure incurred till date	Anticipated expenditure up to zero date	6-Monthly phasing						Completion Cost
					6	12	18	24	30	……	
	Escalation Factor(IC)										
	Escalation Factor(FC)										
	I. E&M EQUIPMENT										
	i). EOT Crane										
	ii). T.G. Sets										
	iii). Bus Duct										
	iv). Penstock Valves										
	v). Power Transformer										
	vi). Protection and Relay Panels										
	vii). AC Supply System										
	viii). Switchyard										
	ix). GIS										
	x). Power and Control Cables										
	xi). SCADA										
	xii). Electrical Auxiliaries										
	xiii). Mechanical Auxiliaries										
	xiv). Initial Spares (IC)										
	xv). Initial Spares (FC)										
	TOTAL (E&M EQUIPMENT)										
	II. SERVICES										
	i). Preliminary Works										
	ii). Freight & Insurance										
	iii). Erection & Commissioning										
	Total (Services)										
	III. TAXES & DUTIES										
	i). Custom Duty										
	ii) GST										
	TOTAL (TAX & DUTIES)										
	IV. OVERHEADS										
	i). Establishment										
	ii). Contingencies										
	iii). Tools & Plants										
	TOTAL (OVERHEADS)										
	TOTAL (E & M COST)										

3. Miscellaneous Works :

Average Annual Escalation Factor: _____%

(₹ Lakhs)

Sl. No.	Item	Present day Cost	Expenditure incurred till date	Anticipated expenditure up to zero date	6-Monthly phasing						Cost at completion level
					6	12	18	24	30	… …	
	Escalation Factor										
	i). Security										
	ii). Helicopter Service, if required										
	iii). Setting up of Industrial Training Institute, if required										
	Total (Misc Cost)										

4. Transmission System Works (upto Cooling Point) :

Average Annual Escalation Factor: _____%

(₹ Lakhs)

Sl. No.	ITEMS	Present Day Cost	6-Monthly phasing						Cost at completion level
			6	12	18	24	30	…..	
1	**Transmission Line Including Transportation and E, T & C**								
2	**Termination Bay**								
3	**Taxes and Duties**								
4	**Overheads**								
5	**Total Cost (Transmission works up to pooling point)**								

Note: Present day cost of each item/ group of items (Annex-2c) will be phased on half yearly basis and escalated at a rate based on prevailing indices to arrive at completed (Escalated) cost.

Annex –2(c)(i)

Illustration for calculation of annual escalation factor of E&M works

Assumptions: Let us assume that the cost of E&M work of the project is at June, 2022 PL. Tentative Zero date of the project is 01st Jan, 2023 and Tentative CoD of the project is 1st June, 2027

Step 1: Find out the period between present day price level (June, 2022) and COD (June, 2027) - n = 5 years (round off zero decimals)

Step 2: Collect data of relevant WPI/CPI indices of past n+1 years.

INDEX	YEARLY INDICES					
	2017	**2018**	**2019**	**2020**	**2021**	**2022**
Q - Manufacture of Electrical Equipment	109.20	111.20	111.60	112.00	120.30	127.60
R - Manufacture of Machines and Equipment	108.50	110.80	112.80	113.40	118.40	124.90
M - MEAN (Q & R)	108.85	111	112.2	112.7	119.35	126.25
L - Labour	281.2	294.8	317.4	335.1	351.40	372.40

Step 3: Calculate percentage increase in indices for past n years. Thereafter, calculate average annual increase in indices for the period under consideration. Average annual escalation factor shall be arrived by multiplying weightages to average annual increase in indices.

INDEX	Year to Year Escalation					Av. Yearly Escalation	Weight on item	Escalation
	2018	**2019**	**2020**	**2021**	**2022**			
M - MEAN (Q & R)	1.98%	1.08%	0.45%	5.90%	5.78%	3.04%	70%	2.13%
L - Labour	4.84%	7.67%	5.58%	4.86%	5.98%	5.78%	30%	1.74%
	Escalation for Indian component (IC) per Annum							**3.86%**

Step 4: Similar Method may be used for calculation of annual escalation factor for Foreign Currency. Example is given below:

INDEX	YEARLY INDICES					
	2017	**2018**	**2019**	**2020**	**2021**	**2022**
Average USD FE Rate	65.1216	68.3895	70.4203	74.0996	73.92	78.59

INDEX	Year to Year Escalation					Av. Yearly Escalation	Weight on item	Escalation
	2018	**2019**	**2020**	**2021**	**2022**			
Average USD FE Rate	5.02%	2.97%	5.22%	-0.24%	6.31%	3.86%	100%	3.86%
	Escalation for Foreign component (FC) per Annum							**3.86%**

Step 5: Cost estimates at Completion level shall be framed by escalating the phasing of expenditure of present day cost to the mid-point of period in which expenditure is proposed to be incurred using corresponding average annual escalation factor for Indian component and Foreign component.

Annex-2(d)

ESTIMATED COST OF PROJECT & FINANCIAL PACKAGE SUMMARY

A. ESTIMATED COST OF PROJECT

1	Name of Project							
2.	Capacity (MW)							
3	Name of Promoter							
4	Location							
5	State							
Sl. No.	Item	Currency	Foreign Currency Component			Indian Component (₹ Crores)	Total Cost (₹ Crores)	% of total cost
			Amount	Exchange Rate @	Equivalent in Indian ₹ Crores			
(1)	(2)	(3)	(4)	(5)	(6)=(4)x(5)	(7)	(8)=(6)+(7)	(9)
1	**Hard Cost** (excluding IDC & Financing Charges)	(i)…						
		(ii)…..						
		(iii)….						
		(iv)…						
						Sub-Total (1) =		
2	**IDC (@@)**							
	(i) Debt Package-I							
	(ii) Debt Package-II							
	(iii) Debt Package-III							
						Sub-Total (2) =		
3	**Financing Charges**							
	(i) Debt Package-I	(i)…						
	(ii) Debt Package-II	(ii)						
	(iii) Debt Package-III	(iii)….						
	(iv) Others (if any)	(iv)…						
						Sub-Total (3) =		
						GRAND TOTAL (1+2+3)		

NOTES:

(i) @ - Exchange Rate prevailing at the time of price level of the cost.

(ii) @@ - Detailed calculation for interest during construction (IDC) shall be attached separately for each Debt Package (in respective currencies) clearly indicating Drawl of funds, phasing of expenditure & Gestation Period etc.

(iii) If the currencies or Debt Packages are more, the additional Columns / Rows may be suitably inserted.

B. FINANCIAL PACKAGE SUMMARY

B1. DEBT FINANCING

C	Source/ Name of Agency	Currency	Foreign Currency Component			Interest rate % (Fixed) Floating	Repayment period (Years)	Moratorium period (if any) (Years)
			Amount	Exchange rate @	Equivalent in Indian ₹ Cr			
(1)	(2)	(3)	(4)	(5)	(6)=(4)x(5)	(7)	(8)	(9)
(a)	**Foreign Debt**							
1	Source I							
2	Source II							
			Sub-Total (a) =					
(b)	**Domestic Debt**							
1	Source I							
2	Source II							
			Sub-Total (b) =					
		TOTAL DEBT (a) + (b) =						

B2 EQUITY FINANCING

Sl.No.	Source/ Name of Equity Partners	Currency	Foreign Currency Component			Remarks
			Amount	Exchange rate @	Equivalent in Indian ₹ Cr	
(1)	(2)	(3)	(4)	(5)	(6)=(4)x(5)	(7)
(a)	**Foreign Equity**					
1	Promoters					
2	Others					
			Sub-Total (a) =			
(b)	**Domestic Equity**	₹	…..			
1	Promoters	₹	…….			
2	Others	₹	…….			
3	Public Issue (If any)					
			Sub-Total (b) =			
		TOTAL EQUITY (a) + (b) =				
	DEBT + EQUITY (B1 + B2) =			**DEBT : EQUITY RATIO =**		

FINANCING CHARGES #

Sl.No.	Item	Upfront charges (₹ Cr.)	Commitment charges (₹ Cr.)	Guarantee Fees (₹ Cr.) @	Others (if any) (₹ Cr.)	Total Financing Charges (₹ Cr)	Remarks
(1)	(2)	(3)	(4)	(5)	(6)	(7)=(3)+(4)+(5)+(6)	(8)
	DEBT						
1	Source I						
2	Source II						
3	Source III						
	EQUITY						
1	Public Issue Charges						
					Total		

- Financing Charges as applicable for the Project may be indicated.
@ - Exchange Rate prevailing at the time of submission of DPR/Documents.

Appendix-1

Review Mechanism for pre-DPR activities by CEA and concerned appraising groups with the Project Proponent

The review/consultation mechanism shall be as under:-

- After signing MOA with State Government, the developer shall carry out topographical survey& geological surface mapping of the project and submit the proposed layout of the project and detailed investigation plans to HPP&I Division, CEA along with CWC, GSI and CSMRS for appraisal and finalization.

- CEA along with other agencies shall hold meeting with developer to finalize different alternatives of the project layout for which investigations are to be carried out by the developer along with detailed investigation plan to be carried out in first phase. This meeting would be followed up with subsequent quarterly meetings till first phase investigations are completed.

- After completion of the first phase investigations, the developer shall submit the results to HPP&I Division, CEA along with CWC, GSI and CSMRS. CEA along with other agencies shall hold a meeting with the developer for finalization of project layout and final phase-II investigations to be carried out by the developer. This meeting would be followed up with subsequent quarterly meetings till the GSI clearance is obtained by the developer.

- After obtaining clearances for Hydrological aspects (if any), PPS aspects, Interstate aspects (if any),GSI aspects, CSMRS aspects, FE&SA aspects and layout from HCD/HE&TD, CEA along with CWC, GSI and CSMRS shall hold 3rd consultation meeting for finalization of layout, broad salient features of the project and submission of chapters for design aspects of the project. This meeting would be followed up with subsequent quarterly meetings till the full DPR is actually submitted to CEA for concurrence by the developer.

Miscellaneous:-

- For holding the consultation meeting(s)/ taking clearance on a particular aspect, the developer shall submit its request along with concerned report(s) to the concerned Directorates/Divisions/Organizations under intimation to HPP&I Division of CEA.

  All efforts will be made by the developer to complete the investigations and studies as suggested by the concerned agencies like CEA, CWC, GSI, or CSMRS, in time.

- The developer may approach CEA and other agencies in case of any difficulty in finalization of any study or report.

- Developer shall submit hydrological studies after collection of hydrological data at site for at least one year. However, collection of hydrological data at site is not required if the project is being developed on already existing dams. Instead, developer can use the data already collected by G&D instruments at existing dams.

Appendix-2

Power Potential Studies and Installed Capacity

1 FOR PUMPED STORAGE SCHEMES

1.1 Two reservoirs are used in pumped storage scheme to store and circulate the water for generating electricity during peak hours and pumping during off-peak hours.

1.2 Multipurpose reservoirs are planned to serve more than one purpose. In Indian conditions the multi-purpose reservoirs are planned for drinking water, irrigation, hydro electric power, flood control and flood moderation etc. Planning of such a reservoir requires detailed analysis of past run off records and other hydrological data.

1.3 In case of hydro power projects involving flood moderation, in addition to power generation, the reservoirs are planned to have cushion for flood moderation during flood periods.

1.4 Fixing the storage capacity, FRL and MDDL of Reservoir

The capacity of the reservoir shall be fixed based on the guidelines given in IS: 5477 (Part-1, 2, 3 and 4) “Fixing the capacity of Reservoirs”.

Live storage is the volume of water stored in the reservoir between FRL and MDDL. It can be provided to meet peak power requirement. For the project governed by Indus water Treaty (IWT), allowable pondage is computed as per the procedure laid down in IWT. However, topological restrictions may restrict allowable pondage.

After the reservoir capacity is determined, the next step would be to fix the FRL/ MDDL. Area / Elevation Curves of the proposed site are used to determine these levels. While fixing the FRL/ MWL, the factors like upper level of domain of the project allotted by the State Government, submergence in reservoir area, tail water level of upstream development, free flow stretch to be left between two projects as per MoEF&CC stipulations, if any, geological constraints in raising dam height etc. are fully taken in to account.

For determining the MDDL, the considerations like siltation of reservoir during the life of the project, water to be drawn directly from the reservoir for the purpose other than generation, live storage to be provided, safe limit of operating heads of the turbines etc. are considered.

The reservoirs are operated in order to achieve the maximum benefits consistent with their physical characteristics and functions for which they are planned and constructed. For actual operation of reservoir or a system of reservoirs, individual regulation schedules are required to be formulated, after considering all critical factors involved.

Reservoir operation studies are carried out in accordance with IS: 7323 – 1994 “Operation of Reservoirs Guidelines”. Levels computed in the above studies are refined considering the optimum benefits/ cost analysis.

1.5 For determination of installed capacity ensure that the-

i) Various water levels (FRL, MDDL, TWL) are approved by concerned department of State Government in case of off-stream open loop projects and on- stream projects.

ii) Allocation of water for recoupment of evaporation losses is approved by concerned department of State Government.

iii) Efficiencies of T-G sets (in pumping and generating modes) are taken correctly as per latest machine available in Market

iv) Head losses in water conductor system (WCS) in pumping and generation mode and Evaporation losses of the reservoir are approved by CWC.

v) Rated head assessments are accurate.

vi) Other requirements of water are met.

1.6 Fixating the installed capacity

i) Installed capacity may be fixed considering live storage capacity of the reservoirs, number of cycles of operation per day/week, peaking hours required.

1.7 Selecting unit-size & Number of Units

i) Number of generating units should be kept minimum because the cost of generating units and related equipment increases with the increase in number of units

ii) Unit-size is decided based on the transport limitations i.e. maximum size (LxWxH) of package of generating units/ transformer which can betransported to site.

iii) Where more than one units are to be installed in a power house, these should be of the same capacity to facilitate inter-changeability of generating units, spares and other equipment in the station.

iv) The unit size should be verified for system stability and loss of generation probability criteria.

1.8 Computing Design Energy and Cycle Efficiency

i) After fixing installed capacity of the scheme, simulation study for generation has to be done under which the pumped storage scheme will be operated discharging water from upper reservoir to lower reservoir utilizing the live storage. Net head of the scheme and energy generated during appropriate intervals of operation with varying discharges may be calculated at 95% machine availability.

ii) Further, Simulation study for pumping has to be done under which the pumped storage scheme will be operated pumping water from lower reservoir to upper reservoir utilizing the live storage. Net head of the scheme and energy consumed for pumping during appropriate intervals of operation with varying discharges may be calculated 95% machine availability.

iii) Cycle efficiency may be calculated considering energy generated ingeneration mode and energy consumed in pumping mode calculated from above simulation studies.

Appendix-3

Suggestive Measures to Reduce the Tariff of the Project at DPR stage

The list of measures suggested to reduce tariff are as follows:

- Reducing Equity component from existing 30% upto 20%.
- Generating Company/ Project Developer may also explore a long-term loan beyond 18 years, thereby re-financing of loan can be utilized at a later stage.
- Generating Company/ Project Developer may explore back loaded tariff option also by keeping levelized tariff same.
- Generating Company/ Project Developer may explore the option of accepting lowering RoE and O&M expenses.
- To reduce IDC cost, upfront equity infusion may be explored.

Appendix-4

Measures to be adopted to avert flooding of Power House

1. Installation of submersible type dewatering pumps of sufficient capacity in the dewatering sump.
2. In addition to drainage and dewatering pumps, provision of suitable number of submersible pumps of adequate capacity at MIV floor with provision for automatic starting by means of level switches.
3. Location of control panels for dewatering & drainage pumps at a floor higher than that of turbine floor.
4. Provision of suitable float switches in the P.H. building on MIV floor to give closing signal to the MIV in the event of inundation of P.H. due to penstock rupture or leakage in penstock or for some other reasons.
5. i) Provision of hoisting individual mechanism for draft tube gate of each unit for quick closing.

   ii) The draft tube gates to be capable of closing under unbalance condition of water pressure.
6. Provision of operation and control of surge shaft gates from remote for quick isolation of water conductor system in case of failure of other line of defense / protection.
7. In the catchment area of the project, discharge-measuring system may be installed to give advance warning on the occurrence of flood in the river to take action for timely shut down of powerhouse.
8. The unit control panels, unit protection panels etc. to be located at the machine hall to the extent possible.
9. D.C. Batteries, batteries chargers & D.C. Distribution Boards to be placed at a floor higher than that of machine hall.
10. Location of Station Service Transformers and Station Service Board on floor at higher level. Provision of D.G. set connected to Station Service Board capable of operating dewatering pumps in case of failure of supply from other sources.
11. The hydro power station may employ quick methods for determination of silt concentration in the water. One simple method for measurement of silt concentration in the river water is to weigh silted water of a given volume and compare with relatively silt free water of same volume and correlation may be established between the difference in weight and silt concentration. With this, approximate silt concentration will be ascertained quickly and decision may be taken for shut down of powerhouse if silt level exceeds the permissible limit.

