## **Detailed feasibility study survey form – Solar drinking water**

Version 4, 07 June 2023

**Disclaimer:** This site survey form for solar water pumping systems is for drinking water 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, households, location for collection tanks, etc.)

 = take photos = record the GPS point(s)

|  |  |
| --- | --- |
| **Tools required during the survey** | **Checklist** |
| GPS/Abney level | ☐ |
| Measuring tape (>50 meters) | ☐ |
| Camera, calculator, stopwatch | ☐ |
| Sun-path mobile app | ☐ |
| Bucket (5-10 litres) | ☐ |
| Pen and notebook | ☐ |

|  |  |
| --- | --- |
| **Documents to be collected from the site** | **Checklist** |
| Land permit for solar array installation | ☐ |
| Land permit for pump intake construction (collection tank, open well, etc.) | ☐ |
| Land permit for distribution tank construction (if applicable) | ☐ |
| Community water use consent | ☐ |

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**  ***(Give a name to the project in consultation with the community, which will identify it in the future)*** |  | | |
| **Name of surveyor** |  | | |
| **Organisation** |  | | |
| **Name of the client/s**  *Include names of the main local people who contributed to the information on the survey* | | **Phone no.** | |
| 1. | | 1. | |
| 2. | | 2. | |
| 3. | | 3. | |
| 4. | | 4. | |
| **Name of the client organization**  *(cooperative, company, individual, etc.)* |  | | |
| **Type of solar drinking water (SDW) ownership** | ☐ Individual ☐ Community ☐ Local government  ☐ Others: ……………………………………… | | |
| **If community-owned, is the user committee formed?** | ☐ Yes ☐ No | | |
| **If community-owned, describe how they plan to distribute water?** | ☐ No plans yet  ☐Sell water to beneficiaries  ☐ Free distribution, no schedule  ☐ Free distribution, water distribution scheduled by the community | | |
| **SDW management structure** | ☐ User group (non-registered)  ☐ User committee (registered)  ☐ 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:  ………………………………………………………………………………  ☐ 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 SDW funding mechanism** | ☐ Fully subsidised  Name of subsidising entity: ………………………………………………................................  ☐ Partially subsidised   |  |  |  |  | | --- | --- | --- | --- | | **Name** | | **% contribution** | **Funding type** | | Name of entity 1 |  |  | ☐ subsidy  ☐ equity  ☐ loan | | Name of entity 2 |  |  | ☐ subsidy  ☐ equity  ☐ loan | | Name of entity 3 |  |  | ☐ subsidy  ☐ equity  ☐ loan |   ☐ No subsidy   |  |  |  |  | | --- | --- | --- | --- | | **Name** | | **% contribution** | **Funding type** | | Name of entity 1 |  |  | ☐ equity  ☐ loan | | Name of entity 2 |  |  | ☐ equity  ☐ loan | | Name of entity 3 |  |  | ☐ equity  ☐ loan | | | |
| **Is there any conflict within the community regarding the potential SDW project?** | ☐ Yes ☐ No  If yes, describe the conflict:  ………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………  Describe the resolution of the conflict:  ……………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………… | | |

|  |  |  |
| --- | --- | --- |
| **Location information** | | |
| **Tole name** |  | |
| **Village** |  | |
| **Ward no.** |  | |
| **Rural municipality/**  **municipality** |  | |
| **District** |  | |
| **Province** |  | |
| **Mobile network and connection speed** | 1. ☐ NTC, connection speed: ☐ 2G ☐ 3G ☐ 4G 2. ☐ Ncell, connection speed: ☐ 2G ☐ 3G ☐ 4G 3. ☐ Others: ……, connection speed: ☐ 2G ☐ 3G ☐ 4G | |
| **Is the vehicle accessible up to the village?** | ☐ Yes ☐ No  Describe road type: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  Functionality: ☐Year-round  ☐Seasonal,  months of inaccessibility: \_\_\_\_\_\_\_\_\_\_\_\_\_\_ | |
| **Is the vehicle accessible up to the solar array location?** | ☐ Yes ☐ No  Describe road type: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  Functionality: ☐Year-round  ☐Seasonal,  months of inaccessibility: \_\_\_\_\_\_\_\_\_\_\_\_\_ | |
| **Is the vehicle accessible up to the water source?** | ☐ Yes ☐ No  Describe road type: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  Functionality: ☐Year-round  ☐Seasonal,  months of inaccessibility: \_\_\_\_\_\_\_\_\_\_\_\_\_ | |
| **Name and distance of the nearest city/town from the site** | Name |  |
| Distance | \_\_\_\_\_\_\_\_\_\_\_\_ km |

