

# Solar water pump site survey form – irrigation

Version 3, 13 February 2023

**Disclaimer:** This site survey form for solar water pumping systems is for irrigation applications only.

**Note to surveyor:** Please take as many photographs, GPS location tagging and videos of the project location specific to the sections in the survey below (for example, solar array location, controller location, water source, surrounding areas, community, irrigation land extension etc.)



means, take photos



means, record the GPS point(s)

Tools required during the survey	Checklist
GPS/Abney level	<input type="checkbox"/>
Measuring tape (>50 meters)	<input type="checkbox"/>
Camera, calculator, stopwatch	<input type="checkbox"/>
Sun-path mobile app	<input type="checkbox"/>
Bucket (5-10 litres)	<input type="checkbox"/>
Pen and notebook	<input type="checkbox"/>

Documents to be collected from the site	Checklist
Land permit for solar array erection	<input type="checkbox"/>
Land permit for pump intake construction (collection tank, open well etc.)	<input type="checkbox"/>
Land permit for distribution tank construction (if applicable)	<input type="checkbox"/>
Community water use consent	<input type="checkbox"/>

The following section gathers information about the community and operational modality of the project to understand how the project management structure will be set up.

General information	
Date of survey	
Name of the project <i>Give a name to the project in consultation with the community, which will identify it in the future.</i>	
Name of surveyor	
Organization	
Name of the client/s <i>Include names of the main local people who contributed to the information on the survey</i>	Phone no.
1.	1.
2.	2.
3.	3.
4.	4.
Name of the client organization <i>(cooperative, company, individual etc.)</i>	
Type of SIP ownership	<input type="checkbox"/> Individual <input type="checkbox"/> Community <input type="checkbox"/> Local government <input type="checkbox"/> Others: .....
If community-owned, is the user committee formed?	<input type="checkbox"/> Yes <input type="checkbox"/> No
If community-owned, describe how they plan to distribute water	<input type="checkbox"/> No plans yet <input type="checkbox"/> Sell water to beneficiaries <input type="checkbox"/> Free distribution, no schedule <input type="checkbox"/> Free distribution, water distribution scheduled by the community

SIP management structure	<input type="checkbox"/> User group (non-registered) <input type="checkbox"/> User committee (registered) <input type="checkbox"/> Other arrangements: .....																		
If a user group is formed (non-registered), provide the details:	Name of the user group (if any)		Number of members in the user group																
	Name: ..... <input type="checkbox"/> No name																		
If a user committee is formed (registered), provide the details:	The legal name of the user committee		Number of members in the user committee																
The planned SIP funding mechanism	<input type="checkbox"/> Fully subsidized Name of subsidizing entity: .....																		
	<input type="checkbox"/> Partially subsidized																		
	<table border="1"> <thead> <tr> <th></th><th>Name</th><th>% contribution</th><th>Funding type</th></tr> </thead> <tbody> <tr> <td>Name of entity 1</td><td></td><td></td><td> <input type="checkbox"/> subsidy  <input type="checkbox"/> equity  <input type="checkbox"/> loan               </td></tr> <tr> <td>Name of entity 2</td><td></td><td></td><td> <input type="checkbox"/> subsidy  <input type="checkbox"/> equity  <input type="checkbox"/> loan               </td></tr> <tr> <td>Name of entity 3</td><td></td><td></td><td> <input type="checkbox"/> subsidy  <input type="checkbox"/> equity  <input type="checkbox"/> loan               </td></tr> </tbody> </table>				Name	% contribution	Funding type	Name of entity 1			<input type="checkbox"/> subsidy <input type="checkbox"/> equity <input type="checkbox"/> loan	Name of entity 2			<input type="checkbox"/> subsidy <input type="checkbox"/> equity <input type="checkbox"/> loan	Name of entity 3			<input type="checkbox"/> subsidy <input type="checkbox"/> equity <input type="checkbox"/> loan
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	Name of entity 3			<input type="checkbox"/> subsidy <input type="checkbox"/> equity <input type="checkbox"/> loan															
	<input type="checkbox"/> No subsidy																		
	<table border="1"> <thead> <tr> <th></th><th>Name</th><th>% contribution</th><th>Funding type</th></tr> </thead> <tbody> <tr> <td>Name of entity 1</td><td></td><td></td><td> <input type="checkbox"/> equity  <input type="checkbox"/> loan               </td></tr> <tr> <td>Name of entity 2</td><td></td><td></td><td> <input type="checkbox"/> equity  <input type="checkbox"/> loan               </td></tr> <tr> <td>Name of entity 3</td><td></td><td></td><td> <input type="checkbox"/> equity  <input type="checkbox"/> loan               </td></tr> </tbody> </table>				Name	% contribution	Funding type	Name of entity 1			<input type="checkbox"/> equity <input type="checkbox"/> loan	Name of entity 2			<input type="checkbox"/> equity <input type="checkbox"/> loan	Name of entity 3			<input type="checkbox"/> equity <input type="checkbox"/> loan
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Name of entity 2			<input type="checkbox"/> equity <input type="checkbox"/> loan																
Name of entity 3			<input type="checkbox"/> equity <input type="checkbox"/> loan																
Is there any conflict within the community regarding the potential SIP project?	<input type="checkbox"/> Yes <input type="checkbox"/> No																		
	If yes, describe the conflict: ..... .....																		
	Describe the resolution of the conflict: ..... .....																		
<b>Location information</b>																			
Tole name																			
Village																			
Ward no.																			
Rural municipality/municipality																			
District																			
Province																			