Note: Provisions under para 5(ii) may be reviewed at detailed design stage.

Appendix-5

Key preventive measures for disaster management in case of dam failure or sudden release of water

1. Setting-up of an empowered institutional framework for dam safety both at the Central, State and field unit level.
2. Preparation of Operation and maintenance manual for each dam;
3. Provisions to keep perpetual surveillance; carry out routine and periodic inspections; and monitor the operation and maintenance of the dam;
4. Establishment of well-designed hydro-meteorological network and an inflow forecasting system;
5. Establishment of an emergency flood warning system for the probable flood affected areas downstream of the dam;
6. Comprehensive safety evaluation of each large dam by the independent Dam Safety Review Panel at the specified interval.
7. Make available the information relating to maximum anticipated inflows and outflows including flood warning and an adverse impact of the same, if any, on persons and property towards the upstream or downstream of the dam, to the concerned authorities and also make available such information in public domain;
8. Preparation of emergency action plan for each dam. In the emergency action plan, set out the procedures to be followed for the protection of persons and property upstream or downstream of the dam in the event of an actual or imminent dam failure or to mitigate the effect of the disaster; identification of the likely catastrophic flood in the event of any failure of the dam, along with probable areas, population, structures and installations likely to be adversely affected due to flood water released from the reservoir; warning proce4dures, inundation maps and advance preparations for handing efficiently and in the best possible manner the likely adverse situations especially to avoid loss of human life;
9. Provision to put the emergency action plan into action as and when conditions arise which are or likely to be hazardous to a dam or potentially hazardous to public safety, infrastructure, other property or the environment.
10. Provision that every owner of the specified dam shall, while preparing and updating emergency action plan, undertake a consultation process with all disaster management agencies and other concerned department entrusted with disaster management and relief in the area likely to be affected and owners of other dams in the immediate vicinity likely to be affected, so as to bring transparency and allay any unwarranted fear on dam safety issues.

Provision for proper cooperation by the dam owner to Disaster Management Authorities under the Disaster Management Act, 2005 to meet or mitigate any disaster or emergency arising out of the specified dams

Appendix-6(a)

Checklist – 1 (To be examined in the HPA Division, CEA)

S. No	ITEM	REMARKS
1.	Name of the project	
2.	Location a) State(s) b) District(s) c) Taluka(s)/Tehsil(s) d) Basin e) River f) Longitude/Latitude g) Survey of India Topographical Map reference No.(s) h) Earthquake Zone number i) Complete address for correspondence along with pin code/ e-mail, FAX, Telephone numbers of Nodal Officer and Alternate Nodal Officer.	
3.	Whether the scheme is included in the National Electricity Plan. If so, whether the capacity and type of the scheme are same as given in the NEP.	* Yes / No
4.	Category of the project a) Power Project b) Power Project having reservoir for flood moderation. c) Multipurpose Project	*
5.	In case of category 4c) above, whether the clearance of Technical Advisory Committee of Ministry of Jal Shakti is available.	* Yes / No
6.	Mode of formation of the Generating Company in terms of Clause-2(28) of Electricity Act, 2003.	*
7.	Whether the Generating Company is Registered with the Registrar of the Company. Whether Article of Association has Generation as one of the objectives of the Company	* Yes / No
8.	What is the mode of allocation of the scheme whether through i) MOU route up to 100 MW ii) Tariff based bidding iii) MOU route with equity participation of State Govt. If so %age of State Govt. equity iv) Any other mode	*
9.	Whether authorization of the Competent Government in favour of the company to establish, operate and maintain specific Power Station available	* Yes /No
10.	Whether land availability Certificate from State Government available	Yes/No
11.	Whether State Govt. authorized the company to utilize water of that stretch of river.	Yes/No
12.	Whether Cost Estimates enclosed Present Day & Completed Cost - For Generating Companies in Central, State, Private and Joint Sectors and For SEBs & State power Utilities	*Yes/No

13.	Financial Analysis/ How the project is going to befinanced.	
14	Whether arrangement for absorption/ dispatch of powermade	Yes/ No
15	Whether arrangements for wheeling/ evacuation of Power made	Yes/ No
16.	Whether any agreement with the transmission company to provide evacuation system made. If so details of the agreement.	Yes/ No
17.	Whether Consent of STU/ State Govt. for availability of off peak power/energy (for pumped storage scheme) is obtained.	Yes/ No
18.	Whether salient features of the Project filled up in the prescribed format.	Yes/ No
19	Status of CWC /other affected States clearance frominter-state angle, if applicable	*
20.	Status of Defense clearance, if required	
21.	Whether the area is likely to have any Environmental and Ecological problems due to the altered surface water pattern If yes, whether preventive measures have been discussed	Yes /No
22	Status of MoEF&CC Clearance from Environment/ & Forest angle	
23.	Status of Clearance from Indian Board of Wild-Life	
24	Status of Clearance under Forest Rights Act from Ministry of Social Justice & Empowerment/ State Government (In case Scheduled Tribe population isaffected)	
25	Whether Rehabilitation and Resettlement Plan from State Revenue Department enclosed.	Yes/No
26	Whether approvals of CEA/ CWC/ GSI/ CSMRS have been obtained and included in the DPR in respect of following aspects -	*
	i). Gen. Layout by HCD Dte., CWC & HE&TD/ HPP&I Div., CEA	Yes/No
	ii). Hydrological Aspects by Hydrology Dte., CWC	Yes/No
	iii). Power Potential Aspects by HPA/ HPP&I Div. CEA	Yes/No
	iv). Foundation Engg. and Seismic Aspects by FE&SADte, CWC	Yes/No
	v). Geological Aspects by GSI	Yes/No
	vi). Construction Material Aspects by CSMRS	Yes/No
	vii).Inter-State Aspects by ISM Dte, CWC	Yes/No
	viii) Design of transmission system upto pooling point by PSPA Div., CEA	Yes/No
	ix) Dam/Barrage Design aspects by CMDD/BCD Dte., CWC	Yes/No
	x) Gates/HM Design aspects by Gates Design Dte., CWC	Yes/No
	xi) Hydel Civil Design aspects by HCD Dte., CWC	Yes/No
	xii) E&M Design aspects by HE&TD/ HPP&I Div, CEA	Yes/No
28	International Clearance by MoJS	Yes/No

Note : In case marked 'Yes' in the Check List, attach the supporting document.

* : Must for examination of DPR

Appendix-6(b)

Checklist – 2 (To be examined in CEA)

Following chapters/documents should be available in the DPR

i) Basin Planning*
ii) Power supply position in the State and justification of the scheme from power demand and supply considerations
iii) Project layout map and drawings
iv) Hydrology*
v) Power Potential Studies
vi) Geology
vii) Construction Material and Geotechnical aspects
viii) Foundation Engineering and Seismicity aspects
ix). Inter-State* aspects
x) Design of civil structures
xi) Design of Electrical & Mechanical equipment
xii) Power evacuation aspects (Transmission of Power and Communication Facilities (up to Cooling Point)).
xiii) Set of drawings giving general layout of the project, civil components, E&M equipment, Single Line switching scheme etc.

*Note: Chapters on Basin Planning and Inter-state Aspects are notrequired for Off-stream closed loop type PSPs.

No.15/2/2016-H.I(Pt.)(230620)
Government of India
Ministry of Power
***

Shram Shakti Bhawan, New Delhi,
Dated, the 28th September, 2021

OFFICE MEMORANDUM

Subject: Budgetary Support towards Cost of Enabling Infrastructure, i.e., roads/ bridges - regarding.

1. Ministry of Power (MoP), vide OM no. 15/2/2016-H-I(Pt.)(230620) dated 08.03.2019, notified various measures approved by the Union Cabinet to promote Hydropower in the country. This included budgetary support for Enabling Infrastructure i.e., roads/ bridges for Hydropower projects on case-to-case basis. The basic objective of budgetary support for enabling infrastructure is to reduce tariff of Hydropower projects by ensuring that consumers are charged cost related to power components only. The budgetary support shall be provided for projects starting construction after 08.03.2019, i.e., date of notification. It was also mentioned that the budgetary support would be provided after appraisal/approval of each project by PIB/ CCEA as per the extant rules/due process and would be provided by MoP through its budgetary grants. The limit of this budgetary support for such roads and bridges would be i) Rs. 1.5 crore per MW for projects upto 200 MW and ii) Rs. 1.0 crore per MW for projects above 200 MW.

2. **Eligibility for Budgetary Support towards Cost of Enabling Infrastructure**

   i. All large Hydropower projects (above 25 MW capacity) including Pumped Storage Projects (PSPs), concurred either by Central Electricity Authority (CEA) or the State Government, wherein Letter of Award (LoA) for the first major works package (Dam/ HRT/ Power House etc.) is issued after 08.03.2019, shall be eligible for budgetary support towards Cost of Enabling Infrastructure.

   ii. All Roads and Bridges required to connect major components like Dam, Power House, Adits, Surge shaft, Pressure Shaft, TRT, etc. of the project to the nearest

State/ National Highway including any strengthening/ widening works shall be considered eligible for budgetary support. However, these roads/ bridges would exclude the works, for which either the Letter of Award have been issued or are currently under implementation by any Central/ State Agency like NHAI, BRO, PWD, SRRDA, RWD, PWD (Roads), REO(Rural Engineering Organisation) etc. or Central Schemes like PMGSY (Pradhan Mantri Gram Sadak Yojna), MGNREGA or State specific schemes like Mukya Mantri Sadak Yojana etc.

iii. Cost of roads and bridges normally covered under head "R-Communications" in the concurred DPR including the following related costs shall be eligible for release as budgetary support:

a. Land acquisition cost
b. All statutory taxes/ levies, duties, cess, etc.

The specifications/ requirements like carrying capacity, turning radius, vertical clearance, width and gradient etc. of the roads/ bridges shall be as per concurred DPR.

3. The grant of Budgetary Support for the 'Enabling Infrastructure' shall be in the form of 'Reimbursement' after achievement of milestones mentioned in succeeding paragraphs related to the construction of project.

4. This OM shall be applicable to all eligible hydro projects i) wherein tariff is determined by CERC/ SERC under Section 62 of the Electricity Act 2003, ii) tariff is determined through competitive bidding under Section 63 of the Electricity Act 2003 iii) projects developed by agencies like BBMB which do not approach CERC/SERC for tariff determination/ adoption.

5. **'In-principle' approval of Ministry of Power for Grant of Budgetary Support**

The procedure for obtaining 'In-principle' approval of Ministry of Power for grant of budgetary support for 'Enabling infrastructure' prior to commencement of construction is given below:

a. After the DPR is concurred by CEA/ State Govt., the developer shall submit an application for 'in-principle' approval of budgetary support to CEA in the specified format **(Annexure-I)**. For DPRs concurred before the issue of these guidelines, the developer shall submit the updated cost of Enabling Infrastructure (based on indexation issued by CWC) in the application for 'in-principle' approval.

b. CEA shall examine applications received in consultation with CWC and forward its recommendations in the specified format **(Annexure-II)** to Ministry of

Power within one month of the end of the quarter in which application is received.

c. Ministry of Power shall issue 'in-principle' approval for Budgetary Support in the specified format **(Annexure-III)** to the Developer after receiving recommendations from CEA.

The 'in-principle' approval by Ministry of Power would be only for the purpose of facilitating financial closure, etc. of projects from Banks/ FIs and will not create any obligation or commitment on part of Government to provide Budgetary Support subsequently till all the conditions for grant of the same are satisfied.

6. **Procedure for Release of Grant towards Budgetary Support**

The grant of Budgetary Support for the 'Enabling Infrastructure' shall be provided to the developer in the form of 'Reimbursement' as per the following procedure:

i. After achievement of 25% financial progress w. r. t. approved / original project cost, the Developer shall submit the application in the specified format **(Annexure–IV)** to CEA for Reimbursement of Budgetary Support towards Enabling Infrastructure.

ii. The developer shall submit a Bank Guarantee in specified format **(Annexure-V)** to the CEA for an amount equivalent to eligible Budgetary Support (or the Support requested whichever is less) with validity period up to the date of determination of tariff by the regulatory commission. Ministry of Power may encash the Bank Guarantee, in part or full, upon the recommendation of CEA, in cases where (a) the project is delayed by more than two years beyond the scheduled commissioning date excluding any delays attributable to force majeure conditions and (b) in cases where the funds are found being used/ diverted for works other than those related to enabling infrastructure. CEA shall maintain a proper account of the Bank Guarantee and shall be the custodian of such Bank Guarantee.

iii. The developer shall submit verification records viz., auditor's certificate, self-certification, etc. along with the application as specified in para 6 (i) above in support of his claim for release of Grant.

iv CEA shall examine the applications received during each quarter in consultation with CWC and forward its recommendations in the given format **(Annexure-VI)** to Ministry of Power within one month of end of each quarter.

v On receiving recommendation from CEA, Ministry of Power shall process and obtain the approval of the competent authority for grant as per delegation of powers and General Financial Rules issued by Ministry of Finance, GoI which would be released through budgetary Provisions of Ministry of Power.

vi The Grant shall be limited to the amount as per "In-Principle' approval or the actual expenditure incurred on Enabling Infrastructure whichever is lower under the overall ceilings mentioned in para 1 above.

7. The physical progress of the enabling infrastructure works of each of the projects shall be monitored by a Monitoring Committee to be constituted by CEA and a Status Report, in this regard, shall be submitted to MoP on quarterly basis.

8. By 15th July of every year, the CEA shall send Estimates for Annual Budgetary Grants for the next financial year to Ministry of Power. These budgetary estimates would be based on projects scheduled for completion of milestone, as specified in para 6 above, during the next year.

9. A Report on the 'In-principle' approvals granted and Budgetary Support released during the year shall be sent by CEA to Ministry of Power every year by 31st May.

10. If ownership of the project changes before the commissioning of the project, MoP and CEA would be duly informed within three (03) months of such change.

11. This issues with the approval of Hon'ble Minister for Power.

29/9/21.

(Raghuraj Rajendran)
Joint Secretary

To:

1. **Principal Secretary/Secretary (Power / Energy), State Governments/UTs.**
2. **Secretary, CERC/FOR, Chanderlok Building, Janpath, New Delhi**
3. **Secretary, State Electricity Regulatory Commissions/Joint Electricity Regulatory Commissions**

Copy to:

1. **Secretary, MNRE, CGO Complex, New Delhi**
2. **Secretary, Ministry of Jal Shakti**
3. **Chairperson, CEA, Sewa Bhawan, RK Puram, New Delhi**
4. **Chairperson, CWC, RK Puram, New Delhi**

Annexure - I

Application for In-principle approval of budgetary support of Enabling Infrastructure works of Hydropower Projects from Ministry of Power

To,

Central Electricity Authority
Sewa Bhawan, Sector-1,
R K Puram, New Delhi - 110066.

Sir,

In terms of OM no. 15/2/2016-H.I(Pt.)(230620) dated 28 /09/2021, it is requested to grant "in-principle approval" for budgetary support for cost of enabling infrastructure for _____project of ____ MW as per details below:

S. No.	Particulars of the Project	Description
1	Name of the Developer	
2	Date of Implementation Agreement between State Govt. & Developer	
3	Date of DPR Concurrence (TEC Letter enclosed)	
4	Salient features of the project (details enclosed)	
5	Date of award of 1st major civil work (if project construction has started)	
6	Estimated Cost of project as per TEC in Rs.....	
7	Estimated Cost of Enabling Infrastructure as per TEC (in Rs.)	
8	Amount Claimed for Enabling Infrastructure (in Rs.) as per CWC Indexation	
9	Justification of the proposal (Justification regarding length of road required and existing status of roads in the project area)	
10	**Status of clearances:**	
	Environmental Clearance, Forest Clearances – I & II from MoEF&CC	
	Wildlife clearance by National Board of Wildlife	
	State Govt. approval for State Sector projects	
	Clearance from MoWR, RD&GR for International aspects	
	Defence Clearance from Ministry of Defence (if required)	

	Clearance from Ministry of Tribal Welfare (if required)						
11	**Timeline of activities of enabling infrastructure works**						
	Description	Year..... to Year.....					
		Y1	Y2	Y3	Y4	.....	(Yn)
	Letter of Award, signing of Contract & Mobilization						
	Details of Enabling Infrastructure Works 1.---------- 2.----------						

We hereby certify and agree as follows:

a. Information given above is correct as per records maintained for the purpose.
b. No proposal for approval has been submitted to CEA for the scheme in past.
c. Work to be carried out under the above project is as per the sanctioned scheme and is in line with Technical Standards / Guidelines issued by CEA or any other such Authority.
d. The BG is liable to be encashed by the CEA , in part or full, in case of delay in completion of works by the developer by more than two years excluding the delay attributable to force majeure conditions and if fund is found being used/ diverted for works other than that related to enabling infrastructure or if the project gets abandoned.
e. The amount provided by Ministry of Power as budgetary support for Enabling Infrastructure shall not be claimed as tariff.