****

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Record the GPS points around the perimeter of the drinking water area**  *(for scattered pieces of land, record the overall catchment area)* | | | | |
| **Waypoint number** | **Description** | | **Latitude** | **Longitude** |
|  |  | |  |  |
|  |  | |  |  |
|  |  | |  |  |
|  |  | |  |  |
|  |  | |  |  |
|  |  | |  |  |
|  |  | |  |  |
|  |  | |  |  |
|  |  | |  |  |
|  |  | |  |  |
|  |  | |  |  |
|  |  | |  |  |
|  |  | |  |  |
|  |  | |  |  |
|  |  | |  |  |
|  |  | |  |  |
|  |  | |  |  |
|  |  | |  |  |
| **Water information** | | | | |
| **Population** | |  | | |
| **Water requirement per day**  *(if known, otherwise, must calculate it by the household requirement)* | | ………………………. ltrs/day | | |
| **Name of the water source** | |  | | |
| **Type of water source** | | ☐ Bore-well ☐ Open-well ☐ Canal    ☐ River ☐ Pond  ☐ Others: ……………………………… | | |
| **Describe the physical location of the water source** | |  | | |
| **Water source ownership** | | ☐ Public ☐ Private  If private, is the owner willing to share the water source for pumping?  ☐ Yes ☐ No  Any concerns?  .………................................................................................................... | | |
| **Is there any conflict within the community regarding water use?** | | ☐ Yes ☐ No  If yes, describe the conflict: ……………………………………………………………………………………...  ……………………………………………………………………………………..  Describe the resolution of the conflict:  ……………………………………………………………………………………..  ……………………………………………………………………………………… | | |
| **GPS location of water source i.e. pump intake** | | Latitude: …………………………...  Longitude: ………………………… | | |
| **If river pumping, is the pump intake location at risk of flood damage during monsoon?** | | ☐ Yes ☐ No  If yes, discard pump intake location or mention mitigation strategy: …………………………………………………………………………………………  …………………………………………………………………………………………. | | |
| **If river pumping, will there be adequate water level in the pump intake throughout the year?** | | ☐ Yes ☐ 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: …………… ☐ ft ☐ meter  The static water level of the bore-well: …………… ☐ ft ☐ 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: …………… ☐ ft ☐ meter  The total depth of the open well: …………… ☐ ft ☐ meter  The static water level of the open well: …………… ☐ ft ☐ meter  Describe how the static water level is measured: ……………………………………….. | | |
| **If canal or stream, what is the water flow rate?** | | ……………………………litres/min  Describe measuring method: ☐ Bucket measurement ☐ Others: ……………………. | | |
| **Any risks of water source drying?** | | ☐ No, consistent year-round ☐Yes, drying in certain months  If the risk of drying, mention which months: ….……………………………………………. | | |
| **Any risks of water source depletion (inadequate for pumping)?** | | ☐ No, consistent year-round ☐Yes, low water in certain months  If the risk of depletion, mention which months: .…………………………………….. | | |
| **Describe the quality of water.**  ***(clear/murky/sandy etc.)*** | |  | | |
| **Describe the current uses of the water source** | | |  |  | | --- | --- | | **Purposes of water use** | **% of households** | | Irrigation |  | | Drinking water |  | | Livestock |  | | Other: ……………………………………………… |  | | Other: ……………………………………………… |  | | | |



|  |  |
| --- | --- |
| **The existing water-pumping mechanism** | |
| **What is the current mechanism for drinking water?** | ☐ Rainwater  ☐ Canal  ☐ Diesel pumps  ☐ Electric pumps  ☐ Hand pump  ☐ None  ☐ Others: …………………………………………. |
| **What is the limiting factor of the current mechanism for drinking water 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?** |  |



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

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

|  |  |
| --- | --- |
| **Solar array location** | |
| **Land ownership type** | ☐ Private ☐ Public ☐ Others: ………………………. |
| **Is the concerned owner willing to allocate the land for solar array installation?** | ☐ Yes ☐ No  Any concerns? ....………...............................................................................................………......................................................................................... |
| **GPS location of solar array location** | Latitude: …………………………...  Longitude: ………………………… |
| **Area available for the array installation** | …………………….. sq.m |
| **Topography type** | ☐ Flat ☐ Slope ☐ Uneven |
| **If the land is sloped, what is the direction and degree of the slope?** | The direction of slope: ……………………….. *(north/south/east-west, etc.)*  Slope degrees: …………….. |
| **Are there any nearby obstacles that may cause shading in the array? Describe.**  ***Trees, buildings, electric poles etc.*** | ☐ Yes ☐ No  Describe:  ....………............................................................................................................................................................................................................................................................................................................ |