Mobile network and connection speed	1. <input type="checkbox"/> NTC, connection speed: <input type="checkbox"/> 2G <input type="checkbox"/> 3G <input type="checkbox"/> 4G 2. <input type="checkbox"/> Ncell, connection speed: <input type="checkbox"/> 2G <input type="checkbox"/> 3G <input type="checkbox"/> 4G 3. <input type="checkbox"/> Others: ....., connection speed: <input type="checkbox"/> 2G <input type="checkbox"/> 3G <input type="checkbox"/> 4G				
Is the vehicle accessible <b>up to the village?</b>	<input type="checkbox"/> Yes <input type="checkbox"/> No Describe road type: ..... Functionality: <input type="checkbox"/> Year-round <input type="checkbox"/> Seasonal, months of inaccessibility: .....				
Is the vehicle accessible <b>up to the solar array location?</b>	<input type="checkbox"/> Yes <input type="checkbox"/> No Describe road type: ..... Functionality: <input type="checkbox"/> Year-round <input type="checkbox"/> Seasonal, months of inaccessibility: .....				
Is the vehicle accessible <b>up to the water source?</b>	<input type="checkbox"/> Yes <input type="checkbox"/> No Describe road type: ..... Functionality: <input type="checkbox"/> Year-round <input type="checkbox"/> Seasonal, months of inaccessibility: .....				
Name and distance of the nearest city/town from the site	<table border="1"> <tr> <td>Name</td><td></td></tr> <tr> <td>Distance</td><td>.....km</td></tr> </table>	Name		Distance	.....km
Name					
Distance	.....km				

The following section gathers information on the agriculture value chain to gauge the utilization of solar water pump, their sustainability and their impact on the community.

Agriculture value chain			
Name of the nearest market centre for crop sales			
Distance to the market centre from the village	.....km	Time to reach the market centre by vehicle	.....hrs
Are there financial institutions (FIs) present in the village?	<input type="checkbox"/> Yes <input type="checkbox"/> No If no, the location of the nearest FI ( <i>banks, cooperatives etc.</i> ): ..... Time to reach nearest FI:..... If yes, what type of FI? <input type="checkbox"/> Bank Bank name: ..... <input type="checkbox"/> Cooperative Cooperative name: ..... <input type="checkbox"/> Others: .....		
Are there loan options available for agri-related business?	<input type="checkbox"/> Yes <input type="checkbox"/> No If yes, agri-related loan purpose: ..... Interest rate: .....%      Loan term: .....years Other details: .....		
Are there loan options available for solar water pumping systems?	<input type="checkbox"/> Yes <input type="checkbox"/> No If yes, is there a ceiling to the loan amount? <input type="checkbox"/> Yes <input type="checkbox"/> No If yes, max. amount: NPR .....		

	Interest rate: .....%      Loan term: .....years Other details: .....
Accessibility of agriculture knowledge centre (AKC)	Location of nearest AKC: ..... Distance from the village: ..... Time to reach AKC: .....
Describe any other agri-related support available to the community	..... .....
What agri-related enterprises are present in the village?	<input type="checkbox"/> Agro mill, how many? ..... <input type="checkbox"/> Rice mill, how many? ..... <input type="checkbox"/> Dairy production, how many? ..... <input type="checkbox"/> Cold store, how many? ..... <input type="checkbox"/> Others: .....
Are there AC or DC pump repair centres nearby?	<input type="checkbox"/> Yes <input type="checkbox"/> No If yes, location: ..... Time to reach repair centre by vehicle: .....

