



Alternative Energy Promotion Centre Community Electrification Sub-Component

Format for Detailed Feasibility Studies of Prospective Mini/Micro-hydro Projects

This format is intended for use in conducting detailed feasibility studies for proposed mini/micro-hydro plants. A Pre-feasibility study should have already been completed at this stage. The survey team should take a copy of the filled preliminary feasibility study format so that comparisons can be made at site and any differences be recorded.

1. General

Name of Scheme:

Location: Municipality/Rural Municipality: Village:

State:

Coordinates: (X, Y, Z)

Comments:

.....

Date of site visit:

UC Chairman / Developer:

Address:

Is UC Chairman / Developer same as in Pre-feasibility study?

Yes () No ()

Comments:

.....

Study team leader: Name: Signature:

Team members: 1. Name: 2. Name:

3. Name: 4. Name:

Persons Interviewed, address	Was this person also interviewed during pre-feasibility survey?	

Instructions

The name of the scheme should be same as mentioned in the preliminary feasibility study format. If a different name is assigned, the reasons should be stated so that confusions can be avoided.

If the developer is different than the pre-feasibility study, this should be explained / commented on.

Provide sufficient details of the persons interviewed so that they can be contacted later if necessary.

2. Selection of best available technology

Hydropower: Is there hydro potential? Yes(), No()

If yes, (a) Monthly average flow (Q_{11})lps

(b) Monthly average flow (Q_{40})lps

(c) Available head (H_d)m

Wind: Is there wind potential? Yes(), No()

If yes, (a) Daily average speedm/s (b) Monthly average speedm/s

(c) Availability of land for wind mill(ha or m^2)

(d) Types of potential land: public (), private (), other ().....

(e) Unit cost of land: (NRs/Ha or NRs./ m^2)

Solar: Is there solar potential? Yes(), No()

If yes, (a) Average irradiationkWh/m² (b) Availability of land for solar panel.....(Ha or m²)

(c) Types of potential land: public (), private (), other ().....

(d) Unit cost of land: (NRs/Ha or NRs./m²)

Gasifier: Is there biomass potential? Yes(), No()

If yes, (a) Daily/monthly/annual average wood availabilitym³

(b) Availability of land for harvesting wood.....(Ha or m²)

(c) Types of potential land: public (), private (), other ().....

(d) Unit cost of land: (NRs/Ha or NRs./m²)

3. Choosing best available technology

(a) Hydropower () Reason:

(b) Wind () Reason:

(c) Solar () Reason:

(c) Gasifier () Reason:

4. Site Information

How was the site reached?

..... hours/days walk from road head. Name of road head:

..... hours/day walk from airfield. Name of airfield:

Time for loaded porter to reach the site form..... road head /airfield

..... hours /days

Comment if other site information is different than in preliminary feasibility study:

.....
.....

5. Technical Specifications

Source stream: Intake location:

Elevation: masl

Fill in all of the technical information and provide appropriate comments as necessary, especially in the

Headrace: Open canal lengths & corresponding chainages:

Headrace pipe lengths & corresponding chainage:

From m.....

Unstable lengths requiring stabilisation:m

Gravel trap: Location:m, the from intake

Flushing location & description:

Are ground protection measures required? Yes() No ()

Settling basin:m, from the intake

Flushing location & description:

Are ground protection measures required? Yes() No ()

Forebay:m, from the intake

Flushing location & description:

.....

Are ground protection measures required? Yes () No ()

Based on the survey measurements and data, state the number of individual bends required along the penstock alignment in the space provided.

Penstock: Total length:m; No of Vertical bends:

No of Horizontal bends:Gross head, H_{gross} :m.

Powerhouse site: Description of location:

Elevation: masl; m above annual flood level of the river.

Distance from powerhouse to river bank / tailrace exit point: m

Are ground protection measures required at powerhouse?

Yes () No ()

Transmission and distribution line: Length:.....m

Will part of the scheme alignment or some structures have to be located on private land? Yes () No ()

If yes, specify alignment/structures that will have to be located on private land:

Is (are) the land owner(s) willing to have the alignment/structures on their land? Yes () No ()

Comments:

Comments on significant changes that have been made from the pre-feasibility survey:

6. Hydrology

Measured flow at intake, Q_i = l/s

Method used to measure the flow:

(Attach data sheet & calculations)

Date of flow measurement:

If there are water diversions (e.g., irrigation) close to the intake. i.e. within 2 hours walking distance, the flow diverted at these locations should also be measured and used to determine the 11-month exceedance flow based on MIP.