Date.....

Signature:.....

Name:.....

Seal: .....

(Authorized Representative)

Appendix to Annexure-I

Certificate by MoRTH/ State/ Local Body (as applicable)

To Whomsoever it may concern

Ref. No.: **Date:**

This is to certify that M/s .....have submitted application number .....dated..... seeking information regarding construction of following enabling infrastructure (roads/ bridges) for .....Hydropower project:

1. ----------
2. ----------
3. ----------

–
–
–
–
n. ----------

It is to state that neither Letter of Award have been issued nor the above works are under implementation. Further, this department has no objection in respect of the construction of above roads/ bridges for the above project by the ..... (Name of the Developer).

Signature:
Name:
(Authorized Signatory)

Annexure - II

Recommendation of CEA to Ministry of Power for 'In-principle' approval of budgetary support for Enabling Infrastructure works

	(to be filled by CEA)						
	Project Proposal No.						
S. No.	**Particulars of the Project**						**Description**
1	Name of the Developer						
2	Capacity of the project (in MW)						
3	Date of DPR Concurrence						
4	Salient features of the project (details enclosed)						
5	Date of award of 1st major civil work (if project construction has started)						
6	Estimated Cost of project as per TEC in Rs.....						
7	Estimated Cost of Enabling Infrastructure as per TEC (in Rs.)						
8	Amount Claimed for Enabling Infrastructure (in Rs.) as per CWC Indexation						
9	Justification of the proposal						
10	**Status of clearances:**						
	Environmental Clearance, Forest Clearances – I & II from MoEF&CC						
	Wildlife clearance by National Board of Wildlife						
	State Govt. approval for State Sector projects						
	Clearance from MoWR, RD&GR for International aspects						
	Defence Clearance from Ministry of Defence (if required)						
	Clearance from Ministry of Tribal Welfare (if required)						
11	**Timeline of activities of enabling infrastructure works**						
	Description	Year..... to Year.....					
		Y1	Y2	Y3	Y4	.....	(Yn)
	Letter of Award, signing of Contract & Mobilization						

	Details of Enabling Infrastructure Works 1.---------- 2.----------							
	Recommendation of CEA along with reasons therefor?							

Signature of the Competent Authority (CEA)

Certificate by HPM Division, CEA
To Whomsoever it may concern

Ref. No.: **Date:**

This is to certify that M/s .....have achieved physical/ financial progress of enabling infrastructure works being in line with the scheduled timelines as per Format- .... under these guidelines.

This certificate is issued without prejudices to the rights vested in this Division.

Signature:
Name:
(Authorized Signatory)

Annexure - III

In-principle approval for Budgetary Support to Enabling Infrastructure

To,

____

Sir,

Please refer to your application no._____ dated ____to CEA seeking in-principle approval for budgetary support of cost of enabling infrastructure of Rs. _____ on the basis of cost concurred in the DPR of _____ project of ___ MW.

In this, regard, in-principle approval is hereby accorded for Budgetary Support of Rs. _____ for Enabling Infrastructure works, as recommended by the CEA and as per guidelines issued by Ministry of Power vide OM no. 15/2/2016-H.I(Pt.)(230620) dated 28 /09/2021 and in terms of OM no. 15/2/2016-H.I(Pt.)(230620) dated 08.03.2019.

This in-principle approval is only for purpose of facilitating financial closure, etc. of projects and will not create any obligation or commitment on part of government to provide budgetary support till all the conditions are satisfied. The funds shall be released only after the project is commissioned and tariff petition (including cost of enabling infrastructure) is approved by CERC/ SERC.

Terms and Conditions:

a. Enabling Infrastructure works proposed for funding from Ministry of Power shall not be posed for funding under any other scheme of the Government of India.
b. The developer shall submit Project Status Report to CEA on quarterly basis. CEA would take half-yearly meeting to review progress of enabling infrastructure works.
c. If there is change in ownership before the projects is commissioned, MoP and CEA would be duly informed within three (03) months.
d. All other terms and conditions of OM no 15/2/2016-H.I(Pt.)(230620) dated 28/09/2021 shall apply.

Date:

Signature:
Name:
(Authorized Representative)

Annexure - IV

Application for Release of budgetary support for Enabling Infrastructure works

To,

CEA,
Sewa Bhawan, Sector-1,
R K Puram, New Delhi -66.

Sir,

In terms of OM no.15/2/2016-H.I(Pt.)(230620) dated 26 /09/2021, it is requested to reimburse the cost of enabling infrastructure i.e., roads/ bridges for _____project of ____ MW as per details below:

S. No.	Particulars of the Project	Description
1	Name of the Developer	
2	Date of Implementation Agreement between State Govt. & Developer	
3	Date of DPR Concurrence (TEC Letter enclosed)	
4	Salient features of the project (details enclosed)	
5	Justification of the proposal (Justification regarding length of road required and existing status of roads in the project area)	
6	Details of enabling infrastructure works completed (Length of road, etc.)	
7	Date of award of 1st major civil work (details enclosed)	
8	Estimated Cost of Project as per TEC in Rs.....	
9	Estimated Cost of Enabling Infrastructure works as per TEC (in Rs.)	
10	Date of in principle approval (if applicable) for budgetary support for enabling infrastructure works and amount approved (details enclosed)	
11	Date of achievement of 25% financial progress w.r.t. approved project cost for reimbursement of expenditure incurred (enclose details auditor's certificate, self-certification, etc.)	

12	Details of Bank Guarantee (Amount in Rs. Crore, Validity Period, etc.)	
13	Details of bank account to which funds are to be transferred (details enclosed)	

We hereby certify that the information given above is correct as per records maintained for the purpose.

Date.....

Signature:.....
Name:.....
Seal: .....
(Authorized Representative)

Annexure-V

Format for Bank Guarantee

(To be on non-judicial stamp paper of appropriate value as per Stamp Act relevant to place of execution.)

In consideration of the ----- [Insert name of the Developer/Project Company] (hereinafter referred to as 'Developer') (which expression shall unless repugnant to the context or meaning thereof include its executers, administrators, successors and assignees) submitting the application for release of grant under budgetary support for Enabling Infrastructure i.e., roads/ bridges for Hydro Electric Projects from Ministry of Power (hereinafter referred to as 'Guidelines') for the Project of the capacity of ..... MW, at .....[Insert name of the place] and as per the terms of the 'Guidelines', the [insert name & address of bank] hereby agrees unequivocally, irrevocably and unconditionally to pay to Ministry of Power at [Insert Name of the Place from the address of the Ministry of Power] forthwith on demand in writing from Ministry of Power or any Officer authorized by it in this behalf, any amount up to and not exceeding Rupees------ [Total Value equivalent to eligible Budgetary Support] only, on behalf of M/s ----------[Insert name of the Developer / Project Company]

This Guarantee shall be valid and binding on this Bank up to and including.....[insert date i.e. upto the date of determination of tariff by the regulatory commission] and shall not be terminable by notice or any change in the constitution of the Bank or the term of contract or by any other reasons whatsoever and our liability hereunder shall not be impaired or discharged by any extension of time or variations or alternations made, given, or agreed with or without our knowledge or consent, by or between parties to the respective agreement.

Our liability under this Guarantee is restricted to Rs. ----------only.

Our Guarantee shall remain in force until.....[insert date] Ministry of Power shall be entitled to invoke this Guarantee till .....[insert date]

The Guarantor Bank hereby agrees and acknowledges that Ministry of Power shall have a right to invoke this BANK GUARANTEE in part or in full, as it may deem fit.

The Guarantor Bank hereby expressly agrees that it shall not require any proof in addition to the written demand by Ministry of Power, made in any format, raised at the above mentioned address of the Guarantor Bank, in order to make the said payment to Ministry of Power.

The Guarantor Bank shall make payment hereunder on first demand without restriction or conditions and notwithstanding any objection by ----------[Insert name of the Developer / Project Company] and/or any other person. The Guarantor Bank shall not require Ministry of Power to justify the invocation of this BANK GUARANTEE, nor shall the Guarantor Bank have any recourse against Ministry of Power in respect of any payment made hereunder.

This BANK GUARANTEE shall be interpreted in accordance with the laws of India and the courts at Delhi shall have exclusive jurisdiction.

The Guarantor Bank represents that this BANK GUARANTEE has been established in such form and with such content that it is fully enforceable in accordance with its terms as against the Guarantor Bank in the manner provided herein.

This BANK GUARANTEE shall not be affected in any manner by reason of merger, amalgamation, restructuring or any other change in the constitution of the Guarantor Bank.

This BANK GUARANTEE shall be a primary obligation of the Guarantor Bank and accordingly Ministry of Power shall not be obliged before enforcing this BANK GUARANTEE to take any action in any court or arbitral proceedings against the Developer / Project Company , to make any claim against or any demand on the Developer / Project Company or to give any notice to the Developer / Project Company or to enforce any security held by Ministry of Power or to exercise, levy or enforce any distress, diligence or other process against the Developer / Project Company .

The Guarantor Bank acknowledges that this BANK GUARANTEE is not personal to Ministry of Power and may be assigned, in whole or in part, (whether absolutely or by way of security) by Ministry of Power to any entity to whom Ministry of Power is entitled to assign its rights and obligations under these 'Guidelines'.

Notwithstanding anything-contained herein above, our liability under this guarantee is restricted to Rs. ..... only and it shall remain in force till .....

We are liable to pay the Guarantee amount or any part thereof under this Bank guarantee only if Ministry of Power serves upon us a written claim or demand.

Signature_____

Name_____

Power of Attorney No._____

For

_____ [Insert Name of the Bank]

E-mail ID of the bank:

Banker's Stamp and Full Address.

Dated this_____day of____, 20_____

Witness:

1. ..... Signature

Name and Address

Witness:

2. ..... Signature

Name and Address

Notes:

The Stamp Paper should be in the name of the Executing Bank and of appropriate value.

The Performance Bank guarantee shall be executed by any of the Nationalised or leading Private Sector Banks.

Annexure – VI

Recommendation of CEA for release of budgetary support for enabling infrastructure works

(to be filled by CEA)		
Project Proposal Number:		
S. No.	**Particulars of the Project**	**Description**
1	Name of the Developer	
2	Date of Implementation Agreement between State Govt. & Developer	
3	Date of DPR Concurrence (TEC Letter enclosed)	
4	Salient features of the project (details enclosed)	
5	Justification of the proposal (Justification regarding length of road required and existing status of roads in the project area)	
6	Details of enabling infrastructure works completed (Length of road, etc.)	
7	Date of award of 1st major civil work (details enclosed)	
8	Estimated Cost of Project as per TEC in Rs.....	
9	Estimated Cost of Enabling Infrastructure works as per TEC (in Rs.)	
10	Date of in principle approval (if applicable) for budgetary support for enabling infrastructure works and amount approved (details enclosed)	
11	Date of commissioning of project (details enclosed)	
12	Date of achievement of 25% financial progress w.r.t. approved project cost for reimbursement of expenditure incurred.	
13	Details of Bank Guarantee (Amount in Rs. Crore, Validity Period, etc.)	
14	Details of bank account to which funds are to be transferred (details enclosed)	
Recommendation of CEA along with reasons therefor?		

Signature of the Competent Authority (CEA)
Name:
Stamp:

No.15/2/2016-H.I(Pt.)(260640)
Government of India
Ministry of Power
***

Shram Shakti Bhawan, New Delhi,
Dated : 28th January, 2022

OFFICE MEMORANDUM

Subject: Budgetary Support towards Cost of Enabling Infrastructure, i.e., roads/ bridges - regarding.

The undersigned is directed to refer to this Ministry's O.M. of even number dated: 28/09/2021 (**copy enclosed**) on the subject mentioned above and to partially modify the guidelines as given below:-

Sl. No.	Para in O.M. referred to above	To be read as
1	**Para 2(ii):** All roads and bridges required to connect major components like Dam, Power House, Adits, Surge Shaft, Pressure Shaft, TRT etc of the project to the nearest State/ National Highway including any strengthening/ widening works shall be considered eligible for budgetary support. However, these roads/bridges would exclude the works, for which either the Letter of Award have been issued or are currently under implementation by any Central/State Agency like NHAI, BRO, PWD, SRRDA, RWD, PWD (Roads), REO (Rural Engineering Organization) etc, or Central Schemes like PMSGY (Pradhan Mantri Gram Sadak Yojana), MGNREGA or State specific schemes like Mukya Mantri Sadak Yojana etc.	All **permanent** roads and bridges required to connect major components like Dam, Power House, Adits, Surge Shaft, Pressure Shaft, TRT etc of the project to the nearest State/ National Highway including any strengthening/ widening works shall be considered eligible for budgetary support. However, these roads/bridges would exclude the works, for which either the Letter of Award have been issued or are currently under implementation by any Central/State Agency like NHAI, BRO, PWD, SRRDA, RWD, PWD (Roads), REO (Rural Engineering Organization) etc, or Central Schemes like PMSGY (Pradhan Mantri Gram Sadak Yojana), MGNREGA or State specific schemes like Mukya Mantri Sadak Yojana etc.
2	**Para –3:** The grant of budgetary support shall be in the form of 'Reimbursement' after achievement of milestones mentioned in the succeeding paragraphs related to construction of project	The grant of budgetary support shall be in the form of 'Reimbursement' **after complete construction of a defined part/ full length of the eligible road / bridge** and achievement of milestones mentioned in the succeeding paragraphs related to construction of project

Contd..P/2

3	**Para-3 of Annexure-III:** This in-principle approval is only for purpose of facilitating financial closure, etc. of projects and will not create any obligation or commitment on part of government to provide budgetary support till all the conditions are satisfied. The funds shall be released only after the project is commissioned and tariff petition (including cost of enabling infrastructure) is approved by CERC/ SERC.	This in-principle approval is only for the purpose of facilitating financial closure, etc. of projects and will not create any obligation or commitment on part of government to provide budgetary support till all the conditions are satisfied. The funds shall be released **in the form of 'Reimbursement' after complete construction of a part/full length of eligible roads and complete construction of bridge/bridges and achieving of 25% financial progress w.r.t approved/original project cost.**
4	Certificate attached in page no.12 of O.M. dated: 28/09/2021	Certificate attached in page no.12 of O.M. dated: 28/09/2021 shall now be Appendix to Annexure-VI.

2. This issues with the approval of Hon'ble Minister for Power.

(Raghuraj Rajendran)
Joint Secretary (Hydro)

To:

1. **Principal Secretary/Secretary (Power/Energy), State Governments/UTs.**
2. **Secretary, CERC/FOR, Chanderlok Building, Janpath, New Delhi**
3. **Secretary, State Electricity Regulatory Commissions/Joint Electricity Regulatory Commissions**

Copy to:

1. **Secretary, MNRE, CGO Complex, New Delhi**
2. **Secretary, Ministry of Jal Shakti**
3. **Chairperson, CEA, Sewa Bhawan, RK Puram, New Delhi**
4. **Chairperson, CWC, RK Puram, New Delhi**

Copy also for information to:

1. **PS to Hon'ble Minister of Power/ Ps to Hon'ble Minister of State for Power.**
2. **Sr. PPS to Secretary (Power)/ Sr.PPS to AS&FA/ PPS to AS(Hydro)/ PPS to JS(Hydro)**
3. **PPS/Ps to All Joint Secretaries/Directors/Deputy Secretaries in the Ministry of Power.**

No.15/2/2016-H.I(Pt.)(260640)
Government of India
Ministry of Power
***

Shram Shakti Bhawan, New Delhi
Dated, the 15th February, 2023

OFFICE MEMORANDUM

Subject: Budgetary Support towards Cost of Enabling Infrastructure, i.e., Roads/ Bridges - Revision of regarding.

The undersigned is directed to refer to this Ministry's O.M. of even number dated 28/09/2021 and modifications dated 28/01/2022 (**copy enclosed**) on the subject mentioned above and to partially modify the OM dated 28/01/2022, as given below:-

Sl. No.	O.M. referred to above	To be read as
1.	**Sl.No.–2:** The grant of budgetary support shall be in the form of 'Reimbursement' after complete construction of a defined part/ full length of the eligible road / bridge and achievement of milestones mentioned in the succeeding paragraphs related to construction of the project.	**Sl.No.–2:** The grant of budgetary support shall be in the form of 'Reimbursement' after achievement of 25% financial progress w.r.t. approved/original project cost as under: i. Grant of budgetary support for a defined part/ full length of eligible roads shall be reimbursed in two stages: a. First Stage – After operationalization of Motorable road (construction of kachha/ unpaved road) b. Second Stage- After black-topping/ metalling/ finishing works of defined part/ full length of eligible roads. Further, the cost of repair & maintenance works of roads between above mentioned stages is **not eligible** for budgetary support towards cost of enabling infrastructure. ii. Grant of budgetary support for eligible bridges shall be reimbursed only after complete construction of the bridge.

