



# *Risk Management Policy*

***NHPC Limited***

(A Government of India Enterprise)



**Chairman & Managing Director,  
NHPC Limited.**

## *Foreword*

I am extremely happy to release the booklet on “Risk Management Policy” of NHPC Limited. The main objective of this policy is to ensure sustainable business growth with stability and to promote a pro-active approach in reporting, evaluating and resolving risks associated with the business.

Development of hydro power projects involves various risks like geological risks, hydrological risks, seismic risks, remoteness of project location, long gestation period etc. which leads to increase in project cost and corresponding unit cost of power generation.

Keeping the above in view, a need was felt for a suitable Risk Management Policy, accordingly a detailed policy has been got framed. The policy has its objective: to ensure protection of share holder’s value through the establishment of integrated Risk Management Framework for identifying, assessing, mitigating, monitoring, evaluating and reporting all risks, to provide clear and strong basis for informed decision making at all levels of the organization and to continually strive towards strengthening the Risk Management System through continuous learning and improvement.

I appreciate the efforts of R & D and all who contributed towards the formulation of Risk Management Policy with reference to clause 49 of listing agreement and printing of this booklet as a ready reference.

I am sure that with the cooperation and support of all concerned Risk Management Policy would prove to be beneficial for the Corporation in long run.

With my Best Wishes!

**( S. K. Garg )**  
Chairman & Managing Director

## Contents

1.1	Definitions.....	6
1.1.1	Risk .....	6
1.1.2	Risk Management .....	6
1.1.3	Risk Strategy.....	6
1.1.4	Risk Assessment .....	6
1.1.5	Risk Estimation.....	6
1.1.6	Risk Tolerance/Risk Appetite .....	6
1.1.7	Risk Description.....	6
1.1.8	Risk Register.....	7
1.2	Objectives of the Policy .....	7
1.3	Risk Management Policy .....	7
1.3.1	Principles of Risk Management .....	7
1.3.2	Risk Management Policy Statement .....	8
1.4	Scope and extent of application .....	8
1.5	Risk Assessment .....	9
1.5.1	Identification and categorisation of risks .....	9
1.5.2	Risk Description.....	10
1.5.3	Risk Estimation.....	11
1.6	Risk Matrix .....	13
1.7	Risk Strategy.....	27
1.8	Key Implementation Areas for Risk Mitigation.....	28
1.9	Risk Organisation Structure.....	33
1.9.1	Roles and Responsibilities .....	34
1.10	Risk Management Information System (MIS).....	35
1.11	Maintenance of the Risk Management System.....	37
1.11.1	Approval of the Policy .....	39
1.11.2	Review of the Policy.....	39
	Annexure: Select Illustrative Cases of Risk Materialisation.....	40

### **List of Abbreviations**

<b>Abbreviation</b>	<b>Description</b>
NHPC	NHPC Limited
MW	Megawatt
IPO	Initial Public Offer
IMaCS	ICRA Management Consulting Services Limited
R&D	Research & Development
MIS	Management Information System
CPMG	Corporate Project Monitoring Group
O&M	Operation & Maintenance
MoEF	Ministry of Environment and Forest
EIA	Environment Impact Assessment
EMP	Environment Management Plan
CEA	Central Electricity Authority
DPR	Detailed Project Report
PIB	Public Investment Board
CCEA	Cabinet Committee on Economic Affairs
CERC	Central Electricity Regulatory Commission
LC	Letter of Credit
ABT	Availability Based Tariff
IT	Information Technology
PPA	Power Purchase Agreement
IRM	Integrated Risk Management
CVC	Central Vigilance Commission
R&R	Rehabilitation & Resettlement
PIL	Public Interest Litigation
NGO	Non-Governmental Organisation

MoU	Memorandum of Understanding
-----	-----------------------------

### List of Personnel Met

<b>Sr. No.</b>	<b>Name</b>	<b>Designation</b>
1	Shri D.P. Bhargava	Director (Tech)
2	Shri S.K. Chaturvedi	Ex Director (Personnel)
3	Shri A.B.L. Srivastava	Director (Finance)
4	Shri S.K. Dodeja	Ex Director (Projects)
5	Shri V.K. Jain	Executive Director (R&D)
6	Shri Kamal Kapoor	Executive Director (O&M)
7	Shri S.C. Gupta	Executive Director (CPMG)
8	Shri R. N. Misra	Executive Director (Region- IV)
9	Shri A.K. Sarkar	Executive Director (Contract)
10	Shri Gopal Dhawan	Executive Director (Geology)
11	Shri R.Chandra	Former Executive Director (R&D)
12	Shri Ramesh Chandra	Former Executive Director (QA&I)
13	Shri K.S. Nagaraja	Executive Director (D&E)
14	Shri Dhiman Parija	Executive Director (Siliguri)
15	Shri A.K. Chhabra	General Manager (CPMG)
16	Mr. T.C. Gupta	General Manager (Tanakpur Power Station)
17	Shri O.P. Thakur	General Manager (Civil)
18	Shri Rakesh Goyal	Chief Engineer (Civil) , Parbati Stage-II
19	Shri B.P. Rao	Chief Engineer (Civil) , Parbati Stage-II
20	Shri J. K. Singh	Chief Engineer (Civil) , Parbati Stage-II
21	Shri R. G .Virmani	Chief (Geology), Parbati Stage-II
22	Shri S. K. Agarwal	Chief Engineer (Civil)
23	Mr. D. Chakraborty	Chief, (Finance)Commercial Division
24	Shri N S Parameshwaran	Chief Engineer (O&M)
25	Shri H. N. Satya Narayana	Senior Manager (Civil )Nimoo Bazgo Project
26	Shri Hasan Nadeem	Senior Manager (Civil) Chutak Project

# **Risk Management Policy**

## **1.1 Definitions**

### **1.1.1 Risk**

Risks are events or conditions that may occur, and whose occurrence, if it does take place, has a harmful or negative impact on the achievement of the organization's business objectives. The exposure to the consequences of uncertainty constitutes a risk.

### **1.1.2 Risk Management**

Risk Management is the process of systematically identifying, quantifying, and managing all risks and opportunities that can affect achievement of a corporation's strategic and financial goals.

### **1.1.3 Risk Strategy**

The Risk Strategy of a company defines the company's standpoint towards dealing with various risks associated with the business. It includes the company's decision on the risk tolerance levels, and acceptance, avoidance or transfer of risks faced by the company.

### **1.1.4 Risk Assessment**

Risk Assessment is defined as the overall process of risk analysis and evaluation.

### **1.1.5 Risk Estimation**

Risk Estimation is the process of quantification of risks.

### **1.1.6 Risk Tolerance/Risk Appetite**

Risk tolerance or Risk appetite indicates the maximum quantum of risk which the company is willing to take as determined from time to time in accordance with the Risk Strategy of the company.

### **1.1.7 Risk Description**

A Risk Description is a comprehensive collection of information about a particular risk recorded in a structured manner.

### **1.1.8 Risk Register**

A 'Risk Register' is a tool for recording the risks encountered at various locations and levels in a standardised format of Risk Description.

## **1.2 Objectives of the Policy**

The main objective of this policy is to ensure sustainable business growth with stability and to promote a pro-active approach in reporting, evaluating and resolving risks associated with the business. In order to achieve the key objective, the policy establishes a structured and disciplined approach to Risk Management, including the development of the Risk Matrix, in order to guide decisions on risk related issues. The specific objectives of the Risk Management Policy are:

1. To ensure that all the current and future material risk exposures of the company are identified, assessed, quantified, appropriately mitigated and managed
2. To establish a framework for the company's risk management process and to ensure companywide implementation
3. To ensure systematic and uniform assessment of risks related with construction projects and operational power stations
4. To enable compliance with appropriate regulations, wherever applicable, through the adoption of best practices
5. To assure business growth with financial stability.