Upstream flows abstraction (if any), Q_{up} : (l/s)

Specify water use (drinking water, irrigation etc): irrigation.....

Downstream water use: Q_d : (l/s),

Specify water use (drinking water, irrigation etc):

Irrigation practices in the area (seasonal, year round, rotational etc.): ...

Seasonal.....

11 months exceedance flow based on $Q_i + Q_{up}$ and MIP, Q_{11} : (l/s),

Modifications required for multi-purpose projects should be briefly discussed here. For example, if irrigation flows is to be provided from the headrace, its sectional area will have to be increased, irrigation outlets may be required at different points along the alignment etc.

Estimate the maximum power available (P_{max}) from the 11-month available flow. The value for the overall efficiency of the system η should be based on the efficiencies of the individual component (e.g., penstock, turbine, generator & transformer).

A general plan from the intake to the powerhouse and tailrace should be drawn at site for comparison with the survey drawings, which would be prepared later. Although, this drawing need not be in scale, the waterway lengths and locations of the structures should be mentioned.

Refer to the CESC Flow Verification Guidelines for the methodology regarding the use of MIP method to estimate the monthly flows. Note that if flows are abstracted upstream of the intake, these should also be measured and included to determine the 11 months exceedance flow calculations based on MIP method.

Similarly, when calculating the 11-month available flow for power generation, the upstream abstraction and the downstream demands should be deducted.

11 months available flow, $Q_{avail} = Q_{11} - (Q_{up} + Q_d)$ l/s

Will there be any water right conflict due to the implementation of the scheme? Yes () No ()

Comments on water right issues: none.....

Other possible conflicts due to the implementation of the scheme: none

7. Multipurpose Projects

Can multiple uses of water resources be promoted in this project?

Yes () No ()

If yes, besides power generation, other uses are:

Irrigation () Drinking water () Others (specify):

Modifications required in the scheme layout or components to

incorporate multiple uses of the water resources:

Tailrace water can be used for irrigation.....

8. Installed Capacity and Layouts

Estimated maximum available power:

$$P_{max} = \eta \times (H_{gross} \times Q_{avail}) / 100 = \dots \text{ kW}$$

Draw a general sketch (plan) of the scheme from the intake to the tailrace

(i.e., birds eye view) in the box below;

Draw a general layout plan of the transmission/distribution areas from the powerhouse;

If multiple use of water is possible (i.e., multipurpose projects, the details should be provided here. Note that given the site conditions to the extent possible multipurpose projects should be proposed so that the water resources can be optimally used. Furthermore, the current AEPC policy is favourable to multipurpose projects as the cost ceilings for subsidy are not applicable for such cases.

Any water right conflict that could arise from the implementation of the scheme should be mentioned here.

If other conflicts are foreseen, these should be stated here.

Include names of all villages (or wards), distances and corresponding number of houses that are proposed to be electrified

Estimate the average power requirements per household and lighting hours based on discussions with the community and the power output possible given the flow and head conditions. The probable lighting hours (morning and evening) should be stated in the space provided.

Similarly, a sketch of the transmission / distribution line should be included in the box provided.

8.1 Villages to be electrified

Name of Village	Location from Power-house (km)	No. of Houses	Nos. to be included
Total households to be included in the MHP,		B =	

Daily electricity supply time: fromAM toAM

..... PM toPM

Total hours/day:

Average subscribed power, **F** = watts/household

Name of the farthest village, from the powerhouse, to be electrified:

Distance of this village to the power house =km

Nearest Villages from powerhouse excluded from electrification:

Name	Location from MHP Site	No of Houses
Total households in non-participating villages,		A_n =

Domestic Loads:

Total probable domestic load = $(F \times B)/1000 = G = \dots\dots\dots$ kW

Compared to the pre-feasibility study, has this probable domestic load increased or decreased.?

Reasons / Comments:

The total probable domestic load is calculated by multiplying the total number of households to be electrified by the average subscribed power.

9. Electricity Market

Electrically driven end uses:

S.N.	Description	Location	Name & Address of the Entrepreneur	Expected Operating Time (am/pm)	Power Required (kW)
1					
2					
3					
4					
Maximum power required for business load, J₁ = (Add only if operating time coincide)					

Mechanically Driven end uses:

S.N.	Description	Location	Name & Address of the Entrepreneur	Expected Operating Time (am/pm)	Power Required (kW)
1					
2					
3					
4					
Maximum power required for business load, $J_2 =$ (Add only if operating time coincide)					

Note: All business loads should generally be operated during non-lighting hours. Maximum business load should be limited to total domestic load.

