

The Indian growth in power availability has not been able to keep pace with the growth in power demand making it the most vital and essential infrastructure for economic development of any country. In India concentrated efforts have been made to increase the availability of power to give a fillip to Indian economy. However, the Northern Regional Power system continues to remain under the grip of severe power shortage due to the widening gap between peak power availability and demand. Due to limited resources available with the Central and State Governments, the Government of India has approved participation of the private sector in the generation, supply and distribution of electricity in the country in order to overcome the anticipated power shortage. As a result, the Himachal Pradesh State Government decided to allow private sector participation in respect of hydroelectric projects. Till year 2002, Government of Himachal Pradesh has signed MoU's with private entrepreneurs for eight projects.

According to Fourth National Power Plan, the country would need addition of over 1,50,000 MW thereby raising the installed capacity in the country to about 2,38,000 MW to meet peak demand of 1,76,647 MW and energy requirement of 1058 Billion Units by the end of 11th Plan (2011-12). The impact of accelerating hydropower development examined in the report on the plan, indicated that accelerating the present pace of hydro development to add 58,000 MW over the next 15 years would result in a saving of 9,000 MW in terms of new thermal capacity. It has been projected that the requirement of peaking power in the country is likely to go up by over 190% in the next 15 years. Studies had also revealed that to sustain the massive thermal power development, indigenous coal production has to be increased.

The detailed power planning studies carried by Central Electricity Authority (CEA) have convinced that the share of hydro power in the overall installed generated capacity in the country should be at least about 40% to ensure optimum utilisation of natural and financial resources for electric power generation. Thus the accelerated hydropower generation is unavoidable preposition when about 75% of the hydro potential of 84,000 MW still remains to be harnessed. Integrated development of hydro projects and rural development with a focus on environmental management can be duly taken care of through the clearly laid down strategies and policies. Indian power development needs priority correction by substantial addition of hydropower generation capacity together with blending of the catchment area treatment, watershed development and water harvesting practices in the mountain and hilly terrains of the country.

A study entrusted by RSWML on demand and supply gap and future incremental demand shows that there is likely to be sufficient demand supply gap in the northern grid which the project can tap as per the *Table 1.1*:

Table 1.1: Power Demand Supply Position (in net MW)

State Region	Existing		Year 2006-07		Year 2011 -12	
	Demand	Supply	Demand	Supply	Demand	Supply
Peak Demand						
Chandigarh	206	206	403		637	
Delhi	3,417	3,101	4,310		5,659	

State Region	Existing		Year 2006-07		Year 2011 -12	
	Demand	Supply	Demand	Supply	Demand	Supply
Haryana	3,411	3,325	4,899		7,192	
Himachal Pradesh	770	770	973		1,354	
Jammu & Kashmir	1,250	1,060	1,923		2,563	
Punjab	5,849	5,455	7,719		10,801	
Rajasthan	3,880	3,820	6,772		9,423	
Uttar Pradesh	6,700	5,750	10,223		14,385	
Uttranchal	771	705	1,161		1,634	
Northern Region	24,092	21,889	35,540	30,571	49,674	39,739
Gap		2,203		4,969		9,935

Source: Existing as per actuals, Forecast as per XVI EPS published by CEA, Future supply estimates by Earnst & Young for RSWML

The above table shows the supply gap of 4,969 MW and 9,935 MW during the years 2006 - 07 and 2011 - 12 respectively.

Allain Duhangan Hydroelectric Project is envisaged as a run-of-the-river development on combined discharges of Allain and Duhangan streams in Kullu district of Himachal Pradesh and will feed power to the Northern Grid comprising the states of UP, Rajasthan, Haryana, Punjab, Himachal Pradesh, Jammu & Kashmir, Delhi and Union Territory of Chandigarh. The power generated at this project is intended to meet the growing power requirements of Himachal Pradesh as well as the Northern Regional Grid of the Indian Power Supply system.

The energy benefits from the project have been assessed as about 821 MU (as per Lahmeyer International India (LII) study). The project would afford peaking capacity benefits of 192 MW for a minimum of four hours per day. The project will be operated as a peaking station for power absorption in the Northern Grid and will mitigate short fall in peak load availability and demand in the Northern Grid.

The project would be one of the cheapest sources of power generation in the Northern Region as compared to alternative of thermal or nuclear power generation. The northern grid has been identified as the beneficiary of power from ADHEP.