## **1.3 Risk Management Policy**

In order to fulfil the objectives of this policy and lay a strong foundation for the development of an integrated risk management framework, the policy outlines the following guiding principles of Risk Management:

### **1.3.1 Principles of Risk Management**

1. All business decisions will be made with the prior information and acceptance of risk involved
2. The Risk Management Policy shall provide for the enhancement and protection of business value from uncertainties and consequent losses
3. All employees of the company shall be made aware of risks in their respective domains and their mitigation measures
4. The risk mitigation measures adopted by the company shall be effective in the long-term and to the extent possible be embedded in the business processes of the company
5. Risk tolerance levels will be regularly reviewed and decided upon depending on the change in company's strategy
6. The occurrence, progress and status of all risks will be promptly reported and appropriate actions be taken thereof.

### **1.3.2 Risk Management Policy Statement**

The policy statement is as given below:

- 1. To ensure protection of shareholder value through the establishment of an integrated Risk Management Framework for identifying, assessing, mitigating, monitoring, evaluating and reporting of all risks*
- 2. To provide clear and strong basis for informed decision making at all levels of the organisation*
- 3. To continually strive towards strengthening the Risk Management System through continuous learning and improvement*

### **1.4 Scope and extent of application**

The policy guidelines are devised in the context of the future growth objectives, business profile envisaged and new business endeavours including new products and services that may be necessary to achieve these goals and the emerging global standards and best practices amongst comparable organizations. This policy is meant to ensure continuity of business and protection of

interests of the investors and thus covers all the activities within the company and events outside the company which have a bearing on the company's business. The policy shall operate in conjunction with other business and operating/administrative policies.

## 1.5 Risk Assessment

The process of Risk Assessment shall cover the following:

- a) Risk Identification and Categorisation – the process of identifying the company's exposure to uncertainty classified as Strategic / Business / Operational.
- b) Risk Description – the method of systematically capturing and recording the company's identified risks in a structured format
- c) Risk Estimation – the process for estimating the cost of likely impact either by quantitative, semi-quantitative or qualitative approach.

### 1.5.1 Identification and categorisation of risks

As defined earlier, risks are events or conditions that may occur, and whose occurrence, if it does take place, has a harmful or negative impact on the achievement of the organization's business objectives.

Key characteristics by which risks can be identified are:

- Risks are adverse consequences of events or changed conditions
- Their occurrence may be identified by the happening of trigger events
- Their occurrence is uncertain and may have different extents of likelihood

Recognizing the kind of risks that company is/may be exposed to, risks will be classified broadly into the following categories:

1. **Strategic Risk:** include the range of external events and trends (like Government policy, competition, court rulings or a change in stakeholder requirements) that can adversely impact the company's strategic growth trajectory and destroy shareholder value.

2. **Business Risk:** include the risks associated specifically with the company and having an adverse impact on the company’s capability to execute activities critical for business growth, thereby affecting its near-term performance. E.g. occurrence of a risk event delaying the timely completion of construction activity of a hydro-electric power generation project leading to the deferment of revenues expected from the project.
3. **Operational Risk:** are those risks which are associated with operational uncertainties like unpredictable changes in water levels, force majeure events like floods affecting operations, internal risks like attrition etc

### 1.5.2 Risk Description

A risk description helps in understanding the nature and quantum of risk and its likely impact and possible mitigation measures. Risk descriptions for each of the risks identified in the Risk Matrix are to be documented and recorded in a structured format in each area where the risk is identified. The suggested format is provided below:

#### **Risk Description**

1	Name of Risk	Short description by which the risk may be referred to
2	Scope of Risk	Qualitative description of the events by which the occurrence of the risk may be identified, any measurement indicating the size, type, number of the events and their related dependencies
3	Nature of Risk	Strategic/ Business/ Operational
4	Stakeholders	List of stakeholders affected and impact on their expectations
5	Quantification of Risk	Cost of impact, if risk materialises
6	Risk Tolerance and Trigger	Loss potential and financial impact of risk on the business Value at Risk Probability of occurrence and size of potential losses Objective(s) for control of the risk and desired level of performance to assimilate Risk Trigger
7	Risk Treatment & Control Mechanisms	Primary means by which the risk is currently being managed Levels of confidence in existing control system Identification of protocols for monitoring and review of the process of treatment and control
8	Potential Action for Improvement	Recommendations to reduce the occurrence and/or quantum of adverse impact of the risk
9	Strategy and Policy Developments	Identification of function responsible for developing the strategy and policy for monitoring, control and mitigation of the risk

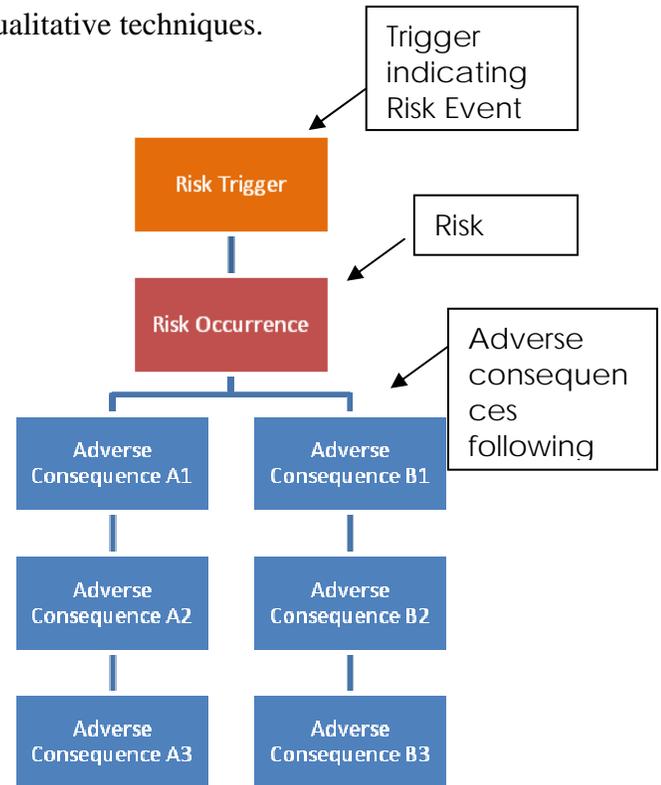
The various risks that the company is or can be exposed to are identified in the Risk Matrix.

### 1.5.3 Risk Estimation

In this process, the consequences of the risk occurrences have to be quantified to the maximum extent possible, using quantitative, semi-quantitative or qualitative techniques.

Process of risk quantification for the company has to be qualitative, supported by quantitative impact analysis. To apply this approach, the chain of adverse consequences (refer adjacent figure), which may occur in case the identified risk materialises, should be enlisted. For each of the chains of adverse consequences, the cost impact needs to be calculated and attributed to the particular risk. In such an exercise, actual cost impacts (like claims by contractor, loss of equipment value, etc) as well as opportunity costs (like loss in realisation of revenue, delay in commission of project etc) must be captured to arrive at the total cost impact of materialisation of the risk.

According to the adverse impact analysis for identified risks, an appropriate risk rating shall be determined for each risk identified as per the criteria below:



## Risk Estimation

Consequences of Risk (Cost of Impact - Stakeholder or Strategic or Financial)	
Rating 4 (Devastating)	Significant stakeholder concern / Significant impact on strategy or operational activities / Cost of impact is likely to exceed Rs. 100 Crores p.a.
Rating 3 (Major)	Major stakeholder concern / Major impact on strategy or operational activities / Cost of impact is likely to be between Rs. 50~100 Crores p.a.
Rating 2 (Tolerable)	/ Moderate stakeholder concern / Moderate impact on strategy or operational activities / Cost of impact is likely to be between Rs. 5~50 Crores p.a.
Rating 1 (Minor)	/ Minor stakeholder concern / Minor impact on strategy or operational activities / Cost of impact is likely to be less than Rs. 5 Crores p.a.