Additional business likely after 3 years:

Type of Business	Location	Power kW	Comments

Peak load (M_p) on the system should generally be equal to the total probable domestic load (G) calculated earlier. In the exceptional case if the peak load is different such as due high end uses these should be explained and the financial viability justified in the report as discussed earlier.

Design plant capacity should be calculated by adding 25% to the peak load. This allows for 10% transmission/distribution losses and 15% for future requirements such as increased household power demands and additional connections.

Compare M_d with the available maximum power, P_{max} , on Section 4. If M_d is greater than P_{max} the system needs to be re-designed by decreasing the number of households to be electrified and/or the average household subscribed power. Another possibility is to deduct the 15% power allocated for future expansion.

Note the end point of the NEA grid nearest to the site and the direct distance (not the walking distance) to this point from the site. Also comment on any known proposals to extend the grid in a direction, which brings it closer to the site for the next 5 years, how close, this will bring it to the scheme site, and the source of the information. Comment, if necessary on the reliability of this information.

10. Total System Loads

Total probable load on system:

Peak load on the system = $M_p = \dots\dots\dots$ kW

M_p should generally be equal to G .

Explain if M_p is different than G : $\dots\dots\dots$

$\dots\dots\dots$

Design plant capacity of the project = $M_p + 0.1M_p = M_d = \dots\dots\dots$ kW

Comments: $\dots\dots\dots$

Is M_d less than or equal to estimated maximum power, P_{max} ?

Yes() No()

If yes, $Q_{design} = 100 \times M_d / (H_{gross} \times \eta) = \dots\dots\dots$ l/s

If No, decrease the number of households to be electrified, average subscribed power, and/or deduct 15% allocated for future expansion.

$M_d = \dots\dots\dots$ kW

$Q_{design} = 100 \times M_d / (H_{gross} \times \eta) = \dots\dots\dots$ (l/s)

Based on discussions with the community members, developer and the entrepreneurs, the end uses should be fixed. Then the power requirements of these end uses as well as the operating time should be estimated. The maximum power required for business load should be calculated by adding the individual business loads only if the operating hours coincide. Thus the combinations of various loads may have to be calculated to determine the maximum business load. Depending on whether the proposed business is mechanically or electrically operated, the tables above should be filled in accordingly.

Note that the business loads should generally operate during the non-lighting hours and the maximum business load should be limited to the probable business load. Financial viability should be demonstrated if the business loads exceed the peak domestic load.

If there are possibilities for additional end uses that could be developed after 3 year, these should be included in the table above.

11. NEA Electrical Grid

Nearest NEA grid point:Distance from site: km

Plans to extend the grid in this direction in the next 5 years?

Yes() No ()

To where? How far from site? km

Source:

Comment:

List other mini/micro-hydro plants and mills within a 5 km radius or 2-hours walk from the powerhouse, whether diesel or water powered. Note the distance from the MHP powerhouse to the mill in approximate minutes of walking time for an average local person carrying a load of grain. This information may be available from secondary sources such as the "Micro hydro data of Nepal" in which case they should be verified during the site visit.

Note the monthly tariff charged for electricity at each MHP, which provides electricity. If the tariff is a multi-level tariff note the rate common to the greatest number of consumers and provide details of other rates in the comments section. Note also the milling tariff for the grains shown.

These figures will indicate the prevailing tariff rates for processing various agro-products and other end uses. Thus, it should be noted that if the proposed end use tariff is significantly higher than those in the vicinity, there might be difficulties in successfully operating them

12. Other MHPs in Area

Location	Size (kW)	Distance (km)	Monthly Tariff (Rs./watt)	Comments

13. Estimated Electrical Income

Proposed household electricity tariff, T_f : Rs/watt/month

Probable monthly income from household tariff,

$S_1 = B \times F \times T_f =$ Rs/month

End use income estimate from sales of electricity/power

S.N.	Type	Operating hours/day	Power required (kW)	Energy consumption/ year (kWh)	End use tariff (Rs/kWh)	Yearly income (Rs)
1						
2						
3						
4						
5						
Total						

Total income from end uses, $S_2 =$ Rs./yr

Comment:

14. Agro-processing Market

Is milling to be provided in this MHP scheme? Yes () No ()

If milling is to be provided as part of the MHP scheme, tick the "Yes" box and complete this section.

