Hydropower Projects: Environmental & Social impacts Management & Mitigation measures

July 20, 2015
Agenda

• Types of Hydro-Electric Projects (HEP)
• Components of an HEP
• Regulatory Process: Environmental & Social
• Permits and Licenses during the Project lifecycle
• Key Concerns: Environmental
• Key Concerns: Social
**Type of common Hydro Electric Projects**

**Conventional (dams):**
- A large reservoir is created by constructing a dam to store river water for major hydro power project.
- Water released from the reservoir flows through a turbine, spinning it, which in turn activates a generator to produce electricity.
- The water is released through power intake either to meet peak electricity demands or base load needs or through spillways to maintain a constant reservoir level.

**Run-Off River:**
- A small reservoir is created by constructing a dam / diversion weir to divert river flow through head race tunnel to an adjacent valley utilizing the available head for power generation.
Hydro Power projects in India

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Components of HEP
Key components

A typical run-of-river project consists of the following components:

• an intake and weir structure;
• a penstock (pipeline or tunnel or both) through which water travels downhill;
• a powerhouse that houses generation equipment (turbines);
• a tailrace where the water is returned to its natural watercourse;
• a substation; and
• a transmission line.
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Source: Cleantech Investor.org
Key components cont....

Weir Intake:

- The weir and intake structure is used to divert a portion of a river’s flow into a penstock (pipeline or tunnel or both).
- The structure typically is composed of a low concrete weir and/or adjustable flap gate that create a small headpond and diversion channel that allows the facility to direct water into the penstock.
- The weir and headpond on run-of-river facilities are used for diverting flows that mirror natural flows in the river.

Penstock:

- The penstock is typically a pipeline or tunnel that transports the diverted water downhill from the intake to the powerhouse.
- The elevation drop and amount of water diverted determines the amount of energy generated from the facility.
**Key components cont.**

**Powerhouse:**
- The powerhouse is a building that houses the turbines used to generate electricity.
- Water from the penstock enters the powerhouse, where it is fed into the turbines. The water spins the turbines, which are connected to a generator, to create electricity.

**Tailrace:**
- Once the water passes through the turbines, the tailrace returns the water from the powerhouse to the natural watercourse.

**Substation:**
- The substation or switchyard at a run-of-rover facility contains transformers that convert the electricity produced in the powerhouse to a higher voltage, so the electricity is more efficiently transported over long distances on transmission lines.

**Transmission Line:**
- Electricity generated in the powerhouse is delivered to the electric system through a transmission line or power line.
Schematic Diagram of A Run off River project

Source: PME Bandung commercial Hydro-unit
Muck disposed within River bed near Power house

Source: Jorethang HEP, Sikkim
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*Source:* PME Bandung commercial Hydro-unit
High sediment carbonaceous water discharged directly to the Rangit River Near Barrage at Jorethang

Source: Jorethang HEP, Sikkim
Fish Ladder Kuricchu- Bhutan HEP

Source: Kuricchu, Bhutan website
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Regulatory Process related to HEP
Clearance Process in India

**Preliminary Report:** Since July 2002, the concerned project proponent in the initial stage, will first submit Preliminary Report covering surveys & investigations, international/interstate aspects, hydrology, irrigation planning, environmental aspects, intended benefits etc. which are required to establish soundness of the project proposals.

**In Principal Consent by CWC:** The project proposal will be examined and if found acceptable, the Central Water Commission (CWC) shall convey ‘In Principle Consent’ for preparation of Detailed Project Report (DPR).

**Review of DPR:** The DPR thus prepared will be examined in CWC and project proposal will be put up to the Technical Advisory Committee (TAC) for clearance.

**Clearance from MOEFCC** Simultaneously the project authorities will process and obtain necessary clearances of MOEFCC in respect of EIA and forest area diverted.