Note: The cost impact estimation corresponding to the Risk Ratings have been determined based on the analysis of similar cost impact assessment data of the company's completed and under-construction projects.

## 1.6 Risk Matrix

**Risk Rating:** 4 3 2 1

**Risk Category:** **Applicability to Industry: I or NHPC: N, Nature of risk as Controllable: C or Un-Controllable: UC or Partly Controllable: PC**

No.	Risk Head	Risk Description	Category	Risk Trigger	Risk Rating	Proposed Risk Mitigation Mechanism	Responsibility
<b>A</b>	<b>Strategic Risks</b>						
A1	Political	Unilateral policy changes on river water release	I / N (PC)	Announcement of state policy review	3	<ul style="list-style-type: none"> <li>✓To keep a provision in the MoU with State Governments for ensuring minimum guaranteed discharge of water</li> <li>Illustration: Tanakpur Power Station's capacity got reduced due to change in river discharge. River discharge was diverted for irrigation purposes.</li> </ul>	Projects
A2	Political	Possibility of losing projects due to state level exigencies	I (UC)	Continuous	3	<ul style="list-style-type: none"> <li>✓Ensure transparency in award of projects</li> <li>✓Have strong legally binding agreements with the state Governments, Department of Power once the project is allocated</li> </ul>	Planning Division
A3	Payment Security Mechanisms	Adverse regulatory policy development, Loss of securitization mechanism by 2016	I / N (PC)	Release of draft policy document	2	<ul style="list-style-type: none"> <li>✓Closely monitor future policy developments of CERC and adopt policy advocacy to facilitate that framing of regulations take note of the company's concerns regarding future payment realization</li> <li>✓Get credit rating of the beneficiary assessed prior to signing the PPA so that the company can take a balanced view about the financial status of State utilities and State</li> </ul>	Commercial Division

No.	Risk Head	Risk Description	Category	Risk Trigger	Risk Rating	Proposed Risk Mitigation Mechanism	Responsibility
						<p>Governments and their ability to pay accrued dues</p> <ul style="list-style-type: none"> <li>✓ Adopt Escrow mechanism for power sale realisation beyond 2016.</li> <li>✓ Make an amendment in PPAs with procurers to ensure that the lien on escrow post 2016 would be based upon the pari passu basis</li> <li>✓ PPAs with State Governments to have a clause entitling the company to stop supply of power in case of payment default</li> <li>✓ All new PPAs with private parties to be signed with a two-tier payment security mechanism of LC backed by escrow</li> </ul>	
A4	Market Dynamics	Absence of security mechanism for Unscheduled Interchange (UI) charges	I (UC)	CERC announcement	2	<ul style="list-style-type: none"> <li>✓ Pursue the issue of security mechanism for UI charges with different Regional Power Committees as presently finalization and implementation of UI charges is effected by Regional Load Dispatch Centers</li> <li>✓ Interact with CERC for this regulatory issue to emphasise the importance of developing a LC or Escrow backed effective payment safeguard mechanism for UI charges</li> </ul>	Commercial Division
A5	International	Threat of river diversions like diversion of Brahmaputra by cross border activity	I (UC)	Significant loss of water availability	4	<ul style="list-style-type: none"> <li>✓ Pursue with the Government for taking protective measures to mitigate the impact from adverse cross-border activity</li> </ul>	Corporate Project Monitoring Group

No.	Risk Head	Risk Description	Category	Risk Trigger	Risk Rating	Proposed Risk Mitigation Mechanism	Responsibility
A6	Market Mechanisms for award of contracts	Threat of competition - private and Government power generators like NTPC entering the hydro power sector, Hydro power project award on competitive tariff basis	N (C)	Announcement of hydro policy review	3	<ul style="list-style-type: none"> <li>✓Participation in tariff-based bidding so as to gain experience in competitive bidding and build capabilities for bidding projects by creating a knowledge bank of the company's bids as well as those put in by competitors and identify areas where cost and time can be reduced.</li> </ul>	Planning Division/ Commercial Division
A7	Force Majeure	<p>a) Impact of natural calamity like floods, heavy rainfall.</p> <p>b) Earthquakes</p>	I (UC)	Continuous	1	<ul style="list-style-type: none"> <li>✓Indemnify the company against possible losses by insuring the projects / power plants under natural calamity risk insurance policy</li> <li>✓Ensure that the company is adequately protected in the PPAs in such events</li> <li>✓ Develop disaster management plan for each power plant / project with delegation of responsibility and set up nodal disaster management committee to provide guidance at the corporate office to prevent any such loss</li> <li>✓ Ensure that the company's disaster management plan is captured in the State's Master Disaster Management Plan</li> <li>✓Comprehensive hydrological studies to be undertaken</li> <li>✓Obtain/carryout regional geological map for identification of seismogenic source for the contemplated project</li> <li>✓Carryout seismological studies and evaluate seismic</li> </ul>	Contract Division/  Commercial Division/  D&E Division/ EG & Geotechnical Division/ Project/  EG & Geotechnical Division/

No.	Risk Head	Risk Description	Category	Risk Trigger	Risk Rating	Proposed Risk Mitigation Mechanism	Responsibility
		c)Land slide studies				<ul style="list-style-type: none"> <li>parameters</li> <li>✓Take necessary design measures to mitigate the risk earthquake</li> <li>✓Identify potential land slide in the project area</li> <li>✓Assess their impact on the project and make necessary provisions</li> </ul>	D&E Division/ EG & Geotechnical Division/ D&E Division/ Projects
A8	Company	Foreign currency risk	I / N (PC)	Forex fluctuations beyond estimated range	2	<ul style="list-style-type: none"> <li>✓Continuously monitor and track changes in forex rate</li> <li>✓Hedge forex risk with appropriate instruments available in the market forwards, future, options, derivatives</li> <li>✓Strive to keep payment and expenditure currency same as far as possible</li> </ul>	Finance Division
<b>B</b>	<b>Business General Category Risks -</b>						
B1	Market Dynamics	Award of difficult projects to NHPC and easier projects to private players	I (PC)	Continuous	3	<ul style="list-style-type: none"> <li>✓Especially for difficult projects, pursue the Government for single window clearances and timely completion of the approval process with Government support and enter into PPAs to reduce offtake risk</li> </ul>	Planning Division
B2	Market Dynamics	Time and cost overrun of hydro power projects and its impact in a competitive bidding environment	N (C)	Time and cost overrun	2	<ul style="list-style-type: none"> <li>✓Under existing provisions of PPA, tariff as determined by CERC is recoverable from beneficiaries. However, future scenario to be monitored and PPAs to be framed so as to protect the company from adverse effects of time and cost overrun</li> <li>✓Develop an internal mechanism for effecting proper</li> </ul>	Projects / Corporate Project Monitoring Group