14.1. Agro-processing Mills in Area

List all mills, whether diesel or water powered, within a 5 km radius or 2 hour walk of the power house.

List all mills, whether diesel or water powered, within a 5 km radius or 2 hour walk of the power house. Note the distance from the MHP power house to the mill in approximate minutes of walking time for an average local person carrying a load of grain, eg. 30 mins.

Consideration must be given to the effect of other mills nearby and the likelihood that existing mills will continue to be patronised unless the proposed MHP is more convenient or offers cheaper milling rates.

S.N.	Location & distance from the powerhouse	Water or Diesel Operated	Estimated annual volume of grains processed
1			
2			
3			
4			
5			
6			

14.2. Monthly Milling Income from the scheme

Column	1	2	3	4
Grain	Monthly Milling Volume	Rate Rs./ Pa-thi	Monthly Income 1 x 2	Comments
Rice	$V_r =$	$R_r =$		
Maize	$V_m =$	$R_m =$		
Wheat	$V_w =$	$R_w =$		
Millet	$V_l =$	$R_l =$		
Oilseed	$V_o =$	$R_o =$		
Other	$V_x =$	$R_x =$		

Total milling income, $S_3 =$ Rs.

Comment:

15. Estimated Total Income

Total probable monthly income from MHP:

$S_t = S_1 + S_2 = \text{Rs.}$ if the milling & other end uses are operated by the entrepreneurs other than the developer

$S_t = S_1 + S_3 = \text{Rs.}$ if the milling & other end uses are operated by the developer

Note that while calculating the total monthly income, the sales of electricity to end uses and the income both should not be added.

16. Enabling Environment

Item	Excellent	V. Good	Good	Fair	Poor	Comments
General interest in MHP in this place						
Understanding of dangers of electricity						
Understanding about paying for electricity						
Understanding about tariff structure						
Understanding of need for repair fund						
Understanding about end use possibilities						

Other Comments:

Total the production likely to go to this mill from all villages, V_r , V_m , V_w , V_l , V_o and V_x . These are the totals, which will be used to estimate milling income of the scheme. The milling rates should be based on the prevailing rates in the nearby schemes and discussions with the community, developer and the entrepreneurs.

Total all the individual grain milling incomes to give a total monthly milling income, S_3 .

When calculating the total estimated income add the income from sales of electricity to households (S_1) and sales of electricity to business loads (S_2) if the businesses are owned by other entrepreneurs and not the developer. This is because the entrepreneur does not hand over the income from the end uses to the developer

If the developer owns the end uses, then add the income from sales of electricity to households (S_1) and the income from the operation of businesses (S_3) but not the sales of electricity to the businesses (S_2) because the developer does not need to pay for the electricity that is consumed from his power plant.

Rate the interest and understanding of plant owner / UC chairperson / local project lead person, have in micro-hydro plants in general. Also rate:-

- ♦ the general understanding of the dangers of electricity and precautions needed to be taken, eg. repair only by qualified tradesmen, keep children away, don't touch wires together, use proper plugs
- ♦ the concept of paying for electricity consumption (ie. the need to cover the costs involved in producing electricity - operators salary, repair and maintenance, depreciation etc.)
- ♦ the proposed tariff structure, ie. do people understand that different levels of electricity subscription will have different rates and why
- ♦ the understanding of the need to establish an equipment maintenance fund to cover recurring maintenance, future repairs and eventual replacement of machinery
- ♦ the local interest in end use possibilities (milling, small industries such as metal fabrication, noodles, fruit drying, bakery etc.) rather than being satisfied with lighting only Comments should be made whenever interest or understanding is rated "Excellent", "Fair" or "Poor".

17. Management

17.1. Proposed ownership

Private () Company () Cooperative () Community ()

Proposed Name of project:

Name of Owner:

Comment:

17.2. Key People in proposed plant

Name	Role in the proposed MH Plant	Comments

17.3. Probable organisational structure

Entrepreneurial spirit level:- High() Medium() Low()

Planned community participation level:

High() Medium() Low() None()

18. Socio-economic Details

18.1. Agricultural Products / Natural Resources

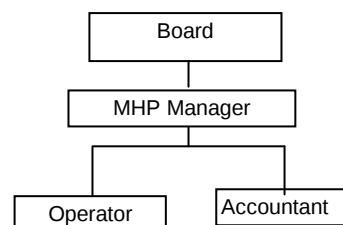
Product	Units	Annual Prod.	Comments
Rice			
Maize			
Wheat			
Millet			
Oilseed			
Buckwheat			
Potatoes			
.....			
.....			