2.	**Sl.No.-3: (Para -3 of Annexure-III)** This in-principle approval is only for purpose of facilitating financial closure, etc. of projects and will not create any obligation or commitment on part of government to provide budgetary support till all the conditions are satisfied. The funds shall be released in the form of 'Reimbursement' after complete construction of a part/full length of eligible roads and complete construction of bridge/bridges and achieving of 25% financial progress w.r.t approved/original project cost.	**Sl.No.-3: (Para -3 of Annexure-III):** This in-principle approval is only for the purpose of facilitating financial closure, etc. of projects and will not create any obligation or commitment on the part of Government to provide budgetary support, till all the conditions are satisfied. The funds shall be in the form of 'Reimbursement' after achievement of 25% financial progress w.r.t. approved/original project cost as under: i. Grant of budgetary support for a defined part/ full length of eligible roads shall be reimbursed in two stages: a. First Stage – After operationalization of Motorable road (construction of kachha/ unpaved road). b. Second Stage- After black-topping/ metalling/ finishing works. ii. Grant of budgetary support for eligible bridges shall be reimbursed only after complete construction of the bridge.

2. This issues with the approval of Hon'ble Minister for Power & NRE.

15/2/23

(Afzal Mohammad)
Joint Secretary (Hydro)

To:

1. **Principal Secretary/ Secretary (Power/Energy), State Governments/UTs**
2. **Secretary, CERC/FOR, Chanderlok Building, Janpath, New Delhi**
3. **Secretary, State Electricity Regulatory Commissions/Joint Electricity Regulatory Commissions**

Copy to:

1. Secretary, MNRE, CGO Complex, New Delhi
2. Secretary, Ministry of Jal Shakti
3. Chairperson, CEA, Sewa Bhawan, RK Puram, New Delhi
4. Chairperson, CWC, RK Puram, New Delhi

Copy also for information to:

1. PS to Hon'ble Minister of Power/ Ps to Hon'ble Minister of State for Power.
2. Sr. PPS to Secretary (Power)/ Sr.PPS to AS&FA/ PPS to AS(Hydro)/ PPS to JS(Hydro)
3. PPS/ Ps to All Joint Secretaries/ Directors/ Deputy Secretaries in the Ministry of Power

No.15/2/2016-H-I(Pt.) (230620)
Government of India
Ministry of Power
***

Shram Shakti Bhawan, New Delhi,
Dated, the 23rd September, 2021

OFFICE MEMORANDUM

Subject: Budgetary Support for Flood Moderation/Storage Hydro Electric Projects (HEPs) - regarding.

Ministry of Power (MoP), vide OM no. 15/2/2016-H-I(Pt.) (230620) dated 08.03.2019, notified various measures approved by the Union Cabinet to promote Hydropower in the country. This included budgetary support for Flood Moderation component for Storage Hydropower projects to be set up in future. The basic objective of budgetary support for Flood Moderation component is to reduce tariff of Hydropower projects by ensuring that consumers are charged cost related to power components only. The value of flood moderation will be worked by technical agencies, viz., CWC, etc. in accordance with the guidelines. The amount required for flood moderation/ storage costs shall be released, through Ministry of Power budgetary provisions after appraisal of each project, on a case-to-case basis, by Public Investment Board (PIB)/ Cabinet Committee on Economic Affairs (CCEA) as per due process.

2. One of the important objectives is to promote ease of doing business i.e. devising a mechanism without duplication of checking and evaluation by multiple agencies. Accordingly, Central Electricity Authority (CEA) and the CWC shall verify the claims of Developer and recommend expenditure to be reimbursed to MoP for release of funds to the Developer. The Designated Independent Agency (DIA) of CERC/SERC would approve the final project cost/ flood moderation cost at the time of filing of tariff petition by the Developer.

3. **Eligibility for Budgetary Support for Flood Moderation component**

i. Eligible projects shall mean All Central, State and Private Sector storage hydro projects (above 25 MW capacity) having explicit Flood Moderation component which have been concurred either by CEA or the State Government and wherein Letter of Award (LoA) for any major works has been issued or is being issued on competitive bidding basis after the date of notification of above mentioned OM dated 08.03.2019. This is applicable to all eligible projects which shall be taken up for construction by 31st March, 2030.

ii. Flood Moderation works shall comprise Dam & appurtenant works and other related activities and their respective joint cost would be apportioned. The eligible expenditure shall also include the following:

a. Interest During Construction (IDC) and any variation in cost with respect to originally sanctioned amount,

b. Land acquisition cost for flood moderation,

c. All statutory taxes/levies, duties, cess, entry tax, etc., including any variation thereof.

iii. Any expenditure, which is not directly related to Flood Moderation works shall be counted as ineligible expenditure. Further, any enhancement of the expenditure on land acquisition after the commissioning of the project shall be treated as ineligible expenditure.

iv. This OM shall be applicable to all eligible hydro projects i) wherein tariff is determined by CERC/ SERC under Section 62 of the Electricity Act 2003, ii) tariff is determined through competitive bidding under Section 63 of the Electricity Act 2003 iii) projects developed by agencies like BBMB which do not approach CERC/SERC for tariff determination/ adoption.

4. Ceiling Limit for Reimbursement of Expenditure Incurred

i. There is no normative ceiling limit for reimbursement of expenditure incurred on Flood Moderation. However, the reimbursement of the cost of Flood Moderation component to the Developers shall be limited to the total cost of Flood Moderation component of as per 'In-principle' approval issued by Ministry of Power, on case-to-case basis, based on recommendation of CEA/ CWC as mentioned in succeeding para 5. However, if the awarded cost is less than the estimated cost as per approval then the flood moderation component will be calculated based on the awarded cost. The expenditure on flood moderation works incurred by the developer beyond the expenditure approved by CEA/ CWC, otherwise found admissible by CERC/SERC, shall be charged to the Project and recovered through tariff.

5. Methods for estimation of Flood Moderation component

i The cost towards flood moderation works would be worked out as the least of the apportioned costs arrived out using the following methods:

a. Bearability Concept
b. Use of facilities Method
c. Equal apportionment method

ii. The joint cost to be apportioned shall comprise cost of Dam & appurtenant works incl. Spillway and Outlet works etc., cost of land acquisition and any other related activities. The inputs used in the above cost apportionment methods, as decided by CWC/ CEA, shall be final and binding on Project Proponent.

6. 'In-principle' approval of Ministry of Power for Grant of Budgetary Support

The hydro projects costing more than Rs. 1000 Crores are presently being concurred by CEA while projects costing upto Rs. 1000 Crores are concurred by State Governments. The complete technical and financial details on Flood Moderation component shall be incorporated in the Detailed Project Report (DPR) for concurrence either by CEA or the State Government, as applicable, and the Flood Component cost would be estimated as under:

i. For the DPRs already concurred prior to the issuance of this OM, the cost of Flood Moderation component of Storage hydro projects would be updated by the developer based on indexation which shall be appraised/ vetted by CEA in consultation with CWC in accordance with the extant guidelines.

ii. For the DPRs concurred after the issuance of this OM, the DPR shall include a chapter indicating technical and financial provisions for Flood Moderation along with a comparison between 'with' and 'without' scenarios of Flood Moderation supported by proper justification. The same shall be appraised/ vetted by CEA in consultation with CWC at the time of DPR concurrence/ appraisal in accordance with the extant guidelines.

iii. A cost benefit analysis for arriving at the economically viable height of storage Dam by optimizing flood cushion during Monsoon and minimizing cost of energy generation would be incorporated by the Developer in the DPR.

iv. The application for 'In-principle' approval of funds shall be submitted by the Developer to Nodal Agency (CEA) at least six months prior to the date of start of construction (Zero Date) in prescribed format **(Annexure-I)**. The Zero Date of construction for purpose of this OM shall be the date of Letter of Award for Dam works.

v. CEA shall examine the applications received in each quarter and forward its recommendations **(Annexure-II)** to Ministry of Power within one (01) month of the end of each quarter.

vi. Ministry of Power shall issue 'in-principle' approval for budgetary support in the specified format **(Annexure-III)** to the Developer after receiving recommendations from CEA. This 'in-principle' approval is only for purpose of facilitating financial closure, etc. of projects and will not create any obligation or commitment on part of government to provide budgetary support subsequently till all the conditions for grant of budgetary are satisfied.

7. **Procedure for Grant of the Budgetary Support through Reimbursement**

i. The total cost of Flood Moderation component shall be reimbursed to the developer in five equal instalments during the construction based on achievement of milestones relating to dam height above Bed Level (H) as under:

	INSTALMENT				
	1	2	3	4	5
Actual Dam Height (H) above Bed Level	**10% of H**	**25% of H**	**40% of H**	**70% of H**	**100% of H**

Note: The Reimbursement shall be limited to actual expenditure if it is less than the instalment due.

ii. The application for reimbursement of expenditure incurred on Flood Moderation works shall be submitted by the project developer as per **(Annexure-IV).**

iii. The developer shall submit a Bank Guarantee in specified format **(Annexure-VI)** to the CEA for an amount equivalent to eligible Budgetary Support (or the Support requested whichever is less) with validity period up to date of determination of tariff by the regulatory commission. Ministry of Power may encash the Bank Guarantee, in part or full, upon the recommendation of CEA, in cases where (a) the project is delayed by more than two years beyond the scheduled commissioning date excluding any delays attributable to force majeure conditions and (b) in cases where the funds are found being used/ diverted for works other than those related to enabling infrastructure. CEA shall maintain a proper account of the Bank Guarantee and shall be the custodian of Bank Guarantee.

iv. CEA shall examine the applications received during the quarter and forward its recommendations **(Annexure-V)** to Ministry of Power within one month after end of each quarter.

v. On receiving recommendation from CEA, Ministry of Power shall process and obtain the approval of the competent authority for grant as per delegation of powers and General Financial Rules issued by Ministry of Finance, GoI which would be released through budgetary Provisions of Ministry of Power.

8. If ownership of the project changes before the commissioning of the project, MoP and CEA would be duly informed within three (03) months of such change.

9. CEA shall constitute a Monitoring Committee to monitor the physical progress of the Flood Moderation works.The developer shall submit progress report on quarterly basis to Monitoring Committee for its review which shall be sent to MOP each quarter. An Annual Report of the 'In-principle' approvals granted and Budgetary Support released during the year shall also be compiled by CEA and sent to Ministry of Power.

10. By 15th July of every year, the CEA shall send Annual Budgetary Estimates for the next financial year to Ministry of Power. The budgetary estimates would be based on projects scheduled for achievement of Dam height milestones in the next year.

11. This issues with the approval of Hon'ble Minister of Power.

28/9/21.

(Raghuraj Rajendran)
Joint Secretary

To:

1. **Principal Secretary/Secretary (Power / Energy), State Governments/UTs.**
2. **Secretary, CERC/FOR, Chanderlok Building, Janpath, New Delhi**
3. **Secretary, State Electricity Regulatory Commissions/Joint Electricity Regulatory Commissions**

Copy to:

1. **Secretary, MNRE, CGO Complex, New Delhi**
2. **Secretary, Jal Shakti**
3. **Chairperson, CEA, Sewa Bhawan, RK Puram, New Delhi**
4. **Chairperson, CWC, RK Puram, New Delhi**

Copy also for information to:

1. **All Joint Secretaries/EA, Ministry of Power**
2. **PS to Hon'ble Minister of Power/ PS to Hon'ble Minister of State for Power.**
3. **Sr. PPS to Secretary (Power)/ Sr.PPS to AS&FA/ Sr.PPS to AS(Hydro)/PPS to JS(Hydro).**

Annexure-I

Application for 'In-principle' approval of funding of Cost of Flood Moderation of Storage Hydro Electric Projects from Ministry of Power

To,

CEA

Sewa Bhawan, Sector-1, R K Puram,
New Delhi 110066.

Sir,

In terms of OM no. 15/2/2016-H.I(Pt.)(230620) dated 08.03.2019 and subsequent OM no. 15/2/2016-H.I(Pt.)(230620) dated: 28 /09/2021, it is requested to grant "in-principle approval" for budgetary support towards cost of flood moderation for _____project of ____ MW as per details below:

Sr. No.	Particulars of the Project	Description
1.	Name of the Developer	
2.	Date of Implementation Agreement between State Govt. & Developer	
3.	Date of Concurrence of DPR (TEC letter enclosed)	
4.	Salient features of the Project (details enclosed)	
5.	Total Updated Project Cost Estimate as per TEC in Rs.	
6.	The total amount (updated, based on indexation) corresponding to Flood Moderation component in Rs.....	
7.	Zero Date of Start of Pre-construction works	
8.	Zero Date of Start of Construction	
19.	LoA for Dams Works	
10.	Target Date for completion of River Diversion Works.	
11.	**Status of Clearances:**	
	Environmental Clearance, Forest Clearances – I & II from MoEF&CC	
	Wildlife clearance by National Board of Wildlife	
	State Govt. approval for State Sector projects	
	Clearance from MoWR, RD&GR for International aspects	
	Defence Clearance from Ministry of Defence (if required)	
	Clearance from Ministry of Tribal Welfare (if required)	
	PIB/CCEA Approval for Govt. funded/ Central Sector Projects and State Approval for State funded projects	
	Ministry of Home Affairs Clearance for participation of foreign companies in tenders for work packages of Hydroelectric Projects in sensitive areas.	
12.	**Timeline of activities of Flood Moderation works**	

	Description	Year..... to Year.....					
		Y1	Y2	Y3	Y4	.....	(Yn)
	Letter of Award, signing of Contract & Mobilization						
	Details of Flood Moderation Works 1.---------- 2.----------						

We hereby certify and agree as follows:

a. The information given as above is correct as per records maintained for the purpose.
b. No proposals have been submitted to CEA for approval/vetting for this scheme in the past.
c. The work to be carried out under the above project is as per the sanctioned scheme and is in line with relevant Standards / Guidelines issued by CEA/CWC etc. or any other such Authority.
d. The BG is liable to be encashed by the CEA , in part or full, in case of delay in completion of works by the developer by more than two years excluding the delay attributable to force majeure conditions and if fund is found being used for works other than those related to flood moderation or if the Project gets abandoned.
e. No tariff shall be claimed for the cost of flood moderation to the extent funded/ reimbursed under the Scheme by Ministry of Power.

Date.....

Signature:.....

Name:.....

Seal:.....

(Authorized Representative)

Annexure-II

Recommendation of CEA to Ministry of Power for 'In-principle' approval of budgetary support for Flood Moderation

	(to be filled by CEA)						
	Project Proposal No.						
Sr. No.	**Particulars of the Project**	**Description**					
1.	Name of the Developer						
2.	Date of Implementation Agreement between State Govt. & Developer						
3.	Date of Concurrence of DPR (TEC letter enclosed)						
4.	Salient features of the Project (details enclosed)						
5.	Total Updated Project Cost Estimate as per TEC in Rs.						
6.	The total amount (updated, based on indexation) corresponding to Flood Moderation component in Rs.....						
7.	Zero Date of Start of Pre-construction works						
8.	Zero Date of Start of Construction						
19.	LoA for Dams Works						
10.	Target Date for completion of River Diversion Works.						
11.	**Status of Clearances:**						
	Environmental Clearance, Forest Clearances – I & II from MoEF&CC						
	Wildlife clearance by National Board of Wildlife						
	State Govt. approval for State Sector projects						
	Clearance from MoWR, RD&GR for International aspects						
	Defence Clearance from Ministry of Defence (if required)						
	Clearance from Ministry of Tribal Welfare (if required)						
	PIB/CCEA Approval for Govt. funded/ Central Sector Projects and State Approval for State funded projects						
	Ministry of Home Affairs Clearance for participation of foreign companies in tenders for work packages of Hydroelectric Projects in sensitive areas.						
12.	**Timeline of activities of Flood Moderation works**						
	Description	Year..... to Year.....					
		Y1	Y2	Y3	Y4	.....	(Yn)
	Letter of Award, signing of Contract & Mobilization						
	Details of Flood Moderation Works 1.----------						
Recommendation of CEA along with reasons therefor?							

Signature of Competent Authority (CEA)
Signature :
Name:

Annexure-III

In-principle approval for Budgetary Support to Flood Moderation/Storage Hydro Electric Projects

To,

____

Sir,

Please refer to your application no._____ dated ____to CEA seeking in-principle approval for budgetary support of cost of Flood Moderation of Rs. _____ on the basis of cost concurred in the DPR of _____ project of ___ MW.