No.	Risk Head	Risk Description	Category	Risk Trigger	Risk Rating	Proposed Risk Mitigation Mechanism	Responsibility
						<p>assessment of project cost components &amp; improve the planning and execution to avoid time or cost overruns.</p> <ul style="list-style-type: none"> <li>✓Implement a system of regular review of costs and fix appropriate responsibility centers for managing costs of the project.</li> <li>✓Develop a mechanism to record the instances and review the effectiveness of procedures in case project is delayed by 5% of the project time schedule</li> <li>✓Build a Knowledge Management System which will be the repository of all project related information. This system can be used to understand the reasons for cost and time overruns and estimation for new projects shall take those factors into account</li> <li>✓Formulate a mechanism to evaluate the loss of power sales realisation due to delayed commissioning of a project and its resultant impact on top and bottom line of the company with the cost of delay</li> <li>✓Carry out Process Benchmarking for key business processes and establish standard times for each activity to be completed</li> </ul>	
B3	Financial	Contractor payment mis-management	N (C)	Cost overrun exceeding contingency fund	2	<ul style="list-style-type: none"> <li>✓Resolve delays in contractor payment and cost escalation, if any on account of force majeure event immediately to prevent project delays and cost implications.</li> <li>✓Develop a dispute resolution mechanism like Dispute</li> </ul>	Projects

No.	Risk Head	Risk Description	Category	Risk Trigger	Risk Rating	Proposed Risk Mitigation Mechanism	Responsibility
						Adjudication Board (DAB) for early settlement of claims for each project. The DAB to be constituted of 3 technical experts including one nominee from the company and contractor each with the third nominee to be decided by consensus. DAB to work on an ongoing basis throughout the project with an agreed amount of financial power for early detection and settlement of the contractual dispute. Well defined criteria to be set for cases to be taken up by the DAB.	
B4	Company	Delays in decision making	N (C)	Continuous	3	<ul style="list-style-type: none"> <li>✓ Enforce more accountability for the delays in decision making leading to financial impact</li> <li>✓ Develop an internal monitoring mechanism for the approval of files or procedure. Identify the key decision points, the delay in which will be detrimental to the overall project. The estimated turnaround time for these decisions and the responsibility centers for decision making should be clearly identified. Once the system is in place the company will fix accountability for delays in decision making</li> </ul>	Corporate Project Monitoring Group / Contract Division/ Projects
B5	Company	Loss of skilled/ experienced manpower	N (C)	Major impact on competitive strength	2	<ul style="list-style-type: none"> <li>✓ Adopt HR tools like employee satisfaction survey, exit interviews and external benchmark study to frame and implement a companywide retention policy to prevent loss of business skills and check attrition.</li> <li>✓ Adopt various mechanism viz Financial / Non financial reward &amp; recognition systems including Performance related incentive based on individual / group performance</li> </ul>	Human Resource Division



No.	Risk Head	Risk Description	Category	Risk Trigger	Risk Rating	Proposed Risk Mitigation Mechanism	Responsibility
						Based on past experience, estimate the cost of social infrastructure and creating employment opportunities and include the same under CSR/R&R.	
C2	Design and Development	Impact of geological surprises like tunnel collapse, land slide and disruption of tunneling activity on account of high ingress of water or debris or high geothermal gradient making working conditions extremely difficult in tunnel, slope stability etc, or failures due to pitfalls in design	I (PC)	Impact on critical path time; or cost overrun	3	<ul style="list-style-type: none"> <li>✓ A comprehensive mechanism needs to be evolved at the project level to ascertain the causes of collapses with regard to geological aspects, designed support and active support installed.</li> <li>✓ Include appraisal of various studies in the DPR process by technically competent authorities/consultants in the respective field to minimize surprises which can be anticipated during the feasibility studies</li> <li>✓ Build a Knowledge Management System which will be the repository of all project related information. This system can be used to understand the reasons for cost and time overruns and estimation for new projects should take those factors into account</li> </ul>	Geotechnical Division /Design and Engineering Division/ Project
C3	Design and Development	Hydrological changes due to climate change	I (PC)	Precipitation beyond design range anytime during the life of the project	2	<ul style="list-style-type: none"> <li>✓ Use hydrological data only from authentic sources. Carry out independent studies to reaffirm the indications of the hydrological data, if necessary</li> </ul>	Design and Engineering Division
C4	Political	Delays due to lack of Government support - Problems of Law &	I / N (PC)	Continuous	3	<ul style="list-style-type: none"> <li>✓ Enter into JVs with State Governments to develop hydro power projects which will help in obtaining faster approvals for the project</li> </ul>	Corporate Project Monitoring Group /Planning

No.	Risk Head	Risk Description	Category	Risk Trigger	Risk Rating	Proposed Risk Mitigation Mechanism	Responsibility
		Order in the States, Transportation, Delay in approvals etc				<ul style="list-style-type: none"> <li>✓Do proactive liaisoning with Government departments to maintain healthy relations</li> <li>✓Identify the various State Government departments such as Environment and Forests, Public Works Department, Department of Home etc which contribute mainly towards the delays and sensitise them about the various issues relating to the project. This matter may be taken up with the concerned Ministry for preparation of necessary guidelines for faster approval/process, highlighting the importance of such projects for the development of State or region</li> <li>✓Pursue State Governments to involve public/local bodies upfront during the award stages itself i.e. prior to construction. Make sure that support of all public/local bodies is clearly outlined in the Implementation Agreement</li> <li>✓Analyse the procedures involved in various clearances and interactions with the Government and identify and suggest opportunities of improving the same. Also, adopt a mechanism to review the progress of EIA and take corrective actions to prevent delays</li> <li>✓For infrastructural works consider hiring local agencies. This will ease and expedite building of infrastructures for a given project.</li> <li>✓Develop an alternative transportation route in case</li> </ul>	Division/ Projects

No.	Risk Head	Risk Description	Category	Risk Trigger	Risk Rating	Proposed Risk Mitigation Mechanism	Responsibility
						<p>transportation problems are not resolved by the Public Works Department for projects in critical stages.</p> <p>✓Have a Clause under contract to penalise the contractor for irrecoverable loss of project activity on account of transportation problems.</p> <p>✓Illustration: Projects being taken up in the North-East face issues in transportation wherein the issue is not resolved quickly by Public Works Department</p>	
C5	Contract Formulation	Delays in award of contract because of contract litigations	N (C)	Impact on critical path time	3	<p>✓Develop a uniform tender approval procedure for avoiding contract litigations that arise due to issues raised on tendering procedures</p> <p>✓Make standard and more detailed contracts covering minute points for avoiding loop holes. Learnings from various contracts should be carried forward to other contracts to make them more robust.</p>	Contract Division
<b>D</b>	<b>Business Risks -</b>	<b>Construction Category</b>					
D1	Terrorism	Impact of terrorism on project lead time and cost overrun like in Dulhasti Power Station	I (PC)	Continuous	4	<p>✓Liaison with State Government (Department of Home), Central Ministry of Power and Ministry of Home Affairs for adequate protection of its project sites</p> <p>✓Ensure that there are no penalty clauses in the ensuing PPAs for the project which are likely to be impacted by the acts of terrorism.</p> <p>✓Explore the option of taking terrorism coverage policy for</p>	Corporate Project Monitoring Group / Projects