Note: 1 pathi (local) = 3 kg, 1 muri= 20 pathi

Note the type of ownership proposed for the scheme; Private means the local equity is totally provided by an individual and the individual also organises any loan component, the MHP will be operated as a business for profit; Company means a group of private individuals organising together to operate the MHP as a business for profit; Cooperative means a group of communities organizing together to operate MHP as both business & cooperative manner; Community means a group representative of the community to be served by the MHP collects the equity and organises the financing of the MHP and will operate it on behalf of the community. Also include proposed name of managing organisation if known.

List the key people involved in the project and their role (e.g., developer, entrepreneur etc.)

Draw a simple sketch of the proposed organisational structure, eg.



Estimate the level of entrepreneurial ability of the management compared with other business people of the area.

Assess the anticipated level of community participation in the MHP scheme, i.e. is the community involved in setting the tariff rate, making policy decisions? such as how to punish payment defaulters etc. Comment as necessary.

List the main products of the area, both agricultural and other natural resources ,e.g., forestry. The project area should include the distribution area or the MHP and up to 2 hours of walk from the agro processing units. Some of the main agricultural products common to rural areas of Nepal are already listed. Note the annual production of the product in the market area and the units being used, eg. muri, pathi, kg., litres. Note conversion factor of pathi into kg in the area.

Compare the annual production figures of this table with the monthly milling volume estimated earlier. The values here should not be less than the annual milling volume estimated to be processed from the proposed MHP.

18.2. Ethnicity and Social information of the beneficiaries (use additional sheets if necessary)

शब्दावलिहरु

क्र. सं.	उपभोक्ताको नाम	लिङ्ग (म/पु)	गा.वि.स	जिल्ला	जात/ जनजाति								वर्ग				सामाजिक स्तर					शारीरिक अवस्था		कैफियत
					त.द	द	त.ज	ज	ब्रा/क्षे/ठ	म	मु	अ	अ.ग	ग	म	स	ए.म	बि.पि	लो.ज	पि.व	द्व.पि	शा.मा	एच.आई.भी	

जात/जनजाति

त.द.	तराई दलित
दलित	पहाडि दलित
त.ज.	तराई जनजाति
ज.	पहाडि जनजाति
ब्रा./क्षे./ठ.	ब्रामण/क्षेत्री/ठकुरी
म.	मधेशि
मु.	मुसलमान
अ.	अन्य नेपाल सरकारले पहिचान नगरेका जातजातिहरु

शारीरिक अवस्था

शा.मा.	शारीरिक / मानसिक अशक्तता
एच.आई. भी.	

सामाजिक स्तर

ए. म.	एकल महिला
बि.पि.	विपत्ति पिडित
लो.ज.	लोपोन्मुख जनजाति
पि.व.	पिछडिएका वर्ग
द्व.पि.	द्वन्द्व पिडित

वर्ग

अ.ग.	अति गरीब	३ महिना सम्म खान पुग्ने
ग.	गरीब	६ महिना सम्म खान पुग्ने
म	मध्यम वर्ग	६ देखि ९ महिना सम्म खान पुग्ने
स	सम्पन्न	वर्षभरि पुग्ने

18.3. Education Level

Education Level	No. of HH	HH Members	Comments
University			
Plus two			
SLC Pass			
Trade			
Secondary School			
Primary School			
Literate			
Illiterate			
Total			

List the distribution of education level across the market area with both the number of households and the total number of individuals at each level. Levels are:-

- University - completed a degree course
- Plus two – has passed plus two or intermediate level.
- SLC Pass - has passed SLC exam.
- Trade - has recognised trade for which they have studied or been apprenticed, eg. auto mechanic, machinist, electrician, goldsmith, tailor
- Secondary school - has completed some years of secondary school
- Primary school - completed primary school
- Literate - can read and write
- Illiterate - cannot read and write - includes infants below school age

18.4. Energy Source

Energy Source	Unit	Rs. per Unit	Conversion to kg or litre	Comments
Firewood				
Kerosene				
Solar Home System				
LPG				
Pico hydro/Peltric set				
Others - specify				

The total households will not be the same as A_i because most households will have more than one education level

List the rates for major energy sources in the project area. Also note the units used, eg. bari for firewood, litre etc. and convert these to more conventional units such as kg for firewood and litre for kerosene. Cost per unit for the resource in the market area should include transport costs into the area.