**Clearance from MoTA:** If Scheduled Tribe population is affected, the clearance of R&R plans will be obtained from the Ministry of Tribal Affairs.
Environmental Clearance Process in India

As per the Ministry of Environment & Climate Change (MoEFCC) EIA notification dated, 14th September, 2006 and as amended till date, River alley projects have been classified as Category 1 (c) as follows:

- **Category A**
  - (i) \(\geq 50\) MW hydroelectric power generation;
  - (ii) \(\geq 10,000\) ha. of culturable command area

- **Category B**
  - (i) \(< 50\) MW \(\geq 25\) MW hydroelectric power generation;
  - (ii) \(< 10,000\) ha. of culturable command area

General Condition shall apply. Note: Irrigation projects not involving submergence or inter-state domain shall be appraised by the SEIAA as Category ‘B’ projects.”
## Relevant Enforcement Agencies

| **The National Green Tribunal** | National Green tribunal has been constituted in 2010 for effective and expeditious disposal of cases relating to environmental protection and conservation of forests and other natural resources including enforcement of any legal rights relating to environment and giving relief and compensation for damages to persons and property. The tribunal will have jurisdiction over all civil cases relating to implementation of the following regulations:  
- The Water Act, 1974;  
- The Water Cess Act, 1977;  
- The Forest Conservation Act, 1980;  
- The Air Act, 1981;  
- The Environment Protection Act, 1986;  
- The Public Liability Insurance Act, 1991; and  
- The Biological Diversity Act, 2002  
  | The Act provides for compensation on account of following  
- Relief and compensation to the victims of pollution and other environmental damage arising under enactment of the above acts;  
- Restitution of property damaged; and  
- Restitution of the environment. |

| **District Administration (Collector’s Office)** | Land acquisition, if any under the Land Acquisition Act, 1894 for the proposed project will be regularised by the State government through district collector’s office.  
  | This act is now replaced by Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement Act 2013. Presently Ordinances too have been issued |
## Relevant Enforcement Agencies

<table>
<thead>
<tr>
<th>State Labour Department</th>
<th>All issues pertaining to implementation of labour laws in any establishment, shop or factory.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Indian Renewable Energy Development Agency Limited (IREDA)</strong></td>
<td>IREDA was established on 11th March, 1987 as a Public limited Government Company under the Companies Act, 1956 and it promotes, develops and extends financial assistance for Renewable Energy and Energy Efficiency/Conservation Projects. IREDA has been notified as a “Public Financial Institution” under section 4 ‘A’ of the Companies Act, 1956 and registered as Non-Banking Financial Company (NFBC) with Reserve Bank of India (RBI). The main objectives of IREDA is to provide financial support to specific projects and schemes for generating electricity and / or energy through new and renewable sources and conserving energy through energy efficiency.</td>
</tr>
</tbody>
</table>
## Key Environmental Legislations

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Name</th>
<th>Scope and Objective</th>
<th>Key Areas</th>
<th>Operational Agencies/ Key Players</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Water (Prevention and Control of Pollution Act, 1974)</td>
<td>Provide for the prevention and control of water pollution and enhance the quality of water</td>
<td>Controls sewage and industrial effluent discharges</td>
<td>Central and state pollution control board</td>
</tr>
<tr>
<td>2.</td>
<td>Air (Prevention and Control of Pollution Act, 1981)</td>
<td>Provide for the prevention and control of air pollution</td>
<td>Controls emissions of air pollutants</td>
<td>Central and state pollution control boards</td>
</tr>
<tr>
<td>3.</td>
<td>Forest Act, 1927</td>
<td>Consolidate acquisition of common property such as forests</td>
<td>Regulates access to natural resources, state has a monopoly right over land, categorizes forests</td>
<td>State government, forest settlement officers</td>
</tr>
<tr>
<td>4.</td>
<td>Forest Conservation Act, 1980</td>
<td>Halt India’s rapid deforestation and resulting environmental degradation</td>
<td>Restriction on de-reservation and using forest for non-forest purpose</td>
<td>Central government</td>
</tr>
<tr>
<td>5.</td>
<td>Wildlife Protection Act, 1980</td>
<td>Protect wildlife</td>
<td>Creates protected areas (national parks, sanctuaries) categories of wildlife protected</td>
<td>Wildlife advisory boards; central zoo authorities</td>
</tr>
<tr>
<td>6.</td>
<td>Environment Protection Act, 1986</td>
<td>Provide for the protection and improvement of the environment</td>
<td>An umbrella legislation; supplement laws</td>
<td>Central government nodal agency MOEF; can delegate powers to state department of Environment</td>
</tr>
</tbody>
</table>
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Specific requirements of HEP Terms of Reference for EIA