In this, regard, in-principle approval is hereby accorded for Budgetary Support of Rs. _____ for Flood Moderation works, as recommended by the CEA and as per OM issued by Ministry of Power vide OM no. 15/2/2016-H.I(Pt.)(230620) dated ✗ /09/2021 and in terms of OM no. 15/2/2016-H.I(Pt.)(230620) dated 08.03.2019.

This in-principle approval is only for purpose of facilitating financial closure, etc. of projects and will not create any obligation or commitment on part of government to provide budgetary support till all the conditions are satisfied.

Terms and Conditions

a. Flood Moderation component works proposed for funding from Ministry of Power shall not be posed for funding under any other scheme of the Government of India.
b. The developer shall submit Project Status Report to CEA on quarterly basis. CEA would take half-yearly meeting to review progress of flood moderation works. CEA would take periodic review on half-yearly basis of the project progress.
c. In the event of change in ownership of the project before the commissioning of the project, MoP and CEA would be duly informed within three (03) months of such change in ownership.
d. All other terms and conditions of OM no. 15/2/2016-H.I(Pt.)(230620) dated ✗ /09/2021 shall apply.

Date:

Signature:
Name:
(Authorized Representative)

Annexure-IV

Application for Reimbursement of expenditure incurred during Financial Year (yyyy-yy) towards Cost of Flood Moderation of Storage Hydro Electric Projects from Ministry of Power

Project Proposal Number ..... **Date of Submission .....**

To,

CEA,

Sewa Bhawan, Sector-1,
R K Puram,
New Delhi -110066.

Sir,

In terms of OM no. 15/2/2016-H.I(Pt.)(230620) dated 08.03.2019 and subsequent OM no. 15/2/2016-H.I(Pt.)(230620) dated 28 /09/2021, it is requested to reimburse the cost of flood moderation for _____project of ____ MW as per details below:

a. Total Cost for Flood Moderation as per CWC/ CEA concurrence/approval in Rs.....(enclose details)
b. Percentage of Dam Height achieved:.....
c. The amount of expenditure incurred on Flood Moderation during this Financial Year (yyyy-yy) for achievement of milestones of Dam height (in Rs.) .....(enclose details viz., Self Certification, Auditor's Certificate, etc.)
d. 'In-principle' approval of funding for Flood Moderation component from Ministry of Power (enclose copy)
e. Authorized Representative and Bank Account to which the funds are to be transferred (enclose details)

2. We hereby certify and agree as follows:

a. The information given as above is correct as per records maintained for the purpose.
b. No proposals have been submitted to Nodal Agency for recommendation of reimbursement of expenditure incurred during this Financial Year (yyyy-yy) for approval/vetting in the past.
c. We also undertake that reimbursement of the expenditure incurred on account of Flood Modeartion shall be first utilized for repayment of any outstanding loan amount, whatsoever, to the Banks/ Financing Institutions and thereafter, balance amount if any, may be appropriated by us as deemed fit.

Date.....

Signature:.....
Name:.....
Seal: .....
(Authorized Representative)

Annexure-V

Recommendation of the CEA to MoP for reimbursement of funds to Developer

	(to be filled by CEA)	
	Project Proposal No.	
Sr. No.	**Particulars of the Project**	**Description**
1.	Name of the Developer	
2.	Date of Implementation Agreement between State Govt. & Developer	
3.	Date of Concurrence of DPR (TEC letter enclosed)	
4.	Salient features of the Project (details enclosed)	
5.	Total Updated Project Cost Estimate as per TEC in Rs.	
6.	The total amount (updated, based on indexation) corresponding to Flood Moderation component in Rs.....	
7.	Zero Date of Start of Pre-construction works	
8.	Zero Date of Start of Construction	
19.	LoA for Dams Works	
10.	Target Date for completion of River Diversion Works.	
11.	Total Cost for Flood Moderation as per CWC/ CEA concurrence/approval in Rs. (details enclosed)	
12.	Percentage of Dam Height achieved:.....	
13.	Cost of Flood Moderation proportionate to height of Dam in Rs.	
14.	Details of bank account to which funds are to be transferred (details enclosed)	
Recommendation of CEA along with reasons therefor?		

Signature of the Competent Authority (CEA)

Signature: Name:
Stamp:

Certificate by HPM Division, CEA

To Whomsoever it may concern

Ref.No.: **Date:**

This is to certify that M/s .....have achieved physical/ financial progress of enabling infrastructure works being in line with the scheduled timelines as per Format- .... under these Enabling .

This certificate is issued without prejudices to the rights vested in this Division.

Signature:
Name:

(Authorized Signatory)

Annexure-VI

Format for Bank Guarantee

(To be on non-judicial stamp paper of appropriate value as per Stamp Act relevant to place of execution.)

In consideration of the ----- [Insert name of the Developer/Project Company] (hereinafter referred to as 'Developer') (which expression shall unless repugnant to the context or meaning thereof include its executers, administrators, successors and assignees) submitting the application for release of grant under budgetary support for Flood Moderation in Hydro Electric Projects from Ministry of Power (hereinafter referred to as 'Guidelines') for the Project of the capacity of ..... MW, at .....[Insert name of the place] and as per the terms of the 'Guidelines', the [insert name & address of bank] hereby agrees unequivocally, irrevocably and unconditionally to pay to Ministry of Power at [Insert Name of the Place from the address of the Ministry of Power] forthwith on demand in writing from Ministry of Power or any Officer authorized by it in this behalf, any amount up to and not exceeding Rupees------ [Total Value equivalent to installment eligible under Budgetary Support] only, on behalf of M/s ---------- [Insert name of the Developer / Project Company]

This Guarantee shall be valid and binding on this Bank up to and including.....[insert date i.e. upto the date of determination of tariff by the regulatory commission] and shall not be terminable by notice or any change in the constitution of the Bank or the term of contract or by any other reasons whatsoever and our liability hereunder shall not be impaired or discharged by any extension of time or variations or alternations made, given, or agreed with or without our knowledge or consent, by or between parties to the respective agreement.

Our liability under this Guarantee is restricted to Rs. ----------only.

Our Guarantee shall remain in force until.....[insert date] Ministry of Power shall be entitled to invoke this Guarantee till .....[insert date]

The Guarantor Bank hereby agrees and acknowledges that Ministry of Power shall have a right to invoke this BANK GUARANTEE in part or in full, as it may deem fit.

The Guarantor Bank hereby expressly agrees that it shall not require any proof in addition to the written demand by Ministry of Power, made in any format, raised at the above mentioned address of the Guarantor Bank, in order to make the said payment to Ministry of Power.

The Guarantor Bank shall make payment hereunder on first demand without restriction or conditions and notwithstanding any objection by ----------[Insert name of the Developer / Project Company] and/or any other person. The Guarantor Bank shall not require Ministry of Power to justify the invocation of this BANK GUARANTEE, nor shall the Guarantor Bank have any recourse against Ministry of Power in respect of any payment made hereunder.

This BANK GUARANTEE shall be interpreted in accordance with the laws of India and the courts at Delhi shall have exclusive jurisdiction.

The Guarantor Bank represents that this BANK GUARANTEE has been established in such form and with such content that it is fully enforceable in accordance with its terms as against the Guarantor Bank in the manner provided herein.

This BANK GUARANTEE shall not be affected in any manner by reason of merger, amalgamation, restructuring or any other change in the constitution of the Guarantor Bank.

This BANK GUARANTEE shall be a primary obligation of the Guarantor Bank and accordingly Ministry of Power shall not be obliged before enforcing this BANK GUARANTEE to take any action in any court or arbitral proceedings against the Developer / Project Company , to make any claim against or any demand on the Developer / Project Company or to give any notice to the Developer / Project Company or to enforce any security held by Ministry of Power or to exercise, levy or enforce any distress, diligence or other process against the Developer / Project Company .

The Guarantor Bank acknowledges that this BANK GUARANTEE is not personal to Ministry of Power and may be assigned, in whole or in part, (whether absolutely or by way of security) by Ministry of Power to any entity to whom Ministry of Power is entitled to assign its rights and obligations under these 'Guidelines'.

Notwithstanding anything contained herein above, our liability under this guarantee is restricted to Rs. ..... only and it shall remain in force till .....

We are liable to pay the Guarantee amount or any part thereof under this Bank Guarantee only if Ministry of Power serves upon us a written claim or demand.

Signature_____

Name_____

Power of Attorney No._____

For

_____ [Insert Name of the Bank]

E-mail ID of the bank:

Banker's Stamp and Full Address.

Dated this_____day of____, 20_____

Witness:

1. ..... Signature

Name and Address

Witness:

2. ..... Signature

Name and Address

Notes:

The Stamp Paper should be in the name of the Executing Bank and of appropriate value.

The Performance Bank guarantee shall be executed by any of the Nationalised or leading Private Sector Banks.

Plate-1 (a)

PREPARATION OF DETAILED PROJECT REPORT - OFF-STREAM OPEN LOOP AND ON-STREAM PUMPED STORAGE SCHEMES IN NON-HIMALAYAN REGION WITH UNDERGROUND POWER HOUSE IN ANA AREA WITH GOOD GEOLOGY AND SURFACE POWER HOUSE
(TYPICAL BAR CHART SHOWING DIFFERENT ACTIVITIES TO BE CARIED OUT PROJECT AUTHORITIES FOR PREPARATION OF DPR)

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1	NOC FROM STATE FOREST DEPARTMENT																							
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	(g) Submission of Power Potential Studies																							
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	(c) Complete survey, Geophysical investigation, Drilling, Drifting etc. Phase-I																							
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	(e) Final investigation Phase-II																							
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4	SUBMISSION OF HYDEL CIVIL LAYOUT & BROAD SALIENT FEATURES																							
5	SEISMICITY AND FIELD INVESTIGATIONS REPORT SUBMISSION																							
	(a) Submission of Report/Proposal for Site Specific Seismic Design Parameters.																							
6	CONSTRUCTION MATERIAL INVESTIGATIONS																							
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Plate-1 (a)

PREPARATION OF DETAILED PROJECT REPORT - OFF-STREAM OPEN LOOP AND ON-STREAM PUMPED STORAGE SCHEMES IN NON-HIMALAYAN REGION WITH UNDERGROUND POWER HOUSE IN ANA AREA WITH GOOD GEOLOGY AND SURFACE POWER HOUSE
(TYPICAL BAR CHART SHOWING DIFFERENT ACTIVITIES TO BE CARIED OUT PROJECT AUTHORITIES FOR PREPARATION OF DPR)

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8	DISCUSSION WITH CEA, CWC, CSMRS & GSI TO FINALIZE LAYOUT																							
9	SUBMISSION OF DESIGN OFTRANSMISSION SYSTEM (UP TO POOLING POINT)																							
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12	SUBMISSION OF DESIGN OF DAM/ BARRAGE/ EMBANKMENT/ OTHER APPERTUNENT STRUCTURES																							
13	SUBMISSION OF GATES & HM ASPECTS																							
14	PREPARATION OF DPR																							

Plate-1 (a) Contd...

PREPARATION OF DETAILED PROJECT REPORT - OFF-STREAM CLOSED LOOP PUMPED STORAGE SCHEMES IN NON-HIMALAYAN REGION WITH UNDERGROUND POWER HOUSE IN ANA AREA WITH GOOD GEOLOGY AND SURFACE POWER HOUSE
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Plate-1 (a) Contd...

PREPARATION OF DETAILED PROJECT REPORT - OFF-STREAM CLOSED LOOP PUMPED STORAGE SCHEMES IN NON-HIMALAYAN REGION WITH UNDERGROUND POWER HOUSE IN ANA AREA WITH GOOD GEOLOGY AND SURFACE POWER HOUSE
(TYPICAL BAR CHART SHOWING DIFFERENT ACTIVITIES TO BE CARIED OUT PROJECT AUTHORITIES FOR PREPARATION OF DPR)

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7	SUBMISSION OF DESIGN OFTRANSMISSION SYSTEM (UP TO POOLING POINT)																							
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10	SUBMISSION OF DESIGN OF DAM/ BARRAGE/ EMBANKMENT/ OTHER APPERTUNENT STRUCTURES																							
11	SUBMISSION OF GATES & HM ASPECTS																							
12	PREPARATION OF DPR																							

Plate-1 (a) (Contd...)

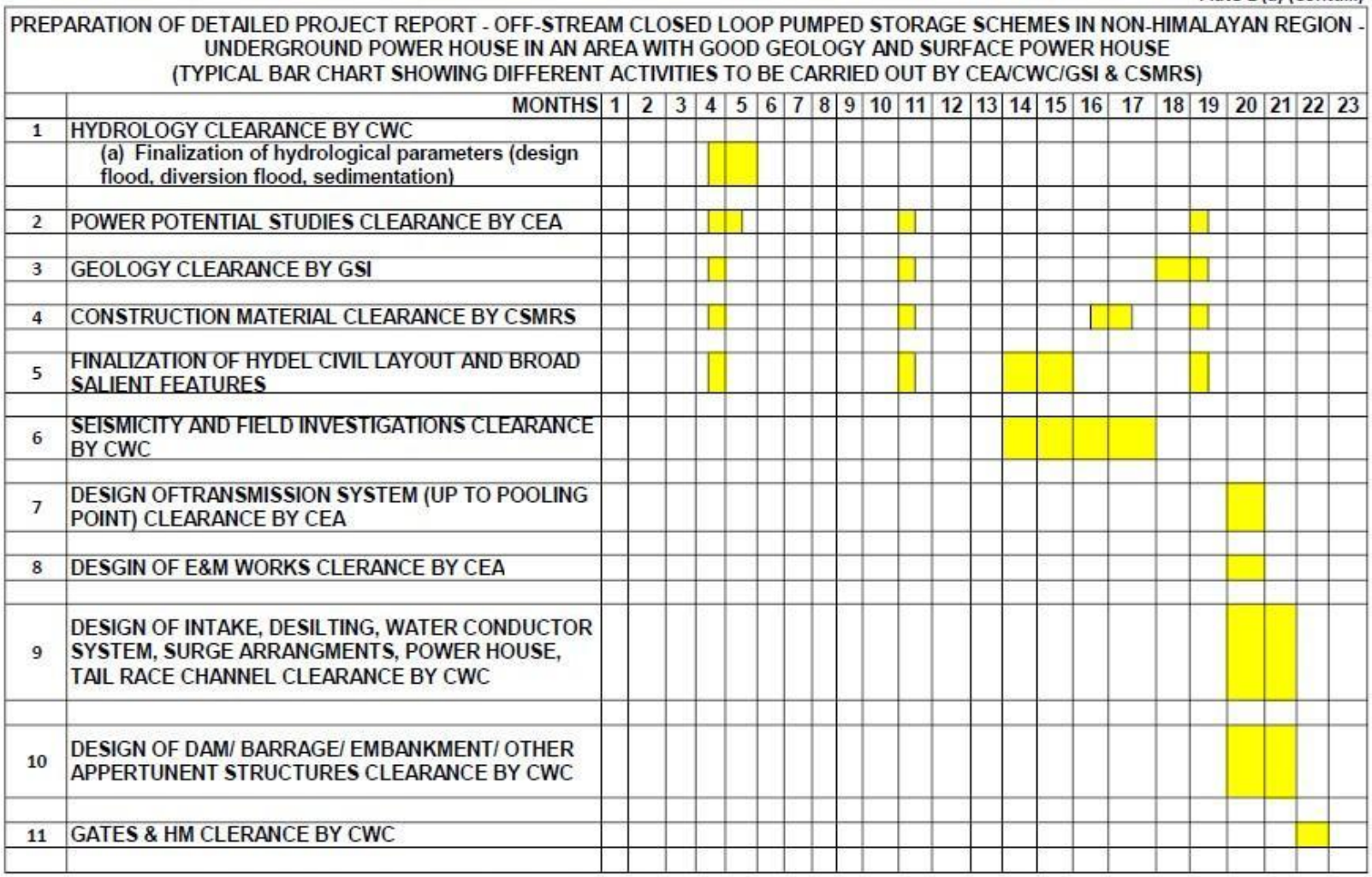
PREPARATION OF DETAILED PROJECT REPORT - OFF-STREAM OPEN LOOP AND ON-STREAM PUMPED STORAGE SCHEMES IN NON-HIMALAYAN REGION - UNDERGROUND POWER HOUSE IN AN AREA WITH GOOD GEOLOGY AND SURFACE POWER HOUSE
(TYPICAL BAR CHART SHOWING DIFFERENT ACTIVITIES TO BE CARRIED OUT BY CEA/CWC/GSI & CSMRS)

	MONTHS	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	HYDROLOGY CLEARANCE BY CWC																							
	(a) Finalization of hydrological parameters (design flood, diversion flood, sedimentation)																							
2	POWER POTENTIAL STUDIES CLEARANCE BY CEA																							
3	GEOLOGY CLEARANCE BY GSI																							
4	CONSTRUCTION MATERIAL CLEARANCE BY CSMRS																							
5	FINALIZATION OF HYDEL CIVIL LAYOUT AND BROAD SALIENT FEATURES																							
6	SEISMICITY AND FIELD INVESTIGATIONS CLEARANCE BY CWC																							
7	INTER STATE MATTERS CLEARANCE BY CWC																							
8	DESIGN OFTRANSMISSION SYSTEM (UP TO POOLING POINT) CLEARANCE BY CEA																							
9	DESGIN OF E&M WORKS CLERANCE BY CEA																							
10	DESIGN OF INTAKE, DESILTING, WATER CONDUCTOR SYSTEM, SURGE ARRANGMENTS, POWER HOUSE, TAIL RACE CHANNEL CLEARANCE BY CWC																							
11	DESIGN OF DAM/ BARRAGE/ EMBANKMENT/ OTHER APPERTUNENT STRUCTURES CLEARANCE BY CWC																							
12	GATES & HM CLERANCE BY CWC																							

Note: Consultation by project developers with CEA, CWC, GSI and CSMRS in 4th,11th and 19th months for framing/ finalization of Power planning aspects, Geological aspects, Construction material aspects and Hydel Civil Layout and broad salient features.

