

**Topics under Detail Feasibility Study Report for Solar Lift Irrigation**

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## Executive Summary

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Describe briefly in **one page** the design and outcomes of the detail feasibility study. The Executive Summary should include the key information of the study.

### Paragraph #1

- i. Site location
- ii. Number of households/farmers/groups
- iii. Date when the on-site survey was carried out

### Paragraph #2

- i. Current status of electricity access
- ii. Catchment area
- iii. Daily crop water requirement
- iv. Ownership model

### Paragraph #3

- i. Land availability for solar array, pump intake, reservoir tanks and water transmission and distribution path
- ii. System description (solar array capacity, pump capacity, inverter capacity, reservoir tank capacities)

### Paragraph #4

- i. Total system cost
- ii. Cost of electromechanical, civil and water transmission & distribution system

### Paragraph #5

- i. Major project risks and mitigations
- ii. Conclusion

## Site details

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### Location

Describe the location of the site and provide information about,

- i. Site address (ward number, rural municipality, district and province)
- ii. Site coordinates

### Site Access

Describe the accessibility of the site. Provide information about,

- i. Access route description (vehicle access, type of road/path(seasonal, all-weather or earthen, gravelled, black-topped etc.)

- ii. *Observations of population and irrigation land density in the site area (for example, dense/sparse farming fields etc.)(in case of community SIP)*
- iii. *Name and distance from the nearest market center with vehicle access*
- iv. *Name and distance from the nearest city and airport*
- v. *Vehicle accessibility-month wise*

*Photo suggestions*

- i. *Access road/path*

## **Site assessment**

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### **Existing infrastructure**

*Describe any existing infrastructures already present on the site that can be utilized by the new SIP system. For example, existing reservoir tanks, distribution pipes etc. If present, describe their features in detail. For example, land coverage of distribution pipes, diameter and length of distribution pipes, the capacity of the reservoir tank etc.*

*Include photos of existing infrastructure.*

### **Water source and security**

*Describe the water source for SIP. Provide information about,*

- i. *Location and security (distance from the nearest household, access path etc.)*
- ii. *Type of water source, seasonal variations, water quality, risks such as landslides*
- iii. *Other existing or planned uses of water sources upstream and downstream*
- iv. *Any potential conflicts in water use and its resolutions*
- v. *Is the water source registered or not, because it may cause further conflicts between villages?*

*Photo suggestion*

- i. *Photo of the water source*

## **Technical design**

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### **Water requirement and vertical head**

*Describe the calculation of water requirement per day and vertical head. Provide information about,*

- i. *Details of daily water requirement calculation ( $m^3/sec$  or litres per day)*
- ii. *Vertical head, total dynamic head*

### **Pump**

*Describe the selection of the pump and its details. Provide information about,*

- i. *Pump's rated capacity (kW/HP)*
- ii. *Justification for the type of pump selected. For example, surface, submersible etc.*
- iii. *Any assumptions and estimations (such as average pumping hours per day etc.)*
- iv. *Details of reference pump that was taken for the selection (market available pump)*
- v. *Requirements of pump housing/protection features*
- vi. *Month-wise water output simulation graph*

### **Solar array location**

- i. *Must include the available land area, ownership details, GPS coordinates, topography, orientation and azimuth, near and far shading, current land use description, local land use regulation and policy, slope and soil type, wind loading etc.*
- ii. *Should have a general assessment of usability concerning natural calamities such as floods, landslides, lightning etc.*
- iii. *Should have assessment related to safety from humans, fencing needs*
- iv. *Details of any land treatment needed to make it suitable for a solar array installation*
- v. *The site should be selected from an adequate distance from the road to allow for any future road expansions, and infrastructure plans and reduce soiling losses in the PV array*

*Photo suggestions*

- i. *Site photo of the solar array location*

### **Solar array and controller sizing**

*Describe details of the solar array and controller. Provide information about,*

- i. *Details of the solar array including array capacity individual panel size, key technical parameters, series and parallel configuration*
- ii. *Positioning of the solar array. For example, orientation, tilt, number of rows, row spacings*
- iii. *Near and far shading analysis*
- iv. *Details of the controller including controller capacity, protection, mounting mechanism, key technical parameters, compatibility with solar array and pump, need for controller box etc.*
- v. *Details of reference solar panel and controller that was taken for the selection (market available panel and controller)*

*Figure suggestion*

- i. *Photos of near shading and relevant analysis*

### **Pump intake and distribution reservoir (if applicable )**

- i. *Describe the type of pump intake system (sump well, concrete tank, borewell etc.), dimensions and capacity*
- ii. *Describe the type of distribution reservoir (concrete closed tank, concrete open tank etc.), dimensions and capacity(if applicable)*
- iii. *Pump fixture (type, construction material etc.) in the pump intake*

- iv. *Must include the available land area, ownership details and commitment letter, GPS coordinates, topography, current land use description, local land use regulation and policy, slope and soil type etc.*
- v. *Should have a general assessment of risks concerning natural calamities such as floods, landslides etc.*
- vi. *Plan of the site or location considering the safety of the pump to be installed or the sump well to be made at the bank of the river*

*Photo suggestions*

- i. *Photo of the pump intake and distribution reservoir locations*

## **Transmission and distribution of water**

*Describe the transmission and distribution plan of water. Provide information about,*

- i. *Details of transmission pipe (ground length, diameter, material(s), number of joints, anchor blocks etc.)*
- ii. *Details of distribution pipe (ground length, diameter, material(s), branches and joints, anchor blocks, flow meters, gate valves etc.)*

## **Balance of systems**

*Describe the balance of systems for SIP completion. Provide information about,*

- i. *Provide details of how cables will be routed and secured from the solar array to the controller box. Then from the controller box to the pump*
- ii. *Include a table describing detailed specifications of the balance of systems such as protection equipment (DC MCBs, SPDs, lightning air terminals/ESEs, earthing points, cable sizes and respective losses, conduits etc.)*
- iii. *Details of the solar array mounting structure. Calculations related to wind loading requirements, civil foundation requirements, size of vertical legs, purlins, braces and struts, rafters, base plates, joints, mid-clamps, end clams etc. must be presented*
- iv. *Include a single-line diagram and suggest including an infographic illustrating the system architecture with key information*
- v. *Include an illustration showing earthing locations, positioning of the lightning protection system, controller box etc.*

## **Bill of quantity and cost**

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### **Electromechanical system**

- i. *Detailed BoQ for the proposed system with a breakdown of each component must be done*
- ii. *Detailing in the BoQ should be such that, if possible, every component used such as the breakdown of combiner boxes and its components, MCBs, MCCBs, busbars, etc. must be proposed in specifics instead of a lump sum*

- iii. *BoQ for services and goods must be separated*
- iv. *Vatable and non-vatable items must be distinguished*
- v. *The currency used must be in NPR with commas as a separator*

### **Civil works**

- i. *Separate BoQ for civil works (pump intake and distribution reservoir, transmission and distribution network, PV array foundations etc.) must be prepared, however, all the BoQ will be compiled to form a single BoQ*
- ii. *Other points mentioned above apply to this section as well*

## **Conclusion**

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*Provide a summary of the SIP architecture, agriculture potential, project cost and outcomes of the economic analysis.*

## **Annex**

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### **Meeting minutes from the community**

- i. *User committee registration at the LG (if applicable)*
- ii. *Water source registration document if it is registered*

### **Site photos**

### **Product datasheets**

- List of separate attachments to be submitted along with this report:
  - Meeting minutes/permission letters for conducting DFS
  - Single Line Diagram