- Various details regarding the project layout etc., would be depicted in proper scale maps at least at 1:50,000 like:
  - Location map of proposed HE project
  - Location map of the project area with contours indicating main project features,
  - Drainage map of the river catchment up to the proposed project site,
  - Soil map of the project area.
  - Geological and Seismo-tectonic maps of the area surrounding the proposed project site showing location of dam site and powerhouse site, and
  - False Color Composite (FCC) generated from satellite data of project area and land-use / land-cover prepared from these images.

- Run off, discharge, water availability for the project, sedimentation rate, etc.
- Basin Characteristics
- Documentation of the existence of barriers and corridors (if any) for wild animals, the habitat fragmentation and destruction of wild animals due to project.
Specific requirements of Terms of Reference for EIA

- **Muck Disposal Plan.** Estimation of Muck quantity, swell factor, muck utilization, if any; identification of muck dumping sites and capacities; locations on layout map, engineering measures for stabilization and restoration plan after completion of dumping.

- **Catchment Area Treatment (CAT) plan** shall be prepared micro-watershed wise. Areas/watersheds falling under 'very severe' and 'severe' erosion categories are required to be treated. Both biological and engineering measures would be proposed. Year-wise schedule of work and monetary allocation would be provided.

- **Public Health Management Plan** to mitigate the impacts on health of locals and workers. This include provisions of health care facilities, ambulances, awareness programs, health checks etc. with budgets.

- **Fishery Conservation & Management Plan** including base line data on catch composition, fish density, fish standing crop, fish population dynamics in and around project area, presence of migratory/endangered fish if any to be checked and mitigation measures should include monitoring the impact of the proposed construction on the fish resources.

- **Sanitation & Solid Waste Management Plan** for domestic waste from colonies and labour camps, etc.

- **Local Area Development Plan/Tribal Area Development Plan** to be formulated in consultation with the Revenue Officials and Village Panchayats.

- **Compensatory Afforestation**: in case of diversion of forest land.
Specific EC conditions laid by MoEF

• Catchment Area Plan should be considered for the project development;

• The identified dumping sites for dumping of the excavated material should be used for muck disposal. For retaining the dumped/unused material for subsequent stabilization along the hill slopes and along the stretch of the road-sausage-cum-retaining walls are usually suggested to be developed. Also, these dumping yards are suggested to blend with the natural landscape by developing sites with gentle slopes, bunds, terraced and water ponds, patches of greenery in and around them;

• Fishery management Plan should be proposed; and

• Environmental Flow in the river is suggested to be released during lean season between 10-15%.
Key Social Legislations

- Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement Act 2013;
- Land Acquisition Act, 1894 and its amendments for existing projects;
- National Policy for Rehabilitation and Resettlement 2007;
- State Panchayati Raj Act;
- State Tenancy Acts;
- Panchayats (Extension to Scheduled Areas) Act, 1996 or PESA;
- The Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006;
- Specific Provisions related to sell and purchase of ST land in various states;
- Companies Act, 2013- CSR Clause; and
- Labour Laws across the lifecycle of the Project
Key Environmental concerns
## Summary of Impacts