Plate-1 (a) (Contd...)

PREPARATION OF DETAILED PROJECT REPORT - OFF-STREAM CLOSED LOOP PUMPED STORAGE SCHEMES IN NON-HIMALAYAN REGION - UNDERGROUND POWER HOUSE IN AN AREA WITH GOOD GEOLOGY AND SURFACE POWER HOUSE
(TYPICAL BAR CHART SHOWING DIFFERENT ACTIVITIES TO BE CARRIED OUT BY CEA/CWC/GSI & CSMRS)



Note: Consultation by project developers with CEA, CWC, GSI and CSMRS in 4th,11th and 19th months for framing/ finalization of Power planning aspects, Geological aspects, Construction material aspects and Hydel Civil Layout and broad salient features.

Plate-1 (b)

PREPARATION OF DETAILED PROJECT REPORT - OFF-STREAM OPEN LOOP AND ON-STREAM PUMPED STORAGE SCHEMES IN NON-HIMALAYAN REGION - UNDERGROUND POWER HOUSE IN AN AREA WITH POOR GEOLOGY

(TYPICAL BAR CHART SHOWING DIFFERENT ACTIVITIES TO BE CARIED OUT PROJECT AUTHORITIES FOR PREPARATION OF DPR)

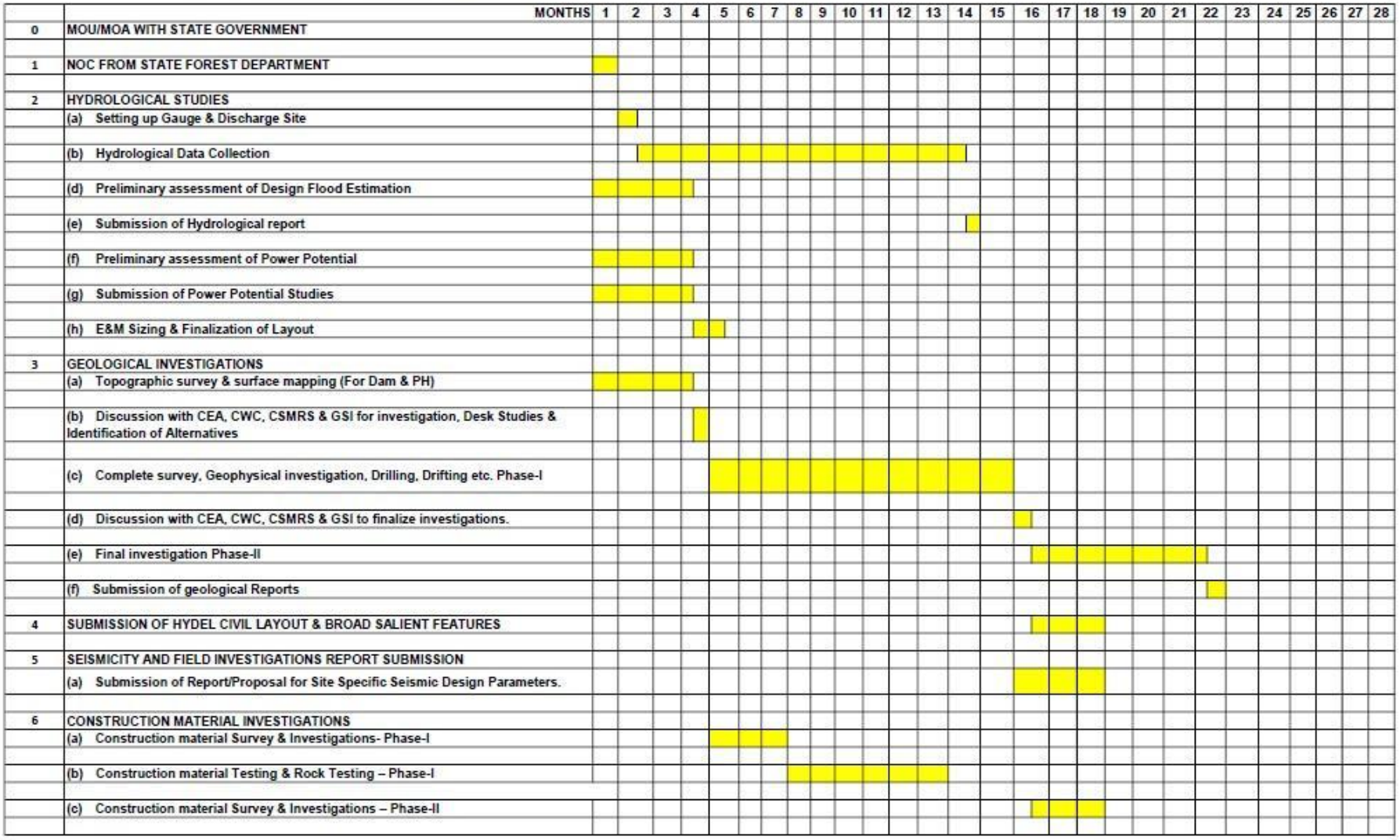


Plate-1 (b)

PREPARATION OF DETAILED PROJECT REPORT - OFF-STREAM OPEN LOOP AND ON-STREAM PUMPED STORAGE SCHEMES IN NON-HIMALAYAN REGION - UNDERGROUND POWER HOUSE IN AN AREA WITH POOR GEOLOGY

(TYPICAL BAR CHART SHOWING DIFFERENT ACTIVITIES TO BE CARIED OUT PROJECT AUTHORITIES FOR PREPARATION OF DPR)

	MONTHS	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
	(d) Construction material Testing & Rock Testing – Phase-II																												
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14	PREPARATION OF DPR																												

Plate-1 (b) Contd...

PREPARATION OF DETAILED PROJECT REPORT - OFF-STREAM CLOSED LOOP PUMPED STORAGE SCHEMES IN NON-HIMALAYAN REGION - UNDERGROUND POWER HOUSE IN AN AREA WITH POOR GEOLOGY

(TYPICAL BAR CHART SHOWING DIFFERENT ACTIVITIES TO BE CARIED OUT PROJECT AUTHORITIES FOR PREPARATION OF DPR)

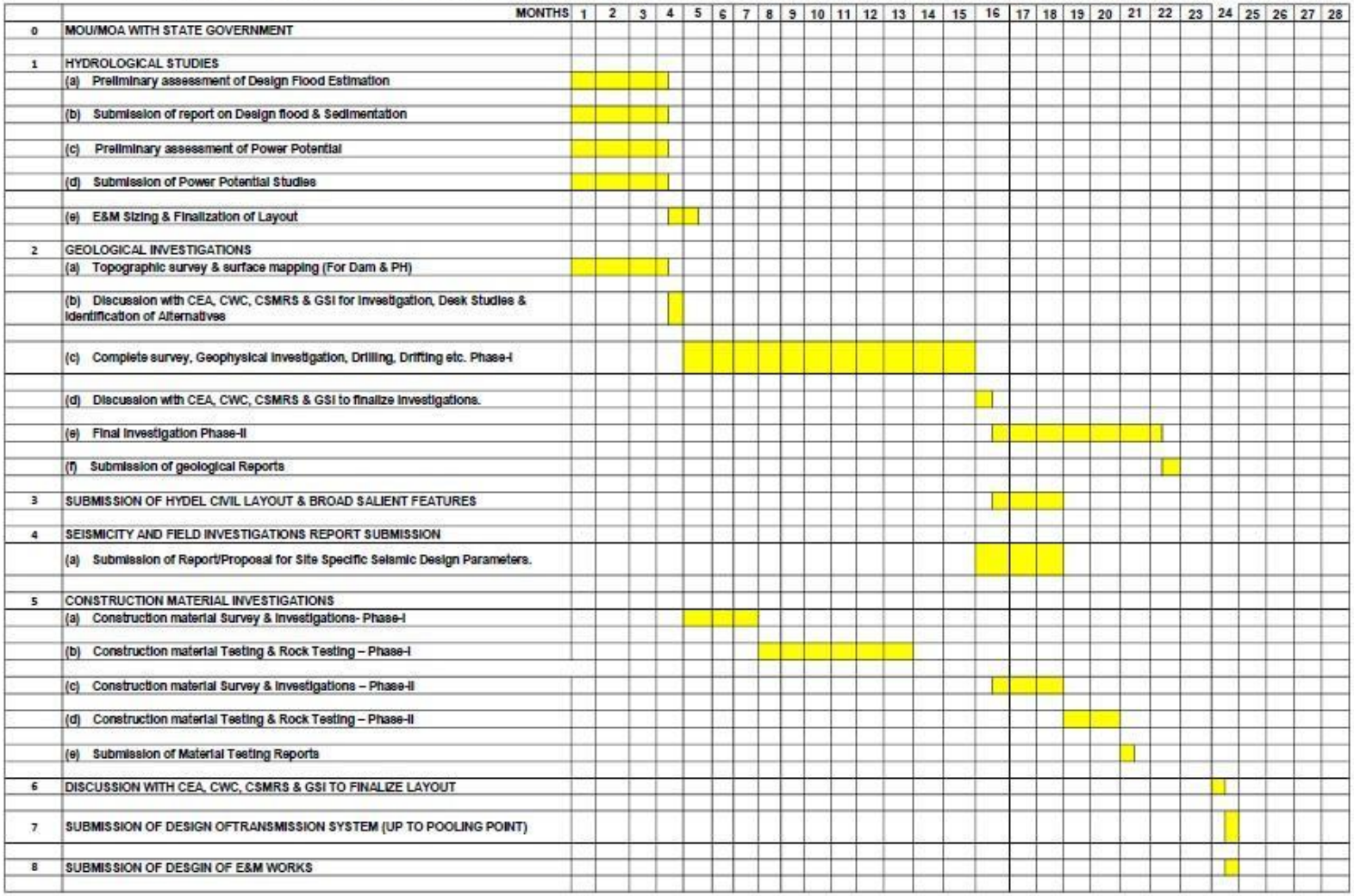


Plate-1 (b) Contd...

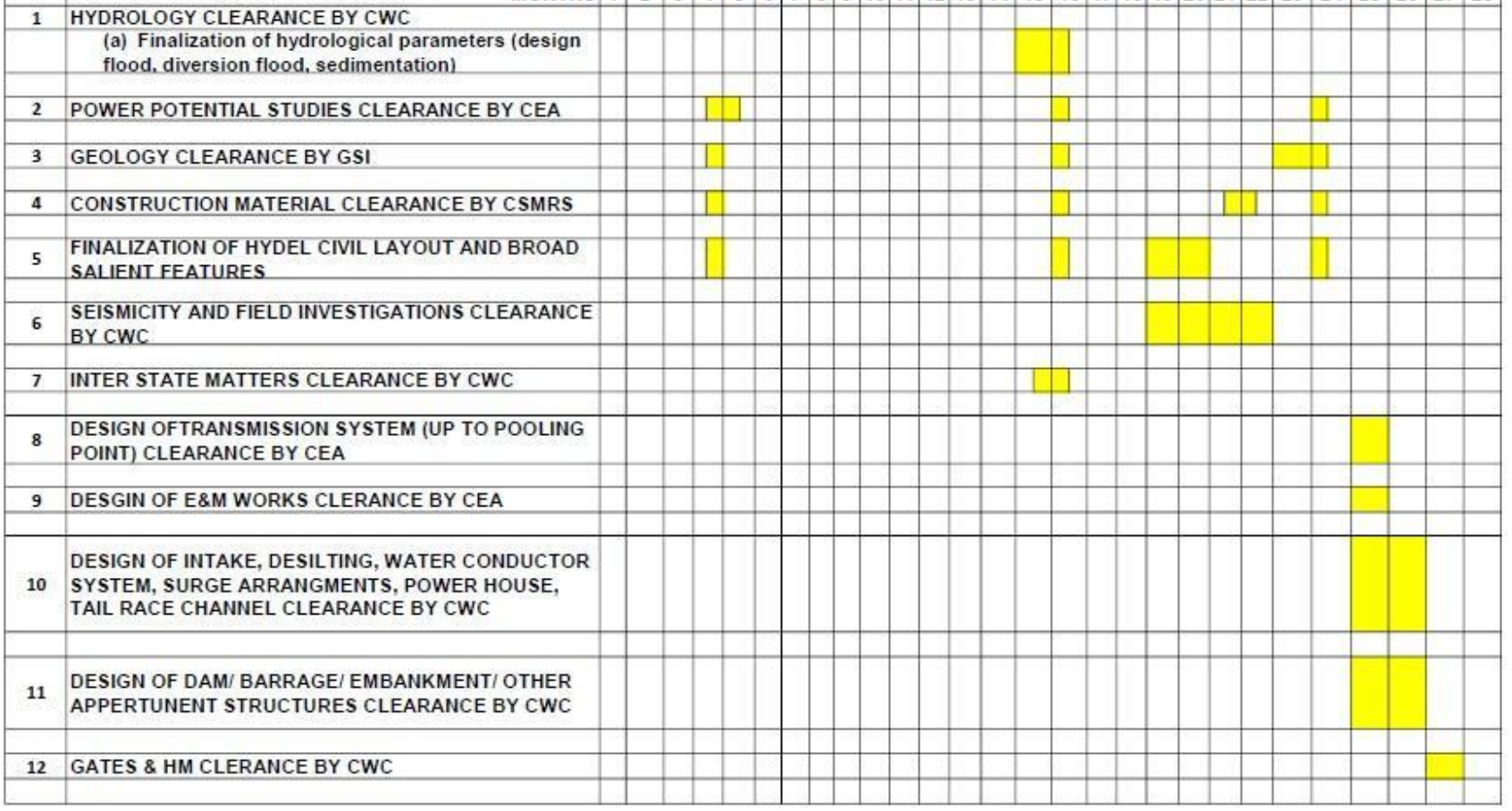
PREPARATION OF DETAILED PROJECT REPORT - OFF-STREAM CLOSED LOOP PUMPED STORAGE SCHEMES IN NON-HIMALAYAN REGION - UNDERGROUND POWER HOUSE IN AN AREA WITH POOR GEOLOGY

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11	SUBMISSION OF GATES & HM ASPECTS																												
12	PREPARATION OF DPR																												

Plate-1 (b) (Contd...)

PREPARATION OF DETAILED PROJECT REPORT - OFF-STREAM OPEN LOOP AND ON-STREAM PUMPED STORAGE SCHEMES IN NON-HIMALAYAN REGION
UNDERGROUND POWER HOUSE IN ANA AREA WITH POOR GEOLOGY
(TYPICAL BAR CHART SHOWING DIFFERENT ACTIVITIES TO BE CARRIED OUT BY CEA/CWC/GSI & CSMRS)



Note: Consultation by project developers with CEA, CWC, GSI and CSMRS in 4th,16th and 24th months for framing/ finalization of Power planning aspects, Geological aspects, Construction material aspects and Hydel Civil Layout and broad salient features.

Plate-1 (b) (Contd...)