Check "Y" or "N" (for yes or no) against the facilities found in the market area and note the distance from the MHP power house. Add any other important facilities in the area.

If there is a phone in the region list the phone number in the space provided.

18.5. Facilities

Facilities	Y	N	Distance from MHP	Comments
Post Office				
Primary School				
Lower Sec. School				
Higher Sec. school				
Plus Two School				
Health Post				
Bank				Type
Police post				
Rural Municipality office				
Cooperative				
Mill				
Telephone				
Agro Business				
Other...				

Note the average landholdings for households in the market area. The figure should include khet, bari and kharbhari.

18.6. Miscellaneous

Average household land holdings in area: 10 ropanies

Number of households migrated into the area in last 12 months: No

Reasons:

Number of households migrated out of the area in the last year:

Reasons:

.....

NGOs or GOs in area:

What are they doing?

.....

Status and role of women: Positive, Participative

Interest of women in the MHP: very positive, supportive.....

.....

Local strengths / skills:

.....

Tourist potential in area, Yes() No()

Other Comments, if any:

.....

19. Rates applicable at the project area

19.1. Local Material Rates

Description	Unit	Rs./unit	Comments
Sand			
Block stone			
Bond stone			
Coarse aggregate			
Wood			
Unskilled labour	Md		
Mason	Md		
Carpenter	Md		
Technician	Md		
Kerosene	litre		
Diesel	litre		
Cement	Bag		

List any Govt. Organisations or NGOs working in the area, and note the type of work they are doing, eg. drinking water installation, non-formal education, community development etc

Comment on the status of women in the market area and what roles they occupy in community life. Note any prominent leadership positions by women.

Note also the general interest shown by women in the coming of a MHP - are they supportive? Why or why not.

Comment on strengths or skills in the community, which are under-utilised or can be used more for community development.

Note if there is any tourism potential for the area and comment as necessary.

Note here any other comments related to socio-economic matters which could affect the project or be useful as baseline information in determining the impact of the project on the community.

19.2. Transportation Rates

Type	Unit	Rs./unit	Comments
Truck/tractor			
Mule - easy load - difficult			
Porter - easy load - difficult			
Public transport			
Hired vehicle			
Plane			
Helicopter			

Note that the transport rate for a truck or tractor is to bring material/equipment from the nearest major supply town to the roadhead. Give rates per kg. if possible

For mules and porters the rates given should be for transport from the roadhead to the MHP site. Note different rates for easy and difficult loads if a local distinction is made. If possible, rate units should also be kg here.

Rates for plane and helicopter transport should only be given if this is the most inexpensive form of transport to site, or there are special circumstances. Comment as needed.

Add other important rates in the space provided if considered necessary.

Nearest major supply market for the project:
All weather road-head of the project site:
Fair weather road-head of the project site:

19.3. Estimated Annual Operation and Maintenance cost

Operating costs	Amount/month (RS)	Comments
Salary - manager		
Salary – operator 1		
Salary – operator 2		
Salary – accountant		
Salary – others		
Salary – others		
Office expenses		
Miscellaneous		
Total monthly operating cost		

List the human resources costs required to run the plant. Note that the manpower of MH plants is also based on the size of the plant and the distribution area covered.

All salaries of people employed by the MHP - manager, operators, accountant should be estimated based on nearby MHP plants or the prevailing rates in the community for similar type of work (e.g., school teacher, government employee etc.)

Annual Operating costs: Rs
Estimated annual maintenance cost:% of total project cost
Rs.
Total operation and Maintenance cost: Rs.

If this is a community owned scheme based on discussions at site, state also the cash contribution by participating households as well as the labour contribution in terms of person days as well as in rupee amount.

20. Equity contribution by developer and loan requirements:

Cash contribution: Total Rs.....
And Rs. /household if Community owned
Labour contribution: persons/day= Rs.....
In case of insufficient funds the developer will:
✍ Increase the equity contribution to meet the balance
Withdraw a bank loan for the balance

Since the project cost will be determined at a later stage the loan amount cannot be fixed at site. However, the survey team should inform the developer that there may be a need for a bank loan if the subsidy and the equity amount are less than the total project cost.

