ANNEXURE - A

Draft Proforma for Monitoring Protocol for reporting of encountered Geology vis-à-vis Geology encountered during S&I stage

Name of the Project: Location:
River Basin/ River: State:
Name of Developer: Commencement of Excavation Work:

Summary of Investigations carried out for major components during DPR stage:

i**. Geological Investigations**

ii. Geotechnical/ Geophysical Investigations

a. Dam and other Appurtenant Structures –

1. Drilling: No. of drill holes: _____ Total drilling: ____m
2. Drifting: No. of Drifts with level and total length in m.
3. Geophysical Survey
   - ✓ Seismic Refraction, Seismic Tomography, Electrical Resistivity /Resistivity Imaging
4. Rock Mechanics Testing for physical and mechanical properties
   - ✓ Insitu
   - ✓ Laboratory

b. HRT/TRT (Water Conductor System) –

1. Drilling: No. of drill holes: _____ Total drilling: ____m
2. Drifting: No. of Drifts with level and total length in m.
3. Geophysical Survey
   - ✓ Seismic Refraction, Seismic Tomography, Electrical Resistivity /Resistivity Imaging
4. Rock Mechanics Testing for physical and mechanical properties
   - ✓ Insitu
   - ✓ Laboratory

c. Power House (Underground/Surface) –

1. Drilling: No. of drill holes: _____ Total drilling: ____m
2. Drifting: No. of Drifts with level and total length in m.
3. Geophysical Survey
   - ✓ Seismic Refraction, Seismic Tomography, Electrical Resistivity /Resistivity Imaging
4. Rock Mechanics Testing for physical and mechanical properties
   - ✓ Insitu
   - ✓ Laboratory

OVERALL Summary of Exploratory Drilling, Drifting and Geophysical Survey:

Total quantum of drilling (in meter):

Total quantum of drifting (in meter):

Total quantum of Geophysical Survey (no. of lines with cumulative length in meter)

Total quantum of Rock Mechanics Testing (no. of lines with cumulative length in meter)

iv. Total cost incurred in Investigations (Cr. Rs.):

Table #1: OPEN /SURFACE EXCAVATION:

Sl. No.	Major Components With key dimensions	Method of Excavation, viz. Blasting/ Mechanical, etc.	Encountered vs Anticipated Geology with problematic zone (s) as per DPR and/or GBR Parameters to Monitor								Extent and causes of variation/ failure, if any	Plan to Proceed further to tackle the problem encountered	Remarks
			Rock Type		Depth of Overburden		Slope Stability assessment, if any.		Adverse Geological Features, if any				
			As per DPR	Actual	As per DPR	Actual	As per DPR	Actual	As per DPR	Actual			
1.	**Dam**												
2.	**Spillway**												
3.	**Plunge pool**												
4.	**Head Regulator**												
5.	**Forebay**												
6.	**Power Intake**												
7.	**Desilting Basin**												
8.	**Power Channel**												
9.	**Penstock Pipes**												
10.	**Surface powerhouse**												
11.	**TRC**												
12.	**Switchyard/ Pothead Yard**												
13.	**Any other structures**												

Note:

1. Deviations in surface excavation arise due to difference in the expected and actual rock lines, occurrence of zones of poor rock mass in slope/ foundation and slope failures.
2. The extent of difference should be clearly measured in quantitative terms.
3. Details of previous investigations should include investigations done during PFR, FR, Pre-DPR, DPR and Post DPR stage also.
4. The variation in geology must be described in detail with supporting data, analysis, inferences, photos, etc. along with GBR.
5. Components of the project in the proforma may be added/deleted as per the approved layout in DPR.
6. Special observations, if any, which is not included above, may be mentioned separately.

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Table #2: Underground Excavations

Sl. No.	Major Components	Size, Shape and Length	Method of Excavation, viz. Blasting/ Mechanical, etc.	Anticipated Geology along with rock class (%)/ problematic zone (s) as per DPR = GBR (based on RMR/Q system)						Actual Geology encountered along with rock class (%) during construction (based on RMR/Q system)						Average Cycle time, in hours including drilling, blasting, mucking and support installation		Extent and causes of variation/ failure, if any	Plan to Proceed further to tackle the problem encountered	Remarks
				Rock type	I	II	III	IV	V	Rock type	I	II	III	IV	V	MS	Actual			
1.	Diversion Tunnel																			
2.	Silt flushing Tunnel																			
3.	Intake Tunnel																			
4.	Desilting Chamber																			
5.	HRT																			
6.	Drop Shaft																			
7.	Surgeshaft / Surge Gallery																			
8.	Gate operation chamber																			
9.	Penstock/ Pressure shaft																			
10.	Penstock Erection Gallary																			
11.	MIV/ Butterfly Valve Chamber																			
12.	Powerhouse Cavern																			
13.	Transformer Cavern																			

14.	**GIS Cavern**																		
15.	**D/s Surge Chamber**																		
16.	**TRT**																		
17.	**Any other structures**																		

Note:

1. Rock characterization and classification (RMR, Q-Index, GSI, etc.) must be mentioned in above Table.
2. The variation in geology must be described in detail with supporting data, analysis, inferences, photos, etc. along with GBR.
3. Components of the project in the proforma may be added/deleted as per the approved layout in DPR.
4. For caverns and shafts, where rock mass is not applicable, Notional rock classes as per actual geology may be assumed for comparison of Encountered vs DPR Geology.
5. Comparing the actual class-wise cycle time of excavation, with that mentioned in the Method Statement (MS) submitted by the executing agency as contained in the Contract Documents, may provide useful information regarding preparedness.
6. Special observations, if any, which is not included above, may be mentioned separately

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