1.5

SITE SELECTION

Himachal Pradesh has a vast hydro potential due to it's nature of terrain and rivers / streams flowing across. It is endowed with approximately 20,000 MW of hydroelectric potential in its five river basins. The proposed project site has been allocated to RSWM mainly based on following considerations:

- availability of perennial water flow from catchment of snow glaciers and rain fed Allain and Duhangan streams;
- suitability of topographical, hydrological, geological, environmental and logistical considerations in the project area for adequately tapping water from the two streams with maximum head for power generation
- availability of comparatively flat hill terrace for development of intermediate storage reservoir with sufficient gradient. Two connecting head race tunnels from Allain barrage and Duhangan weir locations will feed to surgeshaft;
- availability of sufficient head for the proposed power generation potential

- adequate geological constituents of the hills for development of underground power house, thereby avoiding shear zone impacts; and
- comparatively low cost of hydel power generation at the proposed location

1.6

SCOPE OF THE STUDY

The scope of work for the assignment is to undertake supplementary Environmental and Social Impact Assessment Study based on existing documents and undertake specialised studies in line with IFC requirements. The details of the studies include the following:

Updated Environmental and Social Impact Assessment Study: RSWM had previously undertaken the environmental impact assessment study through RITES Limited, a Government of India Enterprise, which was subsequently updated by in-house Indo-Canadian Consultancy Services (ICCS). The ICCS study needs further strengthening and revision in order to meet IFC's requirement of OP 4.01 and relevant guidelines. Moreover, the existing environmental impact assessment study relates to baseline data collected in 1993 – 94, which requires to be updated with reference to the current scenario. The study will include the following sub-studies:

Socio-economic Impact Assessment Study: The SIA study has not yet been undertaken previously and need to be undertaken based on:

- Primary information through observation, sample surveys, interviews and discussions with the project proponent, local community and village institutions.
- Secondary sources (project documents, information already collected by RSWM, available maps, published statistics from District Census Handbooks, District level statistical profiles, etc.)

The socio-economic impact assessment will cover the villages of Jagatsukh, Hamta & Pirni. General information shall be collected for the entire community; however, the study shall focus specifically on those families directly affected by the loss of private land. The socio-economic impact assessment shall be undertaken as per the *Guidelines for Social Assessment of IFC Investment Projects* provided in the ToR and shall include the following:

- Socio-economic Profile of the communities in the two villages in the project area, including
- Impact assessment of existing and proposed project activities (on the community in general and those losing private land in particular).
- Developing mitigation measures for each of social impacts identified.
- Documentation of public consultations and information dissemination undertaken by project proponent.
- Resettlement Action Plan
- Community Development Opportunities

Public Consultation & Disclosure Plan: No Public Consultation & Disclosure Plan (PCDP) has been developed by RSWM. The PCDP shall be prepared by ERM on the basis of consultations with project proponent and local community representatives as per the IFC guidelines (*Guidance Note F*).

Reconnaissance Survey of Transmission Line Corridor: A Reconnaissance Environmental and Social Assessment for the proposed transmission line for power evacuation. We understand that while the exact route of the power transmission line is yet to be finalised, RSWM has information on the proposed corridor for the transmission line, (approximately 185-km connecting the project powerhouse with the northern grid at Nalagarh). As per our understanding, RSWM will undertake a detailed survey and environmental impact assessment at a later stage, once the feasible route of the transmission line is finalised. However, for the time being, RSWM requires a preliminary environmental and social reconnaissance survey of the proposed transmission line corridor for preliminary identification of potential impacts.

Forestry & Watershed Management Report: A study on forestry and watershed management is to be undertaken based on substantial information available with RSWM. The study on Forestry and Watershed Management will describe:

- (a) the available baseline information;
- (b) the steps the project authority will take to reduce risk of deforestation and soil erosion during project construction;
- (c) the recommended roles of the Forest Department and other stakeholders during project implementation; and
- (d) the potential for local communities to collaborate with the Forest Department in the monitoring of the project implementation and project performance.

Hydrological Study: RSWM has substantial information through various studies undertaken on flow pattern of the Allain and Duhangan river basins. However, there is a need to determine impact of the project on both the Allain and Duhangan river basins, by establishing a minimum flow for the maintenance of aquatic ecology and existing agricultural production (e.g., small scale irrigation systems).

Fisheries Study: A detailed fisheries study of the Allain and Duhangan river basins need to be carried out to determine the impact of the project on fish populations and identify appropriate mitigation measures. Information is to be collected on existing aquatic fish species and resources within the Allain and Duhangan rivers. The information will be based on fish catch study and fishing activities, if any, being undertaken in the region. It will also help establish baseline data on fisheries and identify likely effects of the project on fishery resources and any related socio-economic implications on the local people.

Cumulative Impact Assessment: Cumulative impact assessment is to be done based on available information, reconnaissance survey of the area and consultations with the concerned officials on possible existing and future projects upstream and downstream Allain and Duhangan rivers catchment.

Dam Safety: In the event, OP on Dam Safety is applicable, relevant details of experienced and competent professionals and requirement of a panel of experts to review detailed plans and undertake periodic safety inspections will be elaborated in the ESIA.