Net Present Value (NPV) of investment at% rate and 15 years of plant life is: Positive () Negative ()
NPV value is Rs:

21.1. Please mark the area having adverse impact by the project implementation
(Applicable to Mini/Micro Hydro above 10 kW capacity kW)

- Please brief in short about the tools and procedure used to determine the impacts.
-
-

SN		Yes	No	If Yes, action for reducing risk
1.	Short -term construction impacts such as soil erosion, deterioration of water and air quality, noise and vibration from construction equipment			
2.	Disturbance of large areas due to material quarry			
3.	Impounding of a long river stretch			
4.	Dryness (less than 50% of dry season mean flow) over a long downstream river stretch?			
5.	Construction of permanent access road near or through forests			
6.	Clearing of large forested area for ancillary facilities and access road			
7.	Creation of barriers for migratory land animals			
8.	Loss of precious ecological values due to flooding of agricultural/forest areas, and wild lands and wildlife habitat; destruction of fish spawning/breeding and nursery grounds?			
9.	Deterioration of downstream water quality due to anoxic water from the reservoir and sediments due to soil erosion			
10.	Loss or destruction of unique or aesthetically valuable land or water forms			
11.	Loss of productive land			
12.	Is there a landslide exposure risk to Micro/Mini Hydro Component			
13.	Will tailrace and overflow be routed so as to not cause erosion damage			

Note the availability of local people or people who are currently living away from the area but willing to return if a suitable opportunity arises with managerial and/or business operation experience, eg. have successfully operated a small business. Note if a person has already been selected to manage the scheme and the type of experience they have had. If someone has not already been selected comment on how they will be selected. Also note down whether training requirements are essential for the manager and operators (if already identified) and briefly describe the type of training required.

A. Insignificant () B. Minor ()
C. Moderate () D. Major ()
E. Critical ()

21.3. Project impacts on Human Rights

(Applicable to Mini/Micro Hydro above 10 kW capacity kW)

SN	Projects impacts	Yes	No
1.	Disproportionate impacts on the poor, women, children or other vulnerable groups		
2.	Uncontrolled human migration into the area due to sub-project		
3.	Adverse impacts on enjoyment of the human rights of the affected population and particularly of marginalized groups		
4.	Opportunity provided to local communities or individuals to raise concerns regarding the project during the stakeholder engagement process		
5.	Impact on livelihood of vulnerable group of people or community		

21.3.1 Please rate the likelihood consequences of the impacts

- A. Insignificant () B. Minor ()
 C. Moderate () D. Major ()
 E. Critical ()

21.4. Capacity Building

1.	Are the local people available in the project area have business skill or managerial skill?		
2.	Are the local people available in the project area with technical/mechanical repair skills		
3.	Does the human resources available in the project needed any type of capacity building trainings?		
4.	Will the manager and operator for the project selected through Community decision?		
5.	Has the project selected the manager and operator needed for the Project?		

Note : If the project manager and operator are already selected, please state the Name and Experience of the selected candidate as well describe the type of trainings required for the selected candidates

Name of selected Manager: Experience.....

Name of selected operator1: Experience.....

Name of selected operator2: Experience.....

Trainings any.....

21.5. Impacts on labour and working Conditions.

(Applicable to Mini/Micro Hydro above 10 kW capacity)

SN	Project Impacts	Yes	No
1.	Risks and vulnerabilities related to occupational health and safety during project construction and operation		
2.	Project potentiality of requirement of migrant workers to construct or implement it		
3.	Social conflicts if workers from other regions or countries are hired		
4.	Risk of child exploitation or abuse linked to the project		
5.	Equal wages for female and male workers for same work		
6.	Timely payment		
7.	Insurance for workers		

21.5.1 Please rate the likelihood consequences of the impacts

- A. Insignificant () B. Minor ()
 C. Moderate () D. Major ()
 E. Critical ()

Strictly avoid projects that involve any sort of "livelihood threat" to the local communities reliant on specific natural resource and the specific community is not willing to give up using those resources.

Strictly avoid projects that involve any sort of demolition or relocation of physical resource that holds cultural, historic or ethnic significance and the community using it don't give consent for that.

If the natural or physical resources discussed above are noted, the community shall be informed about the changes expected after project implementation, anticipated impacts and compensation measures. Once the specific community provides consent for that it shall be documented separately as the "Vulnerable Community Development Plan" and the project implementation unit shall acknowledge it separately.