List crop names and their coverage areas **currently practised** in the community.

Crop name	Coverage area	
	Area	Unit (ropani, ana, bigha etc.)
1.		
2.		
3.		
4.		
5.		
6.		
7.		
8.		
9.		
10.		

List crop names **currently practised** and tick respective months of the plantation.

Crop name	Baisakh	Jestha	Asadh	Shrawan	Bhadra	Asoj	Kartik	Mangsir	Poush	Magh	Falgun	Chaitra
1.												
2.												
3.												
4.												
5.												
6.												
7.												
8.												
9.												
10.												

Method of irrigation	<input type="checkbox"/> Surface irrigation <input type="checkbox"/> Sprinkler irrigation <input type="checkbox"/> Drip irrigation <input type="checkbox"/> Others: .....
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#### Cost details of crops in **current practice**

Crop name	Amount (kg) grown per year	Unit selling price in NPR/kg
1.		
2.		
3.		
4.		
5.		
6.		
7.		
8.		
9.		
10.		

Cost details of **potential crops after solar water pump intervention – preferably cash crops (vegetables, cardamom, tea, coffee etc.)**. This is just to gauge the community's understanding and awareness of crop potential on their land.

Cash crop name	Coverage area		Anticipated harvest in the respective coverage area	Anticipated selling price in0 NPR/kg
	Area	Unit (ropani, ana, bigha etc.)		
1.				
2.				
3.				
4.				
5.				
6.				
7.				
8.				
9.				
10.				

The following section gathers information on irrigation and water to understand current practices and improvements that solar water pumps can bring.

Land information	
The total size of land to be irrigated <i>Mention the unit of measurement correctly.</i>	Area: ..... Unit: .....(bigha, kattha, ropani, ana etc.)
Types of soil	<input type="checkbox"/> Loamy soil <input type="checkbox"/> Clay soil <input type="checkbox"/> Sandy soil <input type="checkbox"/> Sil soil Other observation: .....
Is the entire land privately owned?	<input type="checkbox"/> Yes <input type="checkbox"/> No If yes, how many owners? ..... If no, describe ownership: ..... .....
If the land is leased:	Lease tenure: ..... Detail out lease terms: .....






If river pumping, will there be adequate water level in the pump intake throughout the year?	<input type="checkbox"/> Yes <input type="checkbox"/> No  If no, discard pump intake location or mention mitigation strategy: ..... .....																							
If river pumping, what is the distance between the river and the sump well?																								
If bore-well, what is the diameter of the bore-well (inches)?	Diameter of the bore-well (inches): .....  The total depth of the bore-well: ..... <input type="checkbox"/> ft <input type="checkbox"/> meter  The static water level of the bore-well: ..... <input type="checkbox"/> ft <input type="checkbox"/> meter  Describe how the static water level is measured: .....																							
If open-well, what is the depth of the bore-well (meters)?	Diameter of the open-well: ..... <input type="checkbox"/> ft <input type="checkbox"/> meter  The total depth of the open-well: ..... <input type="checkbox"/> ft <input type="checkbox"/> meter  The static water level of the open-well: ..... <input type="checkbox"/> ft <input type="checkbox"/> meter  Describe how the static water level is measured: .....																							
If canal or stream, what is the water flow rate?	.....ltrs/min  Describe measuring method: <input type="checkbox"/> Bucket measurement <input type="checkbox"/> Others: .....																							
Any risks of water source drying?	<input type="checkbox"/> No, consistent year-round <input type="checkbox"/> Yes, drying in certain months  If risk of drying, mention which months:.....																							
Any risks of water source depletion (inadequate for pumping)?	<input type="checkbox"/> No, consistent year-round <input type="checkbox"/> Yes, low water in certain months  If the risk of depletion, mention which months:.....																							
Describe the quality of water ( <i>clear/murky/sandy etc.</i> )																								
Describe the current uses of the water source	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 5%;"></th> <th style="width: 65%;">Purposes of water use</th> <th style="width: 30%;">% of households</th> </tr> </thead> <tbody> <tr> <td></td> <td>Irrigation</td> <td></td> </tr> <tr> <td></td> <td>Drinking water</td> <td></td> </tr> <tr> <td></td> <td>Livestock</td> <td></td> </tr> <tr> <td></td> <td>Other: .....</td> <td></td> </tr> <tr> <td></td> <td>Other: .....</td> <td></td> </tr> </tbody> </table>						Purposes of water use	% of households		Irrigation			Drinking water			Livestock			Other: .....			Other: .....		
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	Livestock																							
	Other: .....																							
	Other: .....																							
<b>The existing water-pumping mechanism</b>																								
What is the current mechanism for irrigation?	<input type="checkbox"/> Rainwater <input type="checkbox"/> Canal <input type="checkbox"/> Diesel pumps <input type="checkbox"/> Electric pumps  <input type="checkbox"/> Handpump <input type="checkbox"/> None <input type="checkbox"/> Others: .....																							
What is the limiting factor of the current mechanism for irrigation that justifies the intervention of a solar water pump?																								
If electric pump(s) are also used, what is the reason for pursuing a solar water pump?																								
If a diesel pump(s) are used, provide details	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 5%;"></th> <th style="width: 25%;">Ownership type</th> <th style="width: 15%;">Size</th> <th style="width: 15%;">Fuel consumption per hour</th> <th style="width: 10%;">Daily usage hour</th> <th style="width: 10%;">Days per week used</th> </tr> </thead> <tbody> <tr> <td>1</td> <td><input type="checkbox"/> Purchase   <input type="checkbox"/> Rent</td> <td>..... <input type="checkbox"/> HP <input type="checkbox"/> kW</td> <td></td> <td></td> <td></td> </tr> <tr> <td>2</td> <td><input type="checkbox"/> Purchase   <input type="checkbox"/> Rent</td> <td>..... <input type="checkbox"/> HP <input type="checkbox"/> kW</td> <td></td> <td></td> <td></td> </tr> </tbody> </table>							Ownership type	Size	Fuel consumption per hour	Daily usage hour	Days per week used	1	<input type="checkbox"/> Purchase <input type="checkbox"/> Rent	..... <input type="checkbox"/> HP <input type="checkbox"/> kW				2	<input type="checkbox"/> Purchase <input type="checkbox"/> Rent	..... <input type="checkbox"/> HP <input type="checkbox"/> kW			
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2	<input type="checkbox"/> Purchase <input type="checkbox"/> Rent	..... <input type="checkbox"/> HP <input type="checkbox"/> kW																						