No.	Risk Head	Risk Description	Category	Risk Trigger	Risk Rating	Proposed Risk Mitigation Mechanism	Responsibility
						<p>projects in States effected by terrorism for nullifying any loss of its financial interests</p> <p>Illustration: Dulhasti HE Project got delayed due to active terrorism</p>	
D2	Operating environment	Extreme weather conditions leading to uncertain working environment for contractors and employees and consequent delay in project completion	I (UC)	Impact on critical path time	2	<p>✓Project timelines for such projects should be estimated taking into consideration the past weather conditions data</p> <p>✓The force majeure clause of the tender specifications for execution of the contract should be suitably amended to incorporate the known weather conditions</p> <p>✓Continue to provide special allowances for its personnel who are given postings in such project sites to keep up their motivation towards work.</p> <p>Illustration: Extreme weather conditions (sub-zero temperatures) in Nimoo-Bazgo HE Project, Leh</p>	Corporate Project Monitoring Group/Contract Division/Human Resource Division
D3	Business-logistics	Non availability and/or price hike of raw materials like cement, steel etc.	N (C)	Cost overrun exceeding contingency fund	2	<p>✓Prescribe minimum inventory norms for critical raw material and monitor regularly its movement. Penalty can be included in the contract conditions for not meeting the average inventory norms by the contractor even without any disruption of project activity on such account</p>	Projects / Corporate Project Monitoring Group
D4	Contractor Management	Contractor issues like equipment problems, construction methodology, labor unions, poor labour	N (C)	Impact on critical path time or cost overrun exceeding contingency	2	<p>✓Develop a screening filter for weeding out non-serious bidders and/or put erring contractors under a negative list to forbid them in future tenders participation. Publish such list of erring contractors to deter growth of such vendors.</p>	Contract Division

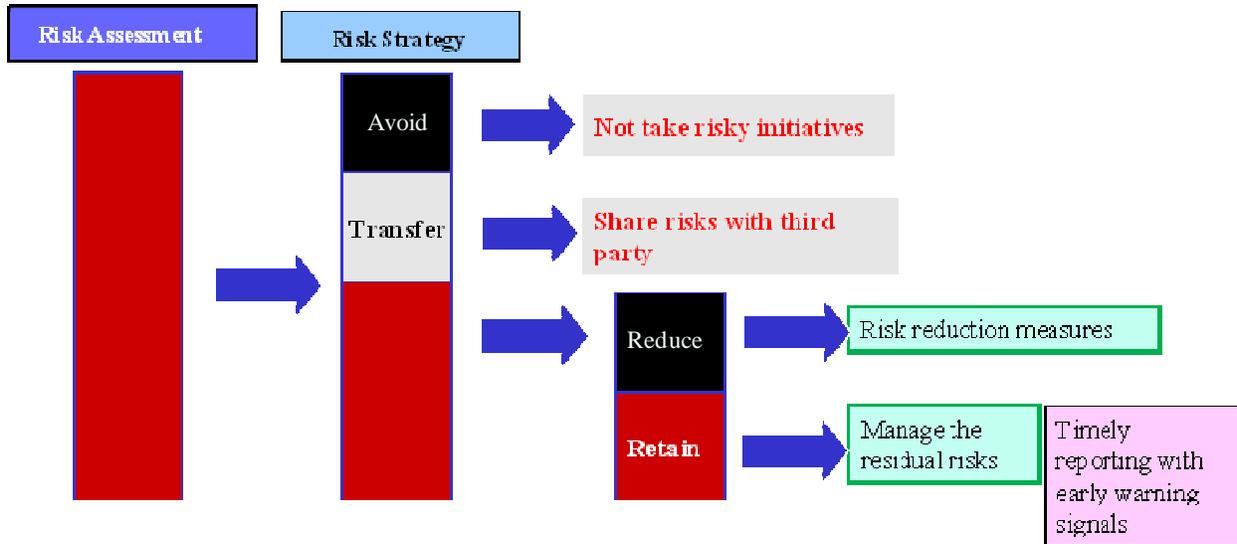
No.	Risk Head	Risk Description	Category	Risk Trigger	Risk Rating	Proposed Risk Mitigation Mechanism	Responsibility
		quality and scarcity of contractor labour		fund		<ul style="list-style-type: none"> <li>✓New contractors to be avoided for the award of critical assignments</li> <li>✓Offer of assignments to be extensively advertised to allow maximum vendors to participate in the tendering process. Expert foreign companies to be encouraged.</li> <li>✓Build a Vendor Information and Rating System to allow evaluation of all vendors. Implement contractors' performance feedback system.</li> </ul>	
D5	Power equipments	Delay in Power equipment supply	N (C)	Impact on critical path time	1	<ul style="list-style-type: none"> <li>✓Include suitable penalty clause in the power equipment purchase agreement for delay in delivery of project critical power equipments</li> <li>✓Consider foreign suppliers with proven technologies for supply of power equipments to reduce dependence on its existing source of power equipments</li> <li>✓Liaison with Ministry of Power, Government of India for timely delivery of power equipments by the Public Sector Undertaking (PSU supplier in case the delay is hampering the on-time completion of its project)</li> </ul>	Contract Division / Corporate Project Monitoring Group
D6	Power equipments	Impact of warranty lapses on account of delay in project commissioning	N (C)	Cost overrun exceeding contingency fund	2	<ul style="list-style-type: none"> <li>✓Include suitable amendment in the purchase contract for critical power equipments, so that warranty remains valid from the date of commissioning of the project</li> <li>✓Have an integrated plan for each project execution so that issues do not arise due to project management loop holes</li> </ul>	Contract Division

No.	Risk Head	Risk Description	Category	Risk Trigger	Risk Rating	Proposed Risk Mitigation Mechanism	Responsibility
<b>E</b>	<b>Operational Risks</b>	<b>(Including Power Stations)</b>					
E1	Operating environment	Hydrological surprises like water freezing, inadequate rainfall etc	I (PC)	Loss of power generation	2	<ul style="list-style-type: none"> <li>✓Mitigate this risk as part of the project design for preparing the detailed project report</li> <li>✓Ensure that the company is protected from loss in sales realisation due to hydrological surprises through appropriate clauses in the PPA</li> </ul>	Power Stations/Commercial Division/Design and Engineering Division
E2	IT& Communication Security	Insecure IT systems	N (C)	Continuous	3	<ul style="list-style-type: none"> <li>✓IT and Communication Network deployed for operation of Power Stations are not connected/exposed to external networks. However, IT &amp; Communication infrastructure deployed for automation of other business functions in the corporation are connected to external network. Adequate perimeter security in terms of Firewall, IDS/IPS etc. has already been put in place.</li> <li>✓IT Security Policy is already implemented to minimise disruption of IT services due to malware attacks and also pilferage of information.</li> <li>✓A Disaster Recovery Site as part of Business Continuity Plan is being developed at an alternate location.</li> </ul>	IT&C Division
E3	Repair & Maintenance	Inadequate equipment and civil maintenance leading to loss of power generation	N (C)	Frequent break down	1	<ul style="list-style-type: none"> <li>✓Annual preventive maintenance and minimum inventory plan for spares to be adhered to minimise breakdown losses in power generation.</li> <li>✓Conduct an analysis of past data to check if maintenance schedules and norms are effective</li> </ul>	O&M Division/Power Station/Design and Engineering Division

No.	Risk Head	Risk Description	Category	Risk Trigger	Risk Rating	Proposed Risk Mitigation Mechanism	Responsibility
						<ul style="list-style-type: none"> <li>✓Link individual incentives for reducing failures which can be avoided by high quality maintenance</li> </ul> Illustration: Tanakpur Power Station	
E4	Operating Environment	Problem of silt at bottom of dam leading to turbine damage	N (C)	Continuous	2	<ul style="list-style-type: none"> <li>✓Silt level at running power stations to be continuously monitored and silt flushing is carried out in affected season as preventive measure</li> <li>✓R&amp;D should include features in design to reduce the impact of such occurrence</li> </ul>	O&M Division/Power Stations/ Design and Engineering Division
E5	Operating environment	Generation loss due to water not released by upstream power projects	I / N (PC)	Sanction of power project upstream of the company's projects	2	<ul style="list-style-type: none"> <li>✓The company through proactive liasioning, to ensure that such projects which may be detrimental to operation of company's projects do not get sanctioned.</li> <li>✓Sign MOU with the State Government for providing sufficient water for power generation to the full capacity of power station</li> </ul>	Project/O&M Division