Ensure ergonomically safe construction works and provide protective gears to the construction workers during work.

Ensure adequacy of basic amenities like safe drinking water, rest-rooms and change rooms.

Employment of staff in a project will ensure the highest level of gender balance to the extent possible.

Ensure there is no discrimination regarding the remuneration of men and women employed for the project in comparable positions. Women are privileged with associated maternity and medical exemptions.

Conduct age verification of the construction worker before employing them for any purpose.

21.6. Impacts on Community Health Safety and Security

(Applicable to Mini/Micro Hydro above 10 kW capacity)

SN	Project Impacts	Yes	No
1.	Community health and safety risks due to the transport, storage, and use and/or disposal of materials likely to create physical, chemical and biological hazards		
2.	Risks to community safety due to both accidental and natural hazards during project construction, operation and decommissioning		

Human waste from project sites will be contained at site itself and their surface/sub-surface drainage should be prevented.

Construction wastes from project sites will be contained appropriately at site and no leakages to the outside environment are ensured.

21.6.1 Please rate the likelihood consequences of the impacts

A. Insignificant () B. Minor ()

C. Moderate () D. Major ()

E. Critical ()

21.7. Impacts on Land acquisition and involuntary resettlement

(Applicable to Mini/Micro Hydro above 10 kW capacity)

S.N	Projects impacts	Yes	No
1.	Project be constructed in private land		
2.	Project be constructed in public land		
3.	Project be constructed in government land		
4.	Project be constructed in leasehold land		
5.	Other types of land		
6.	Physical relocation of people, more than 100		
7.	Physical relocation of people, 25 to 100		
8.	Mode of land procurement - Voluntary		
9.	Mode of land procurement - Involuntary		
10.	Impact on access to natural resources and areas used by Affected Communities resulting in Economic displacement		
11.	Impact on livelihood of land donor		

Strictly avoid projects that involve any involuntary resettlement of the affected families.

Strictly avoid projects that involve any sort of "livelihood threat" due to construction of project structures on the arable land belonging to specific families.

21.7.1 Please rate the likelihood consequences of the impacts

A. Insignificant () B. Minor ()

C. Moderate () D. Major ()

E. Critical ()

21.8. Resource efficiency and pollution prevention

(Applicable to Mini/Micro Hydro above 10 kW capacity)

SN	Project Impacts	Yes	No
1.	Water pollution due to wastewater discharge		
2.	Deterioration of air quality due to air pollutant emission		
3.	Noise pollution		
3.	Solid Waste Management		
4.	Hazardous waste generation		
5.	Reduction of GHG emission due to project implementation		

Natural living resources will be protected to the extent possible. If not, efforts shall be put to recreate the natural environment.

Preventive actions shall be taken towards pollution. If the preventive measures are not possible, pollution arising from the project site will be contained at the site and treatment will be done, if required.

Strictly avoid any project activity that involves GHG emission post project execution.

Strictly avoid project activity that increased vulnerability of a community to the climate induced disasters

21.8.1 Please rate the likelihood consequences of the impacts

A. Insignificant () B. Minor ()

C. Moderate () D. Major ()

E. Critical ()

22. Project categorization based on the potential risk and impact profile

(Please categorize the project based on above impact profile)

Category A []

Projects with the potential to cause significant adverse social and/or environmental impacts that are diverse, irreversible or unprecedented. Note: As per Schedule 2 of EPR 1997.

*So, as per the above impact profile the project falls on **Category A**, so recommended to conduct Environmental Impact Analysis (EIA) and prepare Resettlement Action Plan (RAP) of the project.*

Category B []

Projects with the potential to cause limited adverse social and/or environmental impacts that are few in number, generally site-specific, largely reversible, and readily addressed through mitigation measures. Note: As per Schedule 1 of EPR 1997.

*So, as per the above impact profile, the project falls on **Category B**, so recommended to conduct Initial Environmental Examination (IEE) and prepare Abbreviated Resettlement Action Plan (ARAP) of the project.*

Category C []

Projects that include activities with minimal or no risks of adverse social and environmental consequences

*So, as per the above impact profile, the project falls on **Category C**. However the project has minimal environmental impact. To mitigate the impacts and for enhancing beneficial impacts, so recommended to prepare Environmental and Social Management Plan (ESMP).*

A.....

B.....

C.....