	3	<input type="checkbox"/> Purchase <input type="checkbox"/> Rent	..... <input type="checkbox"/> HP <input type="checkbox"/> kW			
	4	<input type="checkbox"/> Purchase <input type="checkbox"/> Rent	..... <input type="checkbox"/> HP <input type="checkbox"/> kW			
If any diesel pumps are rented, what is the rental cost per hour?		.....NPR/hour				
Cost (per litre) of diesel in the location?						

The following section gathers technical information for the solar water pumping system.

**Note to surveyor:** If the solar array location is on a river bank, then discard the location because it will be at risk of flooding.

Solar array location	
Land ownership type	<input type="checkbox"/> Private <input type="checkbox"/> Public <input type="checkbox"/> Others: .....
Is the concerned owner willing to allocate the land for solar array installation?	<input type="checkbox"/> Yes <input type="checkbox"/> No Any concerns?.....
GPS location of solar array location	Latitude: ..... Longitude: .....
Area available for the array installation	..... sq.m
Topography type	<input type="checkbox"/> Flat <input type="checkbox"/> Slope <input type="checkbox"/> Uneven
If the land is sloped, what is the direction and degree of the slope?	The direction of slope:..... ( <i>north/south/east-west etc.</i> ) Slope degrees: .....
Are there any nearby obstacles that may cause shading in the array? Describe. <i>Trees, buildings, electric poles etc.</i>	<input type="checkbox"/> Yes <input type="checkbox"/> No Describe:..... .....
Sketch the array location	
<div style="border: 1px dashed black; height: 300px; position: relative;"> <div style="position: absolute; top: 10px; right: 10px;">   North </div> </div>	