## 1.7 Risk Strategy

The following framework shall be used for the implementation of the Risk Strategy:



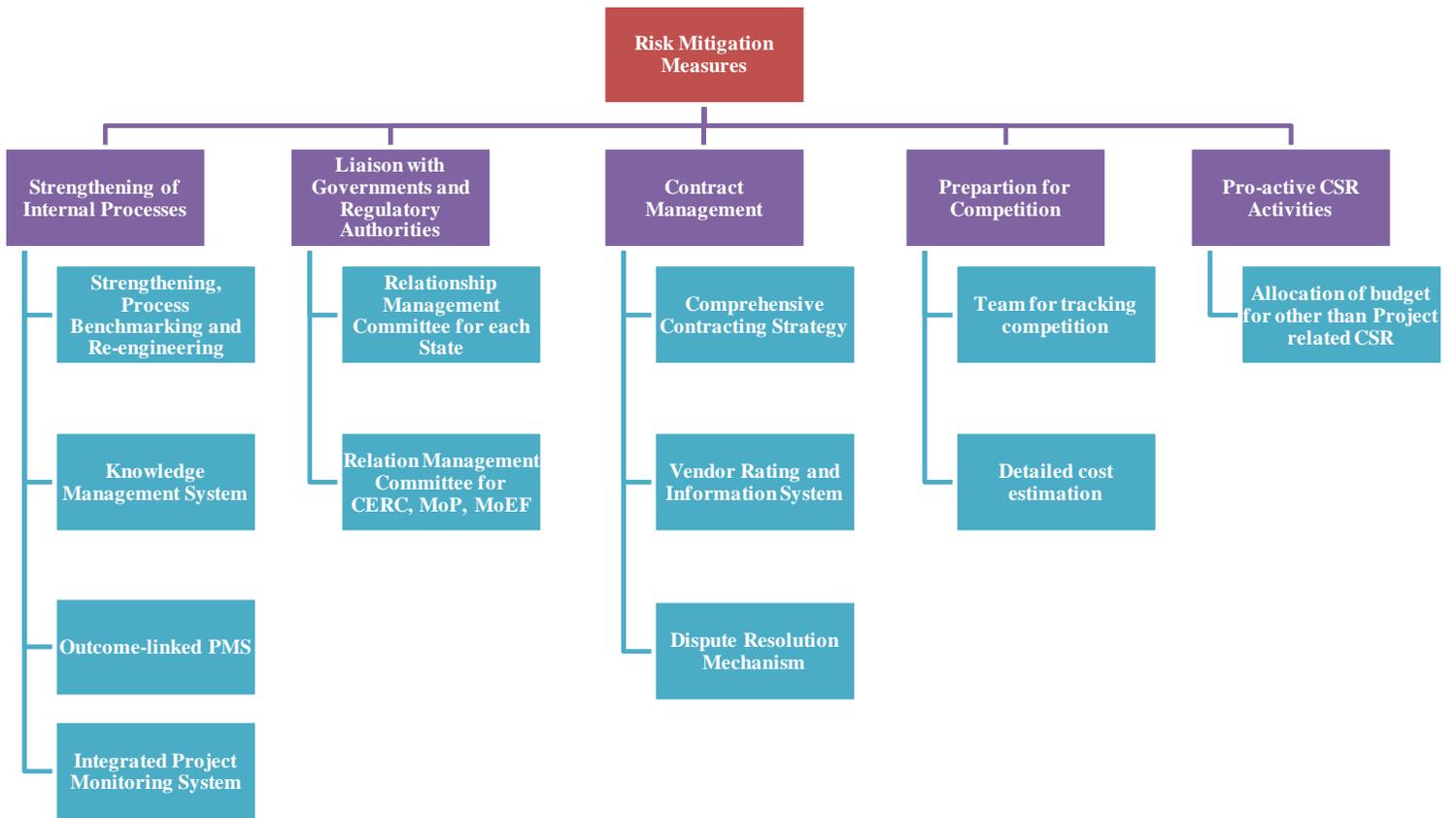
Based on the Risk Appetite/Risk Tolerance level determined and reviewed from time to time, the company should formulate its Risk Management Strategy. The strategy will broadly entail choosing among the various options for risk mitigation for each identified risk. The risk mitigation can be planned using the following key strategies:

- a) **Risk Avoidance**: By not performing an activity that could carry risk. Avoidance may seem the answer to all risks, but avoiding risks also means losing out on the potential gain that accepting (retaining) the risk may have allowed.
- b) **Risk Transfer**: Mitigation by having another party to accept the risk, either partial or total, typically by contract or by hedging.
- c) **Risk Reduction**: Employing methods/solutions that reduce the severity of the loss e.g., shotcrete being done for preventing landslide from occurring.
- d) **Risk Retention**: Accepting the loss when it occurs. Risk retention is a viable strategy for small risks where the cost of insuring against the risk would be greater over time than the total losses sustained. All risks that are not avoided or transferred are retained by default.

This includes risks that are so large or catastrophic that they either cannot be insured against or the premiums would be infeasible.

## 1.8 Key Implementation Areas for Risk Mitigation

The following are the key areas where risk mitigation measures need to be implemented:



- **Strengthening of Internal Processes**
  - **Strengthening, Process Benchmarking and Re-engineering for key Business Processes:** Two key business processes to be focused on –
    - **Survey and Assessment Process**

- **Contract Management Process**

The company needs to strengthen these processes through detailed analysis and should conduct a benchmarking exercise for its key business processes. The complete processes should be studied and analysed to make the system more robust and free from any error which may be potential causes of risks. The exercise should also aim to derive standards for each activity and if required re-jig processes to plug loop holes which may be causes of potential risks.

Responsibility: Contract Division

*Timeline for implementation: 6-9 months*

- **Knowledge Management System:** KMS should be built to capture the learning of the organisation. The KMS will provide benefits for future projects in terms of handling similar risks in other projects, providing better estimates of time and cost for specific activities, estimating occurrences of uncertain events and in capturing the tacit knowledge and experience the company's human resource.

Responsibility: CPMG Division.

*Timeline for implementation: 6-12 months*

- **Outcome-linked PMS:** It is very important that the company links performance targets of individuals and functions/departments with the expected outcomes so as to bring in more responsibility, accountability and drive into the personnel engaged in critical activities. Implementation of an outcome-linked PMS along with process benchmarking would clearly bring out the areas due to which performance of the projects and organisation is slipping.

Responsibility: HR /All HOD's

*Timeline for implementation: 6 months*

- **Integrated Project Monitoring System:** A seamless integrated Project Monitoring System is required for quick response and prompt decision making as well as to bring to attention the areas of short-fall and for tracking delays.

Responsibility: CPMG Division

*Timeline for implementation: 3-4 months*

- **Liaison with Governments and Regulatory Authorities**

- **Relationship Management Committee for each State:** The role of each State Committee would be to pro-actively establish relation with key State Government officials in all relevant Departments. The committee should also have the additional role of taking up CSR activities in the respective States even when there may not be any projects currently in progress.

Responsibility: Regional ED's /Project /Power Station/ Corporate  
Communication Division

*Timeline for implementation: less than 1 month*

- **Relationship Management Committee for CERC, MoP, MoEF:** The key role of this committee will be to be in constant touch with the CERC to understand pro-actively the direction of policy reforms and take initiative to bring out favourable policies. It should also interact pro-actively with the MoP and the MoEF to build strong relationship and favourable image of the company.

Responsibility: Commercial Division/CPMG Div.