PREPARATION OF DETAILED PROJECT REPORT - OFF-STREAM CLOSED LOOP PUMPED STORAGE SCHEMES IN NON-HIMALAYAN REGION - UNDERGROUND POWER HOUSE IN AN AREA WITH POOR GEOLOGY
(TYPICAL BAR CHART SHOWING DIFFERENT ACTIVITIES TO BE CARRIED OUT BY CEA/CWC/GSI & CSMRS)

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6	SEISMICITY AND FIELD INVESTIGATIONS CLEARANCE BY CWC																												
7	DESIGN OFTRANSMISSION SYSTEM (UP TO POOLING POINT) CLEARANCE BY CEA																												
8	DESGIN OF E&M WORKS CLERANCE BY CEA																												
9	DESIGN OF INTAKE, DESILTING, WATER CONDUCTOR SYSTEM, SURGE ARRANGMENTS, POWER HOUSE, TAIL RACE CHANNEL CLEARANCE BY CWC																												
10	DESIGN OF DAM/ BARRAGE/ EMBANKMENT/ OTHER APPERTUNENT STRUCTURES CLEARANCE BY CWC																												
11	GATES & HM CLERANCE BY CWC																												

Note : Consultation by project developers with CEA, CWC, GSI and CSMRS in 4th, 16th and 24 th months for framing/ finalization of Power planning aspects, Geological aspects, Construction material aspects and Hydel Civil Layout and broad salient features.

Plate-1 (c)

PREPARATION OF DETAILED PROJECT REPORT - OFF-STREAM OPEN LOOP AND ON-STREAM PUMPED STORAGE SCHEMES IN HIMALAYAN REGION
(TYPICAL BAR CHART SHOWING DIFFERENT ACTIVITIES TO BE CARIED OUT PROJECT AUTHORITIES FOR PREPARATION OF DPR)

	MONTHS	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
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	(b) Construction material Testing & Rock Testing – Phase-I																												
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Plate-1 (c)

PREPARATION OF DETAILED PROJECT REPORT - OFF-STREAM OPEN LOOP AND ON-STREAM PUMPED STORAGE SCHEMES IN HIMALAYAN REGION
(TYPICAL BAR CHART SHOWING DIFFERENT ACTIVITIES TO BE CARIED OUT PROJECT AUTHORITIES FOR PREPARATION OF DPR)

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14	SUBMISSION OF GATES & HM ASPECTS																												
15	PREPARATION OF DPR																												

Plate-1 (c) Contd...

PREPARATION OF DETAILED PROJECT REPORT - OFF-STREAM CLOSED LOOP PUMPED STORAGE SCHEMES IN HIMALAYAN REGION
(TYPICAL BAR CHART SHOWING DIFFERENT ACTIVITIES TO BE CARIED OUT PROJECT AUTHORITIES FOR PREPARATION OF DPR)

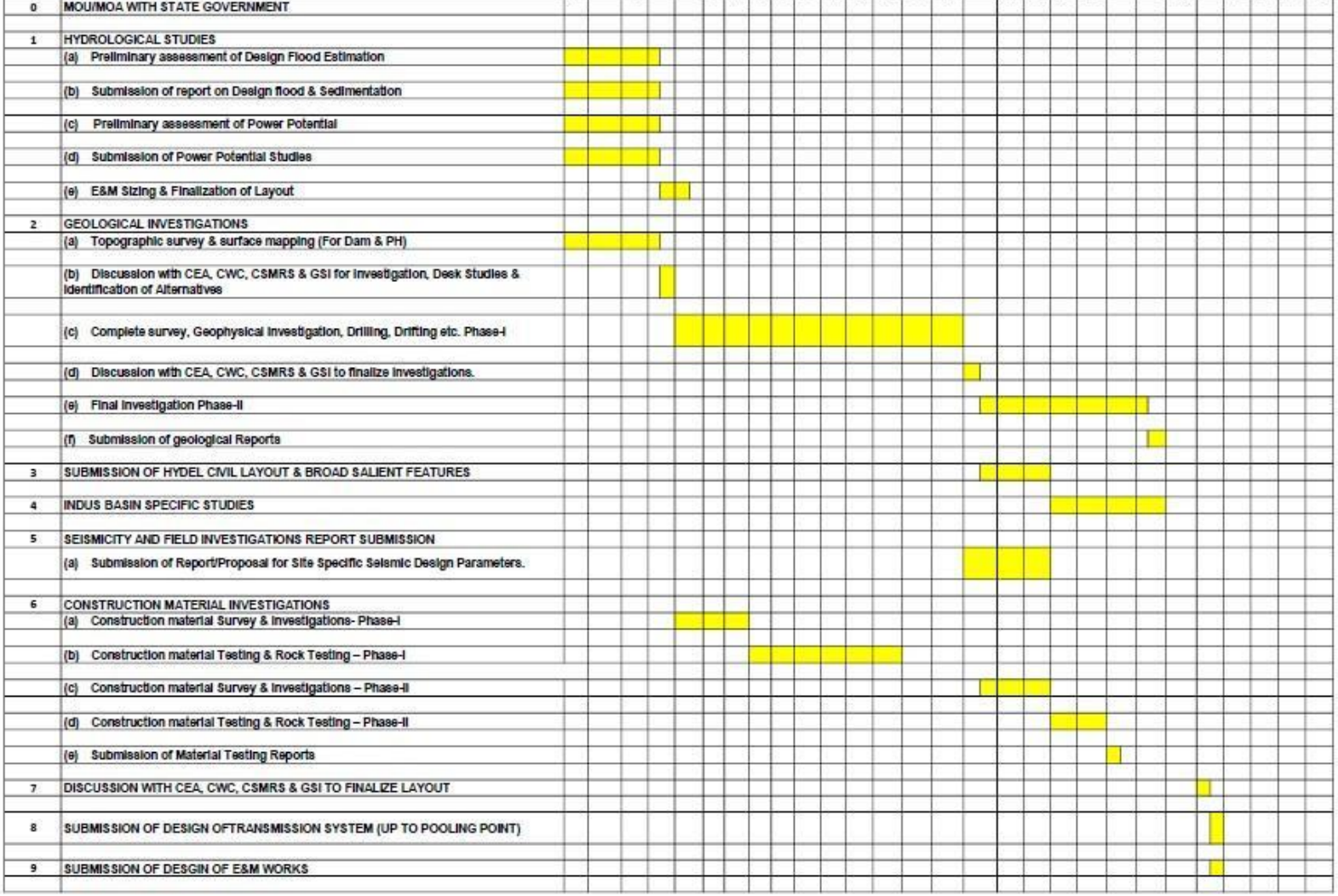


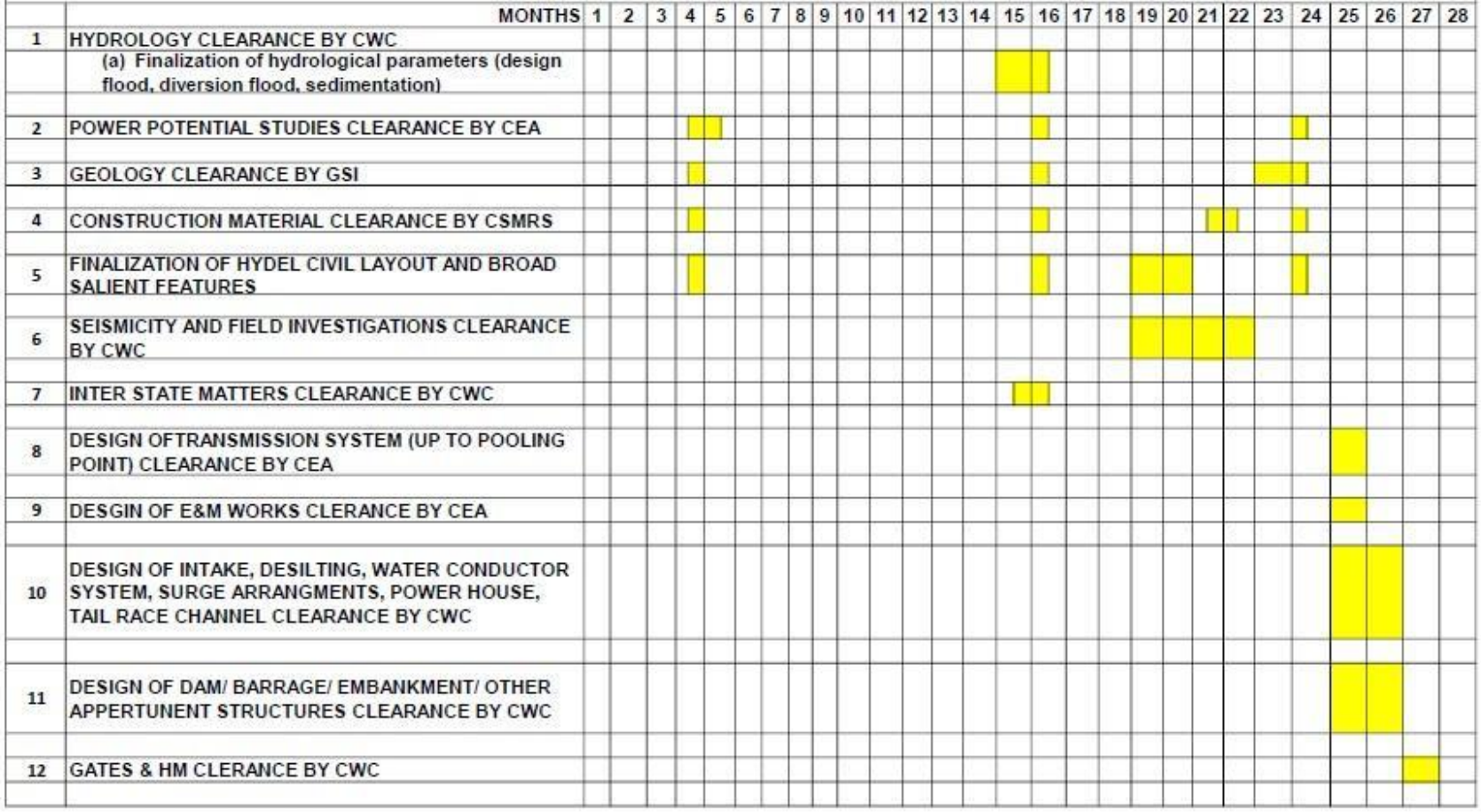
Plate-1 (c) Contd...

PREPARATION OF DETAILED PROJECT REPORT - OFF-STREAM CLOSED LOOP PUMPED STORAGE SCHEMES IN HIMALAYAN REGION
(TYPICAL BAR CHART SHOWING DIFFERENT ACTIVITIES TO BE CARIED OUT PROJECT AUTHORITIES FOR PREPARATION OF DPR)

	MONTHS	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
10	SUBMISSION OF DESIGN OF INTAKE, DESILTING, WATER CONDUCTOR SYSTEM, SURGE ARRANGMENTS, POWER HOUSE, TAIL RACE CHANNEL																												
11	SUBMISSION OF DESIGN OF DAM/ BARRAGE/ EMBANKMENT/ OTHER APPERTUNENT STRUCTURES																												
12	SUBMISSION OF GATES & HM ASPECTS																												
13	PREPARATION OF DPR																												

Plate-1 (c) (Contd...)

PREPARATION OF DETAILED PROJECT REPORT - OFF-STREAM OPEN LOOP AND ON-STREAM PUMPED STORAGE SCHEMES IN HIMLAYAN REGION
(TYPICAL BAR CHART SHOWING DIFFERENT ACTIVITIES TO BE CARRIED OUT BY CEA/CWC/GSI & CSMRS)



Note: Consultation by project developers with CEA, CWC, GSI and CSMRS in 4th,16th and 24th months for framing/ finalization of Power planning aspects, Geological aspects, Construction material aspects and Hydel Civil Layout and broad salient features.

Plate-1 (c) (Contd...)

PREPARATION OF DETAILED PROJECT REPORT - OFF-STREAM CLOSED LOOP PUMPED STORAGE SCHEMES IN HIMALAYAN REGION (TYPICAL BAR CHART SHOWING DIFFERENT ACTIVITIES TO BE CARRIED OUT BY CEA/CWC/GSI & CSMRS)

	MONTHS	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
1	HYDROLOGY CLEARANCE BY CWC																												
	(a) Finalization of hydrological parameters (design flood, & sedimentation)																												
2	POWER POTENTIAL STUDIES CLEARANCE BY CEA																												
3	GEOLOGY CLEARANCE BY GSI																												
4	CONSTRUCTION MATERIAL CLEARANCE BY CSMRS																												
5	FINALIZATION OF HYDEL CIVIL LAYOUT AND BROAD SALIENT FEATURES																												
6	SEISMICITY AND FIELD INVESTIGATIONS CLEARANCE BY CWC																												
7	DESIGN OFTRANSMISSION SYSTEM (UP TO POOLING POINT) CLEARANCE BY CEA																												
8	DESGIN OF E&M WORKS CLERANCE BY CEA																												
9	DESIGN OF INTAKE, DESILTING, WATER CONDUCTOR SYSTEM, SURGE ARRANGMENTS, POWER HOUSE, TAIL RACE CHANNEL CLEARANCE BY CWC																												
10	DESIGN OF DAM/ BARRAGE/ EMBANKMENT/ OTHER APPERTUNENT STRUCTURES CLEARANCE BY CWC																												
11	GATES & HM CLERANCE BY CWC																												
12	INSTRUMENTATION CLERANCE BY CWC																												

Note : Consultation by project developers with CEA, CWC, GSI and CSMRS in 4th, 16th and 24 th months for framing/ finalization of Power planning aspects, Geological aspects, Construction material aspects and Hydel Civil Layout and broad salient features.

Plate-2 (a)

FLOW CHART SHOWING DIFFERENT ACTIVITIES TO BE CARRIED OUT BY PROJECT AUTHORITY/ DEVELOPER BEFORE SUBMISSION OF DPR AND PRE-DPR CLEARENCE FROM CEA, CWC, GSI & CSMRS – OFF-STREAM OPEN LOOP AND ON-STREAM PUMPED STORAGE SCHEMES IN NON-HIMALAYAN REGION – UNDERGROUND POWER HOUSE IN AN AREA WITH GOOD GEOLOGY AND SURFACE POWER HOUSE

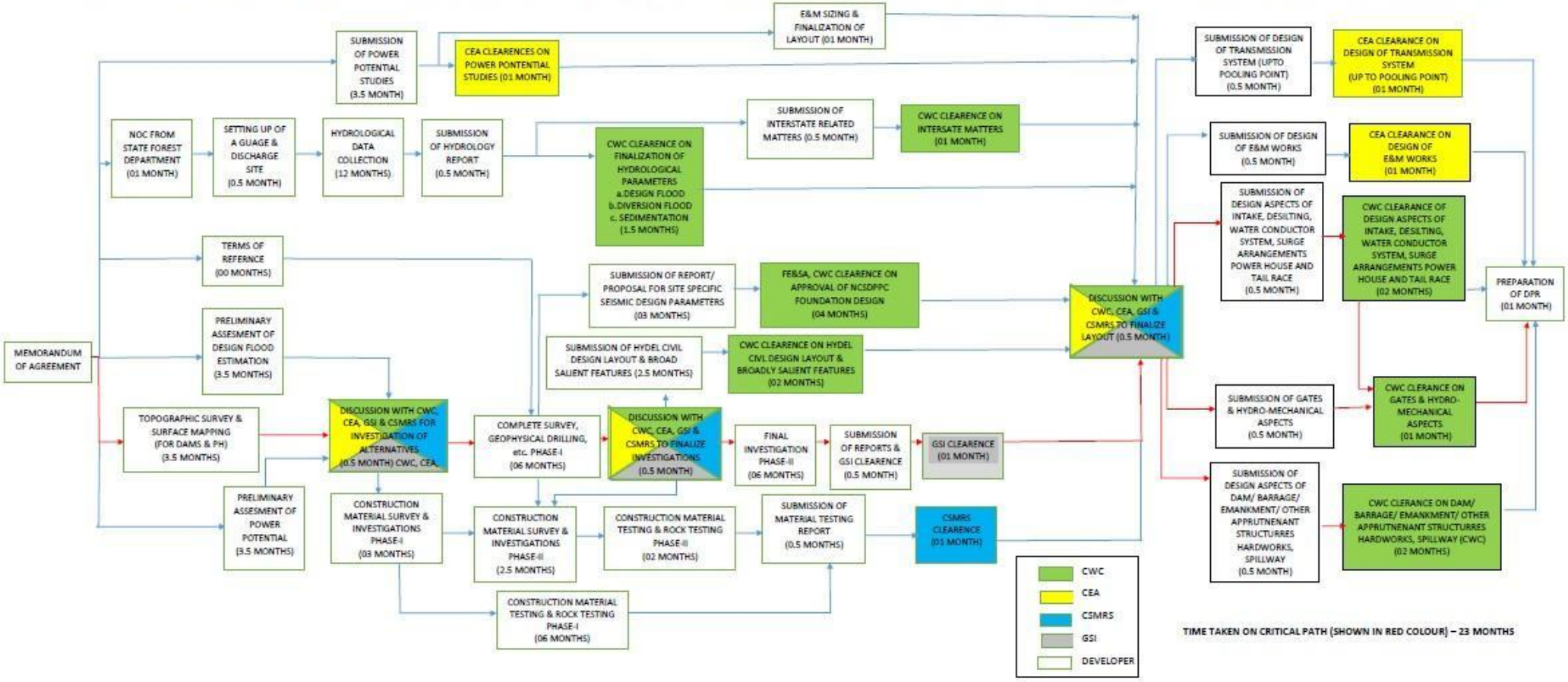


Plate-2 (a) Contd...