<table>
<thead>
<tr>
<th>Project activity</th>
<th>Impacts</th>
</tr>
</thead>
</table>
| **Pre-project construction stage**     | **Land acquisition**: displacement, loss of homes, agricultural land, CPRs, livelihoods  
**Deforestation**: loss of forest cover, biodiversity loss, access to CPRs, landslides  
**Disposal of debris**: loss of vegetation, pollution—noise, air, water, land |
| Minor infrastructure (viz. roads, houses) | **Land acquisition**: displacement, land use changes  
**Deforestation**: loss of forest cover, biodiversity loss, landslides  
**Disposal of debris**: loss of vegetation, pollution—noise, air, water, land  
**Geological**: slopes destabilisation, disruption of underground seepages, disruption of river flows—biotic changes, sediment disposal, nutrient cycling, loss of aesthetic, cultural values |
## Summary of Impacts

<table>
<thead>
<tr>
<th>Project activity</th>
<th>Impacts</th>
</tr>
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<tbody>
<tr>
<td><strong>Operations stage</strong></td>
<td></td>
</tr>
</tbody>
</table>
| Operation and management (water storage/release, power lines) | **Slope destabilisation**: loss of tree cover  
**Sedimentation** (effect on river water quality)  
**Disruption of river flow**  
**Secondary effects** (earthquake risks, floods, land use changes) |
Impacts due to Project Design

Hydrological Balance
changes in the hydrological balance caused by the construction of the dam, reservoirs and canals;
• evaporation losses from reservoirs;
• expected rise in groundwater table, and
• impact on aquatic ecosystems including fish; aquatic birdlife, spawning areas and seasonal migration.

Drainage
• the risk of water logging/flooding;
• siltation, eutrophication, salinization & alkalinization risks, and
• adequacy of proposed drainage network.

Dam, Canals and structures
• adequacy of proposed drainage network.
• adequacy of planned provision to prevent excessive aquatic weed growth, erosion and seepage, and design of culverts, intakes and protective structures to prevent bank scouring.
Impacts due to Project Construction Phase

Soil Erosion
- Runoff during rains from excavated areas, quarry sites, dam faces etc. can result in soil erosion.
- Adequate provisions for revegetation, dressing, resurfacing of burrow pits etc. should be ascertained.

Construction Spoils
- Adequacy of provisions for dumping of construction spoils, waste materials etc. should be reviewed.

Public Health
- Improvement in availability of water for various uses;
- The adequacy of sanitation in workers' camps, and the vectors;
- The vectors that may transmit diseases from local carriers to immigrant labour and staff and vice-versa.
Impacts due to Project Operation Phase

Residues of Agro-Chemicals

• expected increase in the use of pesticides and fertilizers
• adequacy of provisions made in the project for ensuring proper and safe use of fertilizers and pesticides;

Impact on Soil

• improvement of fertility and increase in agricultural production;
• the risk of waterlogging;
• salinization and alkalization risks;
• expected modifications in soil structure and texture, and
• expected soil losses from runoff due to project operation

Ground Water

• Possible changes in ground water quality as a result of percolation of toxic residues of agro-chemicals and its effects inside and outside the project area should be carried out.
Impacts due to Project Operation Phase

Changes in Surface Water Quality and Eutrophication

• risk of surface water pollution by residues from agro-chemical, future trends and its effect on fisheries and aquatic ecosystem;

• risk of eutrophication of reservoir water by sediment, nutrient leaching and fertilizer residues, and consequently, the risk of invasion of noxious aquatic weeds, such as water hyacinth;

• Water Related Diseases

• changes in water quality, eutrophication, weed growth and the increase in areas of stagnant water on the proliferation of insects or other vectors of water-related human and livestock diseases.

• present (pre-project) incidence of main water related diseases in the project area from surveys and existing public health records;

• risk of introduction of new pathogens and disease vectors;

• health care facilities, especially in the resettled area, and

• adequacy of planned measures to reduce the spread of water related diseases.
Environmental Flows

• Alteration of natural flow of river
  • impacts its ecological functions and
  • affects the social, economic, cultural, and recreational values to the local communities.

• Impacts on the river and floodplain ecosystems
  • Change in the annual cycle of flooding and drying.
  • Impact on many species which depend on seasons to provide the signals for reproduction, hatching, migration or other important lifecycle stages.