*Timeline for implementation: less than 1 month*

- **Contractor Management**

- **Comprehensive Contracting Strategy:** The company needs to draw out a clear Contracting Policy to outline guidelines addressing key contract management issues including incentives and penalties related with timely completion of contracted work, handling of unforeseen uncertainties, criteria for allowing contractors to bid etc. This policy should device preventive measures to avoid all contractor related issues.

Responsibility: Contract Division

*Timeline for implementation: 6 months*

- **Vendor Rating and Information System (VRIS):** The VRIS will contain the information about all vendors / contractor as well as limited information about contractors working for competitors. A vendor rating will be generated through this system based on the credentials of the vendor as well as past performance on critical parameters like time and cost overruns. This system will also capture learnings from contracting issues and help in making more robust contracts.

Responsibility: Contract Division

*Timeline for implementation: 6 months*

- **Dispute Resolution Mechanism:** A dispute resolution mechanism for early and prompt settlement of contractors disputes needs to be operationalised for all projects. This could be in the form of a Dispute Adjudication Board (DAB) consisting of one member from the company, one member from the Contractor and one member chosen

by consensus. The DAB will run parallel to the contract review process under which regular review with the progress of the contractor activities will highlight day-to-day issues. In case, such issues do not get addressed within a stipulated time and enlarge to cost impacts beyond a limit they will be brought to the DAB for prompt settlement.

Responsibility: Arbitration Cell /Contract Div.

*Timeline for implementation: less than 1 month*

- **Preparation for Competition:**

- **Team for tracking competition:** The company needs to form a team which will focus on competitive biddings in the market and tracking of all bidding details for various players. The team will also search and build up a database of leading technology providers in the area of hydro-electric power generation which can be partnered with to participate in competitive bidding. A database of most competitive vendors should also be constantly maintained and evaluated. In addition, the team will work on establishing and maintaining benchmarks of various costs components.

Responsibility: Consultancy & Business Development Div.

*Timeline for implementation: less than 1 month*

- **Detailed cost estimation:** The needs to capture costs incurred in current projects in a manner so as to enable the company to prepare for competitive bids using accurate estimates of various cost components. E.g. employee costs specific to projects, detail break up of R&R expenses etc.

Responsibility: Cost Engg. Div.

*Timeline for implementation: 3-6 months*

- **Pro-active CSR Activities**

- **Allocation of budget for other than Project-related CSR activities:** The company needs to budget for a separate fund for proactive CSR activities in key States of importance. This fund will be used by respective State Relationship Management Committees to execute activities for CSR. The activities have to be focused on building a healthy brand image of the company with the Government and the inhabitants of the State.

Responsibility: Corporate Communication Div./HR/Regional ED's

*Timeline for implementation: less than 1 month*

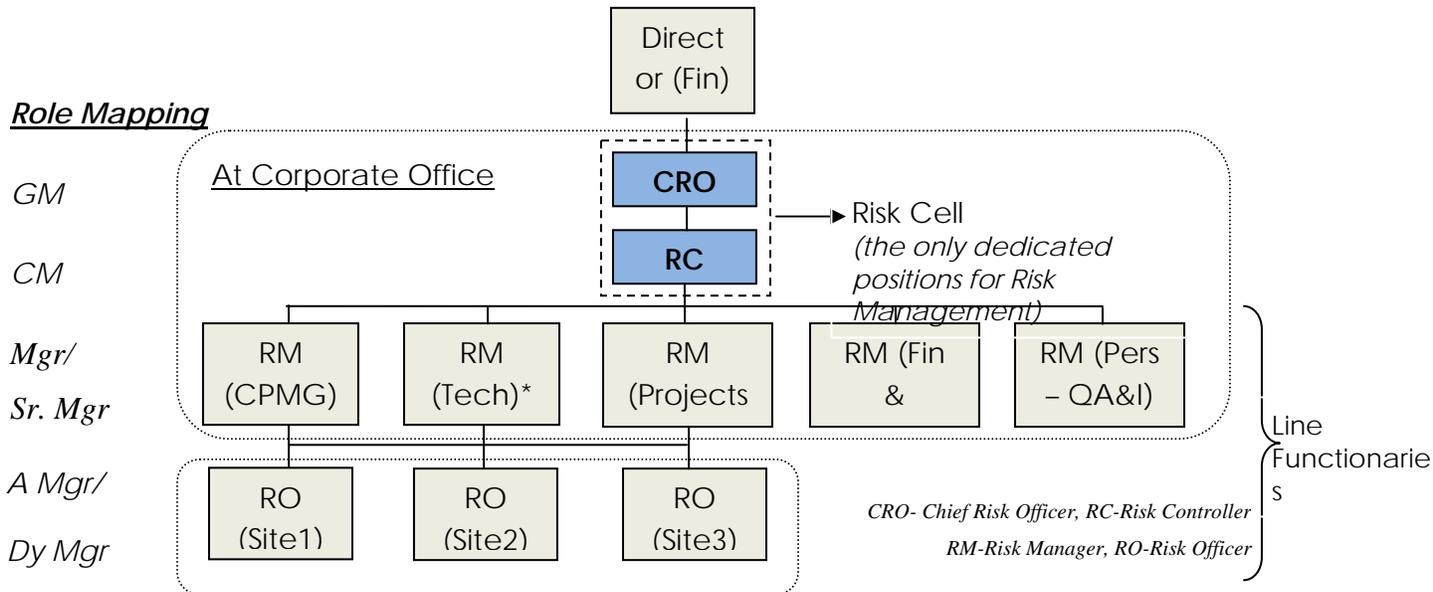
## **1.9 Risk Organisation Structure**

The Risk Management Policy will be implemented through the establishment of a Risk Organisation Structure. At the core, a Risk Cell comprising of the Chief Risk Officer (CRO) and the Risk Controller (RC) has to be formed (please refer to figure below). The CRO will have to be of the level of General Manager while the RC will have to be of the rank of Deputy General Manager/ Chief Manager. The Risk Managers (RM) and Risk Officers (RO) will be line functionaries, with cross-functional job descriptions – they will perform individual line duties, and also report to the Risk Cell. The RMs and ROs will therefore hold additional responsibilities for risk reporting beyond their line duties.

The overall monitoring of the Risk Cell will be done by the Director (Finance). The Board will review the status and progress of the risks and risk management system on a regular basis through the Audit Committee. :

All personnel forming a part of the Risk Organisation Structure have to be trained on the company's risk management system.

Following shall be the Risk Organisation Structure for the company



\* Technical include Operation & Maintenance (O&M)

# Site include construction projects and operational power stations

### 1.9.1 Roles and Responsibilities

- The Board will review the risk management policies and system periodically
- The Chairman & Managing Director will be responsible for ensuring that the risk management system is established, implemented and maintained in accordance with this policy.
- Assignment of responsibilities in relation to risk management will be the prerogative of the Chief Risk Officer.
- Risk Controller will be accountable to the Chief Risk Officer. The Risk Managers will report to the Risk Controller for the implementation of this Policy within their respective areas of responsibility.

- e) Risk Managers will also be accountable to the Risk Controller for identification, assessment, aggregation, reporting and monitoring of the risk related to their respective areas
- f) Risk Officers will be responsible for identification, preliminary assessment, reporting and monitoring the risks related to their individual projects.

### **1.10 Risk Management Information System (MIS)**

An enterprise-wide integrated Risk Management Information System (MIS) needs to be implemented by the company. Currently risks are captured when the core group prepares project completion report wherein all the risks faced during the project life cycle are compiled. This report also capture the various delays happened on the project and the key reasons for the same.