FLOW CHART SHOWING DIFFERENT ACTIVITIES TO BE CARRIED OUT BY PROJECT AUTHORITY/ DEVELOPER BEFORE SUBMISSION OF DPR AND PRE-DPR CLEARENCE FROM CEA, CWC, GSI & CSMRS – OFF-THE-RIVER CLOSED LOOP PUMPED STORAGE SCHEME IN NON-HIMALAYAN REGION – UNDERGROUND POWER HOUSE IN AN AREA WITH GOOD GEOLOGY AND SURFACE POWER HOUSE

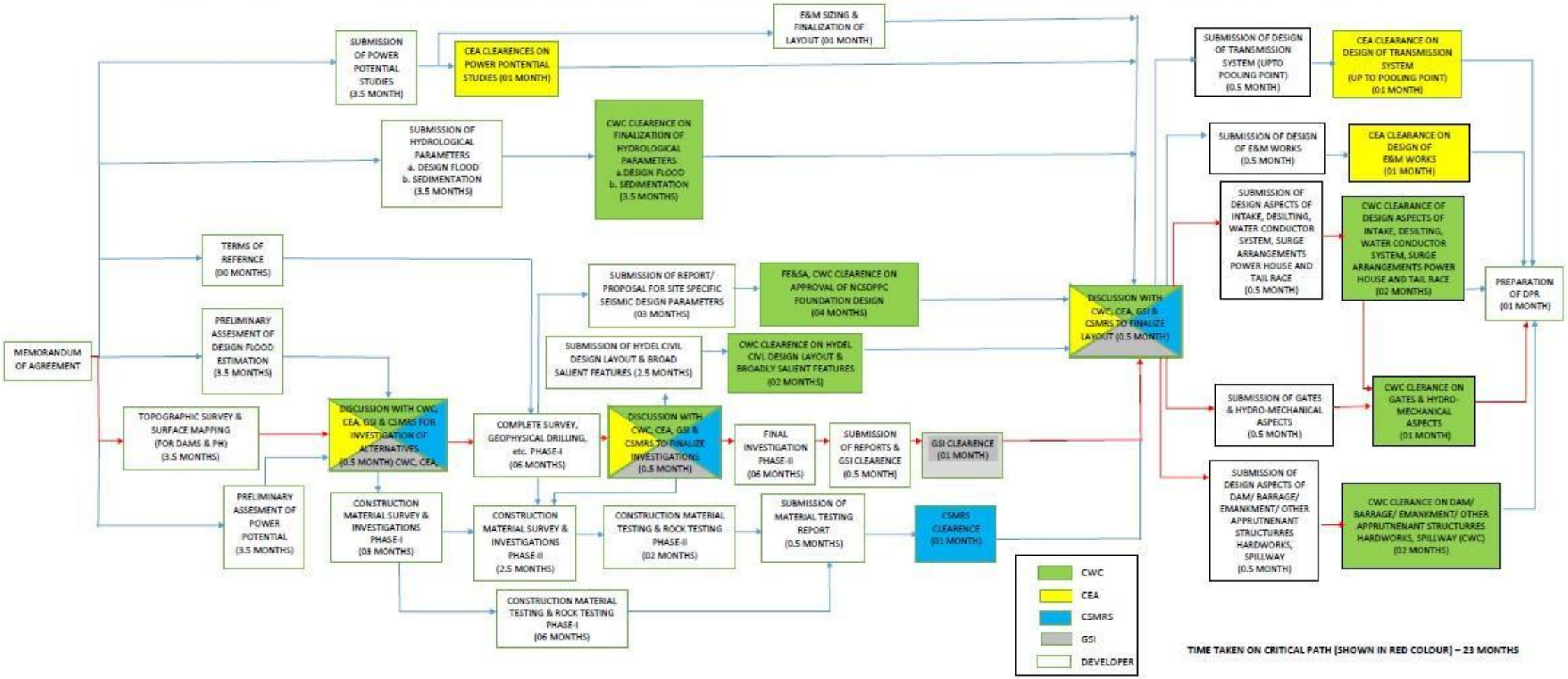


Plate-2 (b)

FLOW CHART SHOWING DIFFERENT ACTIVITIES TO BE CARRIED OUT BY PROJECT AUTHORITY/ DEVELOPER BEFORE SUBMISSION OF DPR AND PRE-DPR CLEARENCE FROM CEA, CWC, GSI & CSMRS – OFF-STREAM OPEN LOOP AND ON-STREAM PUMPED STORAGE SCHEMES IN NON-HIMALAYAN REGION – UNDERGROUND POWER HOUSE IN AN AREA WITH POOR GEOLOGY

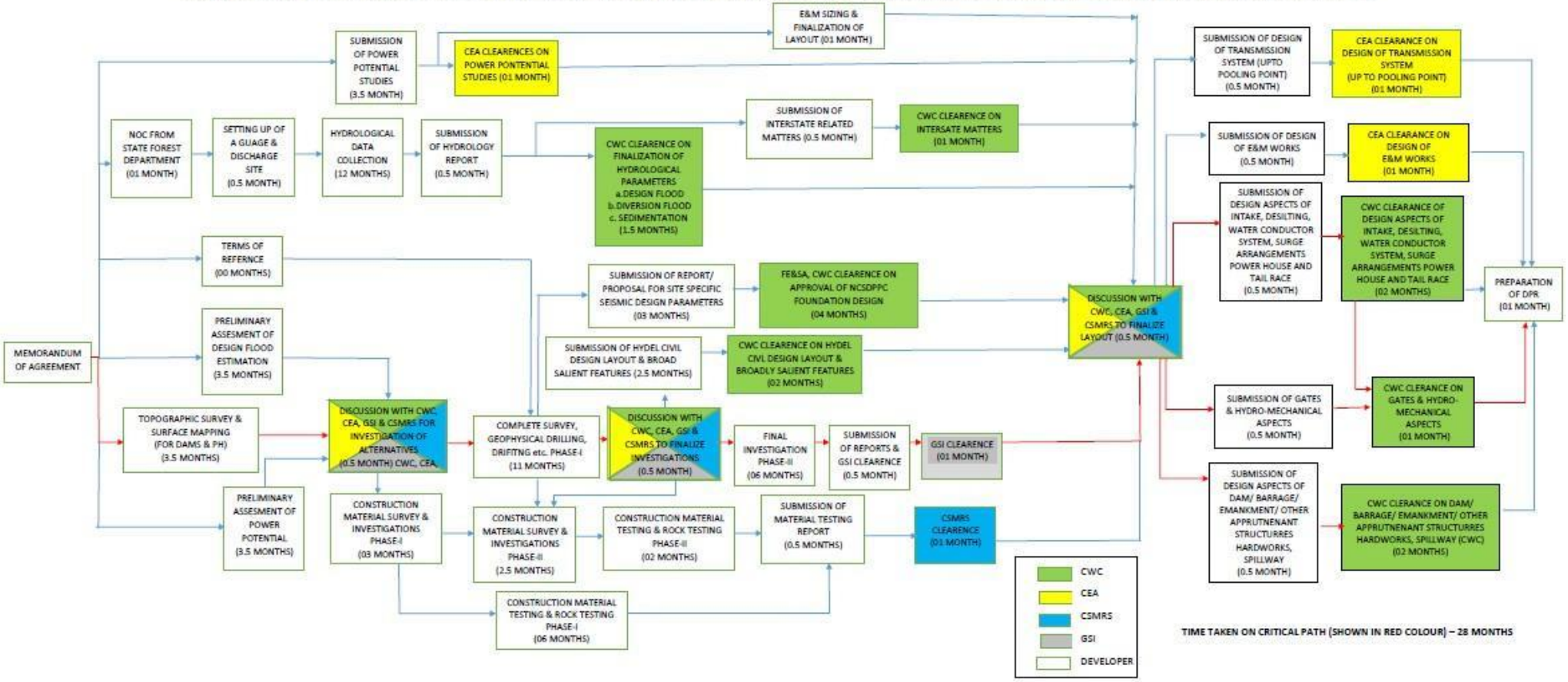


Plate-2 (b) contd.....

FLOW CHART SHOWING DIFFERENT ACTIVITIES TO BE CARRIED OUT BY PROJECT AUTHORITY/ DEVELOPER BEFORE SUBMISSION OF DPR AND PRE-DPR CLEARENCE FROM CEA, CWC, GSI & CSMRS – OFF-THE-RIVER CLOSED LOOP PUMPED STORAGE SCHEME IN NON-HIMALAYAN REGION – UNDERGROUND POWER HOUSE IN AN AREA WITH POOR GEOLOGY

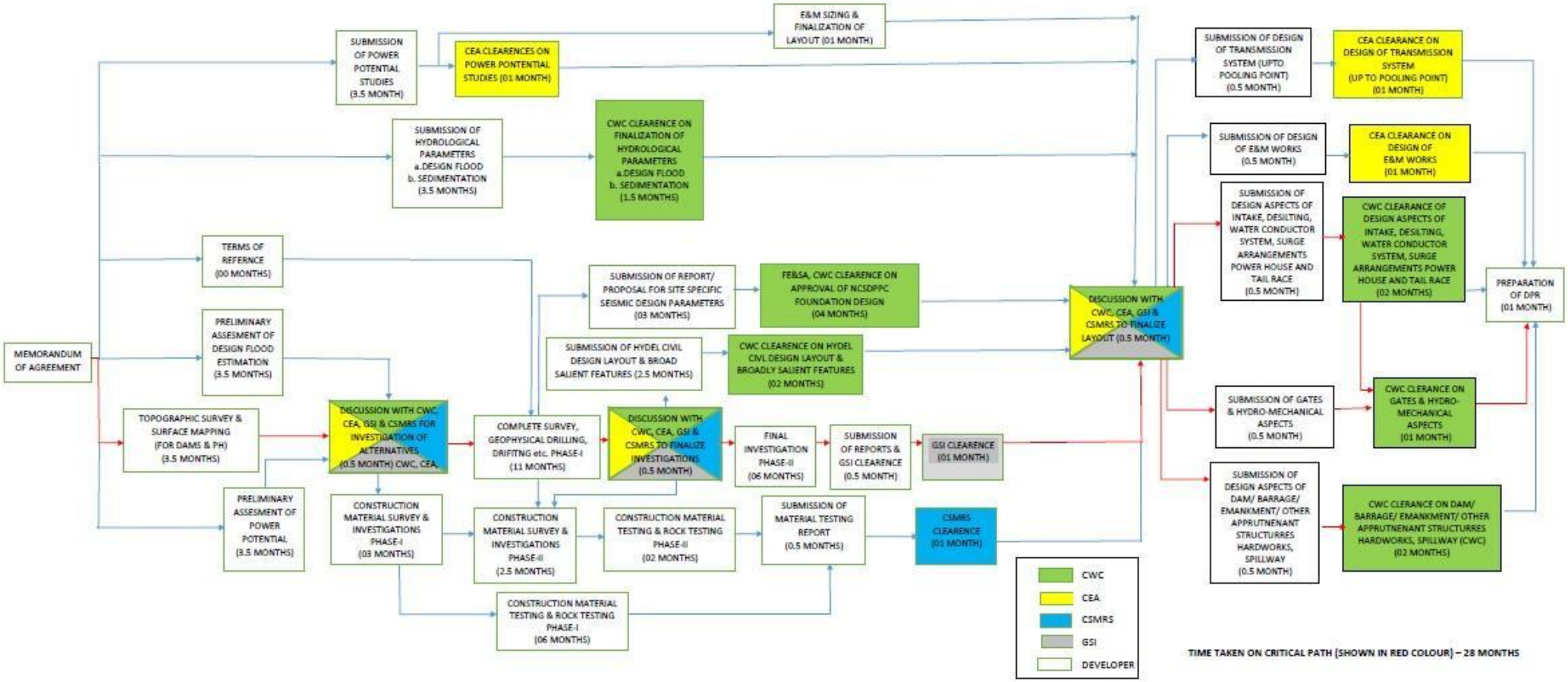
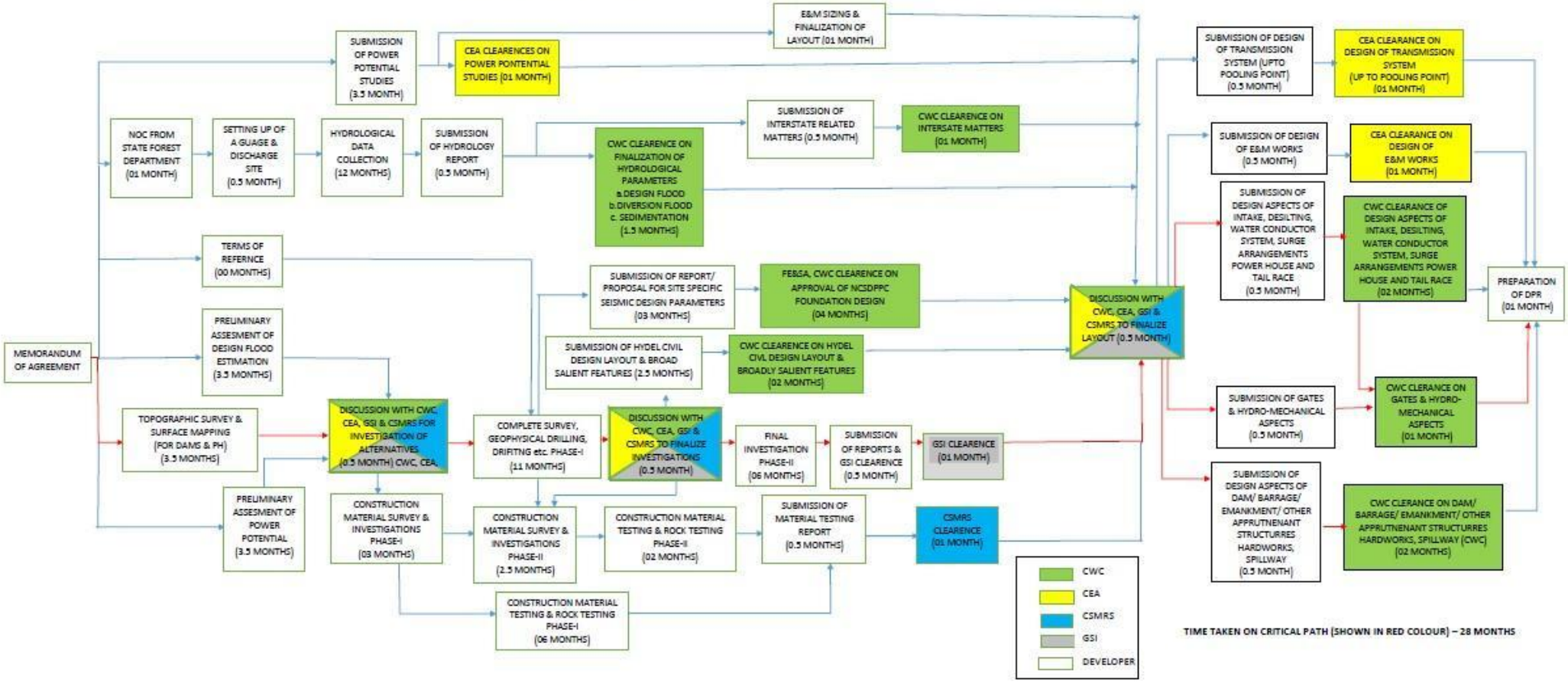


Plate-2 (c)

FLOW CHART SHOWING DIFFERENT ACTIVITIES TO BE CARRIED OUT BY PROJECT AUTHORITY/ DEVELOPER BEFORE SUBMISSION OF DPR AND PRE-DPR CLEARENCE FROM CEA, CWC, GSI & CSMRS – OFF-STREAM OPEN LOOP AND ON-STREAM PUMPED STORAGE SCHEMES IN HIMALAYAN REGION



TIME TAKEN ON CRITICAL PATH (SHOWN IN RED COLOUR) – 28 MONTHS

Plate-2 (c) contd.....

FLOW CHART SHOWING DIFFERENT ACTIVITIES TO BE CARRIED OUT BY PROJECT AUTHORITY/ DEVELOPER BEFORE SUBMISSION OF DPR AND PRE-DPR CLEARENCE FROM CEA, CWC, GSI & CSMRS – OFF-THE-RIVER CLOSED LOOP PUMPED STORAGE SCHEME IN HIMALAYAN REGION