• Rapid fluctuations affecting spawning of fish
  • Change in water levels can prevent the spawning of fish by exposing or submerging the favoured nesting areas in shallow waters.

• Nutrient delivery impacted
  • Nutrient delivery to offshore areas could be disrupted by upstream damming activities that could have serious implications for the biogeochemistry and algal ecology of the downstream areas.
Biodiversity

HEPs are usually located in the presence of a range of ecosystems including mountains, grasslands, subtropical and temperate broadleaf forests, mixed coniferous forests and alpine meadows.

- **Ecosystem supporting a vast diversity of flora and fauna impacted**, including many threatened and endangered species.

- **Impact on the biodiversity-rich forests supporting local community needs** like food, fuel wood, fodder, fibre, medicines, building material and other life supporting resources to the local communities.

- **Impact on the aquatic fauna** in the rivers because of the alteration in the flow patterns

- **Land diverted for the project activities** including quarrying, construction of access roads, housing colonies, warehouses, temporary labour camps

- **Disposal of muck** leads to deforestation further impact the biodiversity of the region.

- **Fragmentation of forests** due to hydropower projects could impact wildlife movement in the area and also heightens the risk of poaching, especially where the projects are located near protected areas.
The unscientific disposal of muck generated during the construction of hydropower projects causes social and environmental hazards in the area where it is dumped.

- Loose muck **increases the level of suspended particulate matter** in the atmosphere causing serious health hazards and photo-retardation among the local population.

- **Muck which leaches into the aquatic ecosystems** and increases the turbidity of water that has serious impact on the aquatic life due to change in water quality and reduction in the availability of light.

- **Muck disposal on higher grounds** increase losses during flood especially with high sediment load;

- **Improper management of muck** (without cast walls or retention walls or without restoration of vegetation) increases the damage during floods.
Key Social concerns
Displacement & Compensation

- Low value of land in remote hilly areas resulting in low compensation for land;
- Non-existent, delayed, inadequate or badly-defined eligibility criteria;
- Inadequate compensation (lesser quantity of land than eligible);
- Lack of land for land option;
- Uncultivable nature of compensatory land;
- Non-availability of irrigation sources;
- Poor soil conditions or land being scattered;
- Rare attempts to compensate for loss of common property resources (CPRs).
- Cash based compensation do not reflect the ‘true’ replacement cost of the asset.
- Some projects defined all those living under the same roof or sharing a common kitchen were eligible for R&R package, while in others is was defined as the eldest surviving male, in whose name the property was registered.
- Benefit sharing with the local community.
Key issues related to R&R include:

- Lack of employment opportunities for displaced communities;
- Access to natural resources, health and education facilities;
- Rehabilitation packages (lesser than replacement cost, delay in payment);
- Processes related to displacement (lack of or misleading information, inadequate warning);
- Loss of livelihoods;
- Quality and quantity of rehabilitated land;
- Lack of effective stakeholder engagement;
- Lack of monitoring or redressal mechanisms.
Other Social impacts

• The influx of migrant workers from other parts of the country for construction can impact the community life of the locals.

• Tribal populations normally have close ties with rivers, forests, hillocks and animals.

• Hourly, daily and seasonal change in the river flow, due to the construction of dams, impacts the locals massively.

• Impounding of water in the dams is known to cut off access roads thus isolating villages/ communities. This has adverse effect on the economy of the locals.

• Cumulative impact of a number of dams in one region or as a cascade of dams on one river.

• Himalayan region has been known to be seismically very sensitive, and hence dams in these regions face potential risks of catastrophic failure from earthquakes.

• Loss to house structures during blasting for construction of utilities including access roads and other structures;

• Opening up of new streams during blasting activities.
Floods in Uttarakhand -2013

Uttarakhand has set an ambitious programme to develop 450 hydroelectric projects (HEPs) to harness its potential of 27039 MW.

- So far 92 projects with a total installed capacity of 3624 MW have been commissioned. Of these, 15 large and medium projects account for 95 per cent of the installed capacity. Another 38 projects with an installed capacity of 3292 MW are under construction. Here too 8 large and medium projects account for 97 per cent of the capacity.