However, such information is needed at all levels of the organization to identify, assess and respond to future occurrences of risk events. Pertinent information from both internal and external sources must be captured and shared in a form and timeframe that equips personnel to react quickly and efficiently. Effective communication would also involve the exchange of relevant data with external parties, such as customers, vendors, regulators and shareholders. Further, both historical and current data needs to be collected. Historical data tracks actual performance against target, identifies trends, correlate results and forecasts performance. Historical data also provides early warning signals concerning potential risk-related events. Current data gives management a real time view of risks inherent in a process, function or unit. This will enable the company to alter its activities as needed in keeping with its risk appetite.

The company needs to start preparing 'Risk Registers' as an immediate measure. The Risk Registers will be maintained at the Risk Officer level for capturing comprehensively all risks in operating power stations and under-construction projects. Each risk will be identified, categoriesd and assessed using the methodology as specified in sections of the policy above.

Each Risk Manager would have access to risk registers of all Risk Officers under the span of control and would be responsible for monitoring them. Risk Controller would in turn monitor all risks at the Risk Manager level.

The 'Risk Register' should contain the following information:

- a) Description of the risk
- b) The impact, should the event actually occur
- c) A summary of the planned response, should the event occur
- d) A summary of the mitigation plan (i.e. the actions taken in advance to reduce the probability and/or impact of the event)
- e) The responsible function / person

All the information mentioned above can be captured by adopting the Risk Description format given in the earlier section of the policy.

The structure of the MIS will be as follows:

## Management Information System

Authority	Function Level	Reporting	Risk Escalation
Audit Committee		To the Board	For regular review and monitoring of the key Risks and the Risk Management System
↑			
Risk Cell	Corporate	To the Audit Committee	To be escalated on the basis of need, impact level and exigency of situation
↑			
Risk Manager	CPM G	To the Risk Cell	To be escalated on the basis of need, impact level and exigency of situation
	Technical *	To the Risk Cell	To be escalated on the basis of need, impact level and exigency of situation
	Projects	To the Risk Cell	To be escalated on the basis of need, impact level and exigency of situation
	Fin & Comm	To the Risk Cell	To be escalated on the basis of need, impact level and exigency of situation
	Pers and QA&I	To the Risk Cell	To be escalated on the basis of need, impact level and exigency of situation
↑			
Risk Officer	Project site 1	To the Risk Manager	All the Risks are to be reported as risk registers
	Project site 2...	To the Risk Manager	All the Risks are to be reported as risk registers
	Power station 1	To the Risk Manager	All the Risks are to be reported as risk registers
	Power station 2...	To the Risk Manager	All the Risks are to be reported as risk registers

\* Technical include Operation & Maintenance (O&M)

### 1.11 Maintenance of the Risk Management System

The Risk Cell will be the key group which will work on an ongoing basis within the risk framework outlined in this policy to mitigate the risks to the Company's business as it may evolve over time.

Effective maintenance of the system will require the following actions:

- a) The Risk Cell, under the guidance of Chief Risk Officer (CRO), will meet periodically with the Risk Managers (RM) and Risk Officers (RO) to identify specific business risk and analyse the risk in terms of consequences, if the risk materialises.
- b) Among all the risks identified the Risk Cell will prioritise and focus on key risks and their mitigation measures

## 2) Evaluation and Control

- a) Identified risks will be assessed in terms of potential consequences and cost of impact
- b) Risks will be ranked in accordance with their likely impact
- c) The acceptability of each identified risk will be assessed
- d) Proposed actions to eliminate, reduce or manage each material risk will be considered and agreed
- e) Responsibilities for the management of each risk will be assigned to appropriate managers

Based on a cost/benefit assessment of a risk, as is undertaken, some risks may be judged as having to be accepted because it is believed mitigation is not possible or warranted.

## 3) Monitoring

As the risk exposure of any business may undergo change from time to time due to continuously changing environment, the updation of the Risk Matrix will be done on a regular basis. The following process will be followed:

- **On an immediate basis**

Escalation of risks which have substantial impact to the business and meet determined escalation tolerance levels to the relevant Risk Manager or the Risk Cell

- **Monthly**

- ✓ The appointed Risk Managers will review the status of risks and treatment actions with key staff in their respective areas
- ✓ Any new or changed risks will be identified and escalated, if deemed necessary
- ✓ The appointed Risk Manager of each area will report to the Risk Cell
- ✓ Particular emphasis is to be given to risks with high ratings and their corrective actions

- **Semi-annually**  
The Risk Cell will report its collective findings to Audit Committee to the Board on a semi-annual basis.
- **Annually**
  - ✓ The risk management process is reviewed by the Board for efficiency and effectiveness
  - ✓ The risk contexts for each project are reviewed
  - ✓ The Risk Management Plan is subjected to annual audit by the Auditor

Everyone in the company is responsible for the effective management of risk. All staff is responsible for identifying potential risks. Management is responsible for developing risk mitigation plans and implementing of risk reduction strategies. The risk management process will be integrated with other planning processes and management activities.

#### **1.11.1 Approval of the Policy**

The Board will be the approving authority for the company's overall Risk Management System. The Board will, therefore, monitor the compliance and approve the Risk Management Policy and any amendments thereto from time to time.

#### **1.11.2 Review of the Policy**

The policy will be the guiding document for risk management at NHPC and will be reviewed as and when required due to the changes in the risk management regulations/ standards/ best practices as appropriate. In any case, the policy will be regularly reviewed semi-annually in December and June every year.

## **Annexure: Select Illustrative Cases of Risk Materialisation**

1. **Geological Surprises:** Geological surprise has come out as a risk which is more prominent for the Himalayan region but cannot be avoided in most cases. However, it can be managed, provided for and mitigated. Cases have been mentioned where the work has been held up for months together as well cases have also been mentioned where they have been managed by the contractors (e.g. Skanska) to maintain the project timeline.

Similarly, the Parbati II power house site had a land slide some time back which destroyed the almost completed construction of the power house. The power house is being reconstructed. This has resulted in considerable time loss.

**Result:** Serious Time Overrun

2. **Litigations and arbitration:** Several litigations come up during the execution of the project from contractors, locals, NGOs etc. The decisions of these litigations often may not be in favour of NHPC. Resolution of these litigations generally leads to time overrun and cost overrun. E.g. Parbati II dam construction has been held up for 5-6 months due to a PIL filed against NHPC by some individual for ban on NHPC quarries. Although this ban is removed now and the decision has been in favour of NHPC, it has lost 6 months of execution on this
3. **Rigid Procedures/Rules:** NHPC is quite rigidly bound with rules. In the case of Dulasti project, a French contractor was given the turnkey job for tunnelling. Due to some unforeseen reasons, the contractor asked for additional monetary compensation but NHPC did have any provision to accommodate this. According to NHPC procedures, the contractor was abandoned and re-tendering of the job was done.

**Result:** Cost went up by 2-3 times and project got extended by 5-6 years, which could have been restricted to nominal cost & time overrun

4. **Natural Calamities:** Since the projects have to do a lot of handling of water etc, natural calamities like floods affect the work on the project. Affect of floods can sometimes be avoided by planning the work in lean seasons. E.g. Indrasagar – flooding at the project resulted in damage to equipment. However, equipment being insured did not result in major cost to the project (to the extent 10% not recovered) but still led to time overrun

**Result:** Time overrun

5. **Acquisition of Land (Private & Forest):** Acquisition of land for most projects is most uncertain event. But a proper provision for land acquisition and support of the State Government can ease the problem. If the project is planned in the proper manner, land acquisition can be started as a parallel activity to clearances and tendering thus allowing for issues related with land acquisition to settle in due course of time. E.g. Kotlibehl – diversion of forest land led to delay in awarding contracts for the project.

**Result:** Time overrun, sometimes cost overrun