The overall outputs of the proposed study will form three volumes with an Executive Summary as per the following details:

- *Non Technical Executive Summary* of the environmental and social impact assessment, prepared in a standalone format including figures and tables;
- *Volume I - The Main Report* that consolidates information derived from both original and supplemental ESIA data, including specialised studies. The format of the main report shall be as per outlines given in IFC's document *Annex B* to OP 4.10.
- *Volume II - A detailed Environmental and Social Management and Monitoring Plan (ESMMP)* that specifies what actions the project authority will take to mitigate all adverse impacts identified in *Volumes I and III*. The ESMMP will include an environmental, health and safety monitoring plan that describes how the project authority will ensure that the measures stipulated in the ESMMP are implemented; and
- *Volume III - A compendium of all specialised studies* conducted under this proposal.

1.7

ORGANISATION OF THE STUDY

This EIA Report is based on requirements of IFC guidelines as the proposed project falls under *Category-A* Projects, as it attracts criteria described in OP 4.01 for projects involving *Large dams and reservoirs* and *Large thermal and hydropower development*. Environmental Assessment (EA) for a *Category-A* project examines the project's potential positive and negative impacts, compares them with those of feasible alternatives (including the "without project" scenario), and recommends any measures needed to prevent, minimize, mitigate, or compensate for adverse impacts and improve performance. A full environmental and social assessment is required which is normally an Environmental and Social Impact Assessment (ESIA).

Accordingly, this report on ESIA is based IFC guidelines and includes observations made by ERM during visits and collection of primary & secondary environmental data for the project area as per the above described scope of work. Available baseline information was reviewed and collated. Discussions were held with RSWM, state government agencies and local people in the area. Socio-economic profile, and social impact assessment with mitigative measures has been done under SIA and is being submitted separately.

Reconnaissance and field surveys were conducted to identify the major environmental issues in the project area and along the proposed tentative transmission line corridor.

1.8

REPORT FORMAT

This ESIA report has been divided into eight *Sections* (in addition to Executive Summary) as briefed hereunder:

Section 1 - Introduction

The section provides description of project background, site and surroundings, objectives, scope and organisation of the study and format of this report.

Section 2 – Environmental and Social Policy, Legal and Administrative Framework

This section provides information on Policy, Legal and Administrative framework applicable to hydropower projects. The Section defines major legal provisions required for hydel projects and current status of the project.

Section 3 – Project Description

This Section deals with the technology and specifications of the project. This also deals with the infrastructural development as a part of project and sources of pollution from the proposed hydropower project and proposed control measures.

Section 4 – Baseline Environmental Status

This Section presents the methodology and findings of field studies undertaken with respect to geology; hydrology; meteorology; quality of ambient air, surface and ground water, soils, noise levels; ecology; and landuse to define the existing environmental status in the catchment and project area.

Section 5 – Reconnaissance Survey of Proposed Power Transmission Line

This section presents reconnaissance survey findings of the power transmission line for the proposed project.

Section 6 – Socio-economic Profile of the Proposed Project Area

This section presents socio-economic profile of the project villages and project affected people.

Section 7 – Identification and Prediction of Environmental and Social Impacts

In this section, the potential impacts of the proposed hydroelectric project and allied activities, which could cause significant environmental concerns, are identified and discussed. This discussion will form the basis for environmental action plan. The section also covers socio-economic impacts due to the project, which forms the basis of the entitlement framework.

Section 8 – Evaluation of Environmental and Social Impacts

In this section, environmental and social impacts due to the proposed hydropower project activities have been quantified under two scenarios (1) “without environmental management plan”, and (2) “with the environmental management plan” using modified Leopold Impact Matrix to establish cause-effect relationship.

Section 9 – Analysis of Alternatives

This section presents comparison of alternatives of power generation, proposed project site, technology, design, and operation including without project situation in terms of potential environmental impacts, the feasibility of mitigating these impacts, their capital and recurrent costs, their suitability under local conditions and their institutional, training and monitoring requirements.

Section 10 Environmental and Social Management and Monitoring Plan (ESMMP)

This Section provides recommendation for environmental and social management and monitoring plan aimed at minimising the negative environmental impacts due to the pre-construction, construction and post construction phases of the proposed hydroelectric power project. Environmental and social monitoring requirements for effective implementation of mitigating measures during development as well as implementation of catchment area treatment plan and operation phase of the hydroelectric generation phase have also been delineated along with requisite institutional arrangements for their implementation.

Annexes:

Annex A: List of Approvals obtained by RSWML for the proposed ADHEP

Annex B: Photo-documentation depicting project site and field studies

Annex C: Record of Interagency and Consultation meetings including consultations For obtaining informed views of the affected people

Annex D: Analysis of Flow Measurements upstream at Proposed Diversion Structures and downstream on Allain and Duhangan Streams

Annex E: Organogram

Annex F: Reference Plates for Biological examination

Annex G: General Standards for Discharge of Environmental Pollutants

Annex H: Drawings related to Muck Disposal Plan