|  |
| --- |
| Sketch the array location.  North |

|  |  |
| --- | --- |
| **Controller** | |
| **Location for controller** | ☐ Outside (mount in the solar array structure)  ☐ Outside (any other location)  ☐ Inside (nearby building)  ☐ Describe controller location: ………………………………………………………………………… |
| **Ground distance from controller to solar array** | ………………………….. m |
| **Measure the earth resistivity near the controller location** | ………………………….. ohm |
| **Horizontal roughing filter** | |
| **Is there land available for the construction of a horizontal roughing filter?** | ☐ Yes ☐ No  If yes, land ownership type: ☐ Private ☐ Public ☐ Others: ………………………………..  Is the concerned owner willing to allocate the land for a horizontal roughing filter?  ☐ Yes ☐ No  Any concerns? ....………...........................................................................................................  ....………........................................................................................................... |
| **GPS location of** **horizontal roughing filter** | Latitude: …………………………..  Longitude: ………………………… |
| **Collection reservoir (pump intake)** | |
| **Is there an existing collection reservoir?** | ☐ Yes ☐ No    If yes, capacity: ………………. ☐litres ☐ m3  Reservoir structure *(concrete, HDPE, etc.)*: .……………………………................................................. |
| **GPS location of the existing collection reservoir** | Latitude: …………………………  Longitude: ………………………… |
| **If a collection reservoir is to be constructed, is there land available?** | ☐ Yes ☐ No  If yes, land ownership type: ☐ Private ☐ Public ☐ Others: ………………………………..  Is the concerned owner willing to allocate the land for a collection reservoir?  ☐ Yes ☐ No  Any concerns? ....………........................................................................................................... ……………………………………………………………………………................. |
| **What type of collection reservoir is planned to be constructed?** *(concrete, HDPE etc.)* |  |
| **GPS location of the new collection reservoir** | Latitude: …………………………  Longitude: ………………………… |
| **Distribution reservoir (for water storage and distribution)** | |
| **Is there an existing distribution reservoir?** | ☐ Yes ☐ No  If yes, capacity: ………………. ☐litres ☐ m3  Reservoir structure *(concrete, HDPE etc.)*: ………………………………................................................. |
| **GPS location of existing distribution reservoir** | Latitude: …………………………  Longitude: ………………………… |
| **If a distribution reservoir is to be constructed, is there land available?** | ☐ Yes ☐ No  If yes, land ownership type: ☐ Private ☐ Public ☐ Others: ………………………………..  Is the concerned owner willing to allocate the land for a distribution reservoir?  ☐ Yes ☐ No  Any concerns? ....………..................................................................................................................................................................................................................................... |
| **What type of distribution reservoir is planned to be constructed?** *(concrete, HDPE, etc.)* |  |
| **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?** | ☐ Yes ☐ No  If yes, mention the vertical height: ………………………m  Describe how the vertical height is measured.  ………………………………………………………………………………  ………………………………………………………………………………  If not, how will the vertical height be determined?  ☐ Google Earth (less accurate) ☐ Others: ……………………………………………………….. |



|  |  |
| --- | --- |
| **Transmission and distribution network** | |
| **Are there existing distribution pipes?** | ☐ Yes ☐ No  If yes, does the existing distribution pipe cover the entire population area?  ☐ Yes ☐ No  If no, how much population does it cover? ……………………….  Mention the diameters of the distribution pipes:  Main pipe: …………….. inches  Branch pipes: …………….. inches  Type of pipe material *(GI, HDPE, etc.)*: ………………………………….. |
| **Will the distribution pipes require water meters?** | ☐ Yes ☐ 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 tap post** | ………………………….. m |
| **What method was used for distance measurement above?** | ☐ Using a measuring tape  ☐ From Google Earth (less accurate)  ☐ Others: …………………………..... |
| **GPS location where the pipe output from the distribution tank meets the nearest tap post** | Latitude: …………………………  Longitude: ………………………… |
| **Number of tap posts** |  |
| **What type of tap post is planned to be constructed? *(for example, concrete)*** |  |



|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Record the GPS points of the transmission and distribution points including nodes for tap posts** | | | | |
| **Waypoint number** | **Description** | **Tick for tap post nodes** | **Latitude** | **Longitude** |
|  |  | ☐ |  |  |
|  |  | ☐ |  |  |
|  |  | ☐ |  |  |
|  |  | ☐ |  |  |
|  |  | ☐ |  |  |
|  |  | ☐ |  |  |
|  |  | ☐ |  |  |
|  |  | ☐ |  |  |
|  |  | ☐ |  |  |
|  |  | ☐ |  |  |
|  |  | ☐ |  |  |
|  |  | ☐ |  |  |
|  |  | ☐ |  |  |
|  |  | ☐ |  |  |
|  |  | ☐ |  |  |
|  |  | ☐ |  |  |
|  |  | ☐ |  |  |
|  |  | ☐ |  |  |

|  |
| --- |
| 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 tap posts. Mark the water source, distribution tank, solar array location, distribution network, tap posts and any landmarks.  North  *For example*  *Source*  *Tank*  *Solar*  *Temple* |

|  |  |
| --- | --- |
| **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** | ☐ No plans ☐ Soon  If soon, by when? ………………………………………………………. |
| **From the surveyor’s point of view, which configuration of solar water pump configuration is recommended and why?** | ☐ Off-grid solar water pump  Give reason: ……………………………………………………………………………………………………………………………………………...  ☐ Solar water pump with manual changeover for national grid connection  Give reason: …………………………………………………………………………………………………………………………………………..  ☐ Grid-connected and net-metered solar water pump  Give reason: …………………………………………………………………………………………………………………………………………….. |

|  |  |
| --- | --- |
| **Additional information** | |
| **Remarks**  **(any other relevant information)** |  |