Studies in the various stretches of the river suggest that:

- A series of dams on the Bhagirathi between Maneri in Uttarkashi district and Koteswar in Tehri Garhwal district have disrupted free flow in a stretch of about 110 km, almost half the length of the Bhagirathi from its origin to Devprayag.

- A comprehensive study by NEERI has highlighted the deleterious effect of the Tehri dam on the unique self-purifying ability of Gangajal in the Bhagirathi.

- A bio-monitoring study by scientists of the Central Pollution Control Board (CPCB) of 11 rivers in Uttarakhand including 5 HEPs sites stated that barrages ‘have drastically changed the ecological sustainability of rivers in the state’.
Floods in Uttarakhand - 2013 contd...

• The most serious impact has been the submergence of riverine ecosystem. Other impacts that have been cited include the loss of forest area and critical wildlife habitats.

• Geological Impacts: Several official committees have confirmed that slope instabilities leading to landslides and subsidence on the rim of the Tehri dam reservoir due to the raising and lowering of the water level have occurred.

• The analysis highlighted the fact that floods are not just about water but water and sediments. The major damage was inflicted by the sediments and water rather than just the water.
### Case Studies

<table>
<thead>
<tr>
<th>Project</th>
<th>Description</th>
<th>Details</th>
</tr>
</thead>
</table>
| Tapovan Vishnugad  | The 520-MW hydropower project is located on the Dhauliganga river, a tributary of the Alakananda river in Chamoli district of Uttarakhand. The project is being developed by NTPC | • Compensation:  
  • Insurance provided to assets owned by PAPs against damages caused;  
  • Provision for an annual appreciation of 5% for the insured assets; |
| Karcham Wangtoo    | The 1,000-MW hydropower project is located on Satluj river in Kinnaur district of Himachal Pradesh. Slated as the largest private sector project, it is developed by Jaypee Associates | • Release of mandatory 15% flows during lean season;  
• Provisions exists for accessing real-time flows data through the project website |
| Parbati II         | The 800-MW hydropower project developed by NHPC is located on the Parbati river in Kullu district of Himachal Pradesh | • Unique and innovative arrangement for muck Management;  
  • Minimal impact on the local environment;  
  • Local species planted in the disposal sites after suitable treatment |
## Case Studies

| Baira Siul | The 180 MW hydropower project is located in the Chamba district of Himachal Pradesh. Developed by NHPC, the project uses inflow of three tributaries (Baira, Siul, and Bhaledh) of river Ravi | • Benefit sharing;  
• cost of infrastructure for supplying power supply (electric line, transformers, meters) borne by the project authorities |
THANK YOU

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Applicability of Key Indian Legislations and the Reference Framework during different phases of Project Life Cycle-HEP