Controller	
Location for controller	<input type="checkbox"/> Outside (mount in the solar array structure) <input type="checkbox"/> Outside (any other location) <input type="checkbox"/> Inside (nearby building) <input type="checkbox"/> Describe controller location: .....
Ground distance from controller to solar array	..... m
Measure the earth resistivity near the controller location	..... ohm
Collection reservoir (pump intake)	
Is there an existing collection reservoir?	<input type="checkbox"/> Yes <input type="checkbox"/> No If yes, capacity: ..... <input type="checkbox"/> litres <input type="checkbox"/> m <sup>3</sup> Reservoir structure ( <i>concrete, HDPE etc.</i> ): .....
GPS location of the existing collection reservoir	Latitude: ..... Longitude: .....
If a collection reservoir is to be constructed, is there land available?	<input type="checkbox"/> Yes <input type="checkbox"/> No If yes, land ownership type: <input type="checkbox"/> Private <input type="checkbox"/> Public <input type="checkbox"/> Others: ..... Is the concerned owner willing to allocate the land for a collection reservoir? <input type="checkbox"/> Yes <input type="checkbox"/> No Any concerns?.....
What type of collection reservoir is planned to be constructed? ( <i>concrete, HDPE etc.</i> )	
GPS location of the new collection reservoir	Latitude: ..... Longitude: .....
Distribution reservoir (for water storage and distribution)	
Is there an existing distribution reservoir?	<input type="checkbox"/> Yes <input type="checkbox"/> No If yes, capacity: ..... <input type="checkbox"/> litres <input type="checkbox"/> m <sup>3</sup> Reservoir structure ( <i>concrete, HDPE etc.</i> ): .....
GPS location of existing distribution reservoir	Latitude: ..... Longitude: .....
If a distribution reservoir is to be constructed, is there land available?	<input type="checkbox"/> Yes <input type="checkbox"/> No If yes, land ownership type: <input type="checkbox"/> Private <input type="checkbox"/> Public <input type="checkbox"/> Others: ..... Is the concerned owner willing to allocate the land for a distribution reservoir? <input type="checkbox"/> Yes <input type="checkbox"/> No Any concerns?.....
What type of distribution reservoir is planned to be constructed? ( <i>concrete, HDPE etc.</i> )	



GPS location of the new distribution reservoir	Latitude: .....
	Longitude: .....



System head	
Is the vertical height from the pump intake to the highest distribution point measured on-site?	<input type="checkbox"/> Yes <input type="checkbox"/> No If yes, mention the vertical height: .....m Describe how the vertical height is measured. ..... If not, how will the vertical height be determined? <input type="checkbox"/> Google Earth (less accurate) <input type="checkbox"/> Others: .....

Transmission and distribution network	
How is the water distribution planned?	<input type="checkbox"/> Open canal flow <input type="checkbox"/> Distribution pipe <input type="checkbox"/> Others: .....
If open canal flow, provide details	Does the open canal cover the entire catchment area? <input type="checkbox"/> Yes <input type="checkbox"/> No If no, how much land area does it cover?.....
Are there existing distribution pipes?	<input type="checkbox"/> Yes <input type="checkbox"/> No If yes, does the existing distribution pipe cover the entire catchment area? <input type="checkbox"/> Yes <input type="checkbox"/> No If no, how much land area does it cover?..... Mention the diameters of the distribution pipes: Main pipe: ..... inches Branch pipes: ..... inches Type of pipe material ( <i>GI, HDPE etc.</i> ): .....
Will the distribution pipes require water meters?	<input type="checkbox"/> Yes <input type="checkbox"/> No If yes, describe the purpose: ..... How many: .....
Ground distance of transmission pipe from the pumping area to the distribution tank	..... m
Ground distance from the distribution tank to the nearest land area to be irrigated	..... m
What method was used for distance measurement above?	<input type="checkbox"/> Using a measuring tape <input type="checkbox"/> From Google Earth (less accurate) <input type="checkbox"/> Others: .....
GPS location where the pipe output from the distribution tank meets the nearest land area to be irrigated	Latitude: ..... Longitude: .....



Record the GPS points of the transmission and distribution points including nodes for gate valves				
Waypoint number	Description	Tick for gate valve nodes	Latitude	Longitude
		<input type="checkbox"/>		
		<input type="checkbox"/>		
		<input type="checkbox"/>		
		<input type="checkbox"/>		
		<input type="checkbox"/>		
		<input type="checkbox"/>		
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		<input type="checkbox"/>		
		<input type="checkbox"/>		



Sketch the water transmission line path from the water source to the distribution tank, then the water distribution line path from the distribution tank to irrigation land. Mark the water source, distribution tank, solar array location, irrigation land and any landmarks.

For example

North

Page 11 of 12

Grid information	
Estimated distance of the national grid from the project location	..... m
Estimate timeline when the grid will be available in the project location	<input type="checkbox"/> No plans <input type="checkbox"/> Soon If soon, by when? .....
From the surveyor's point of view, which configuration of solar water pump configuration is recommended and why?	<input type="checkbox"/> Off-grid solar water pump Give reason: ..... <input type="checkbox"/> Solar water pump with manual changeover for national grid connection Give reason: ..... <input type="checkbox"/> Grid-connected and net-metered solar water pump Give reason: .....

Additional information	
Remarks (any other relevant information)	