<table>
<thead>
<tr>
<th>Applicable Indian Legislation/Guidelines/International Conventions</th>
<th>Pre-construction</th>
<th>Construction</th>
<th>Operations</th>
<th>Decommissioning</th>
<th>Agency Responsible</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Land Purchase</strong></td>
<td></td>
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</tr>
<tr>
<td>Revenue Order nO1, 21/282/LR (S) for Land and its Value 7th August 2006</td>
<td>√</td>
<td>√</td>
<td>X</td>
<td>X</td>
<td>District Collector and Revenue Department</td>
<td>Land has been both acquired as well as purchased.</td>
</tr>
<tr>
<td><strong>Forest Clearance and Wildlife</strong></td>
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<td></td>
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</tr>
<tr>
<td>Forest Conservation Act 1980</td>
<td>√</td>
<td>√</td>
<td>X</td>
<td>X</td>
<td>Forests, Environment &amp; Wildlife Management Department State Government</td>
<td>Forest Clearance to be obtained for forest diversion in HEPS</td>
</tr>
<tr>
<td>Wildlife Protection Act, 1972, 2002 and Rules, 2003 and as amended</td>
<td>√</td>
<td>√</td>
<td>X</td>
<td>X</td>
<td>Forests, Environment &amp; Wildlife Management Department State Government</td>
<td>If any protected/ endangered flora or fauna (as listed in Schedules of WP Act, 1972) are found in the project area, conservation measures require be proposing and implementing for their protection.</td>
</tr>
<tr>
<td><strong>Environment Protection</strong></td>
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<tr>
<td>The Air (Prevention and Control of Pollution) Act 1981, amended 1987</td>
<td>X</td>
<td>√</td>
<td>√</td>
<td>√</td>
<td>SPCB MoEF CPCB</td>
<td>Permissible limits for ambient air quality have been laid down by CPCB under this act which requires to be complied with.</td>
</tr>
<tr>
<td>Environment Protection Act, 1986 and as amended</td>
<td>X</td>
<td>√</td>
<td>√</td>
<td>√</td>
<td>SPCB MoEF CPCB</td>
<td>Permissible limits for ambient air quality, water quality, noise limits has been laid down by CPCB under EP Act, 1986 which requires to be complied with.</td>
</tr>
<tr>
<td>The Noise (Regulation &amp; Control)</td>
<td>√</td>
<td>√</td>
<td>√</td>
<td>√</td>
<td>SPCB</td>
<td>Per the Act, ambient noise levels are to be maintained as</td>
</tr>
<tr>
<td>Applicable Indian Legislation/Guidelines/International Conventions</td>
<td>Pre-construction</td>
<td>Construction</td>
<td>Operations</td>
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<tr>
<td>Rules, 2000 and as amended up to 2010</td>
<td>X</td>
<td>√</td>
<td>√</td>
<td>X</td>
<td>SPCB, MOEF</td>
<td>stipulated in the rules for different categories of areas such as residential, commercial, industrial and silence zones. Considering the context of the project, Project Proponent will need to abide by the limits prescribed for residential zones. As the project is in rural/residential set up, noise standards for residential area will be applicable for the project.</td>
</tr>
<tr>
<td>Ambient Noise Standards</td>
<td>X</td>
<td>√</td>
<td>√</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Storage of Hazardous Chemicals</td>
<td>X</td>
<td>√</td>
<td>√</td>
<td>X</td>
<td>SPCB</td>
<td>MHISC Rules will be applicable during construction and operation phases if chemicals stored at site satisfy the criteria laid down in the Rules.</td>
</tr>
<tr>
<td>Manufacture, Storage and Import of Hazardous Chemicals (MSIHC) Rules, 1989 and as amended</td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Handling of Hazardous Wastes</td>
<td>X</td>
<td>√</td>
<td>√</td>
<td>√</td>
<td>SPCB</td>
<td>Generation of waste oil and transformer oil at site attracts the provisions of Hazardous Waste Rules, 2008. The hazardous wastes have to dispose through approved recyclers only.</td>
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<tr>
<td>Hazardous Wastes (Management Handling and Trans boundary Movement) Rules, 2008 as amended up to 2010</td>
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<td>Building and Other Construction Workers Act, 1996; The Building and Other Construction Workers Cess Act, 1996 H.P. Building and Other Construction Workers (Regulation of Employment and Conditions of Service) Rules, 2008 Inter-state Migrant Workers Act, 1979;</td>
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<td>State Labour Department &amp; Department of Inspectorate of Factories, State Government</td>
<td>Project Proponent will need to comply to the requirements of the these regulations</td>
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<td>Applicable Indian Legislation/Guidelines/International Conventions</td>
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<td>The Industrial Employment (Standing orders) Act, 1946, Employment Exchanges (Compulsory Notification of Vacancies) Rules,1960</td>
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<td>H.P. Industrial Establishments (National &amp; Festival Holidays, Casual &amp; Sick leave) Act, 1969</td>
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<td>The Employment Exchanges (Compulsory Notification of Vacancies) Act, 1959</td>
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<td>Trade union Act, 1926</td>
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<td>During the construction, operation and eventual decommissioning of the site, the following guidelines will need to be followed.</td>
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