Cripley Meadow Allotment Association

Solar-powered trickle feed pump - project report

Background

In the summer of 2018, Cripley Meadow Allotment Association successfully applied to Oxford City Council (OCC) and Oxford and District Federation of Allotment Associations (ODFAA) for a grant of £610.00 to fund a pilot installation of a solar-powered trickle-feed pump to fill one of 6 clusters of communal water tanks.

There is no mains water on Cripley Meadow Allotments; our communal water tanks are periodically filled from the nearby water course using a petrol-powered pump. The idea was to establish whether it would be feasible to replace this expensive (wages cost for labour), time-consuming and sporadic method with a more automated system that would also reduce air and noise pollution and the use of fossil fuel.

More details can be found in the original grant application.

Project timescales and achievements

We had initially envisaged that the project would start in Autumn 2018, but, in the event, were not ready to start in earnest until Spring 2019. At the time of writing (July 2019), we have successfully

Connected the two tanks

Laid /trenched all the water hoses and electrical cables

Installed the submersible pump, inside a black plastic bin for protection

Installed the solar panel, connected the pump and tested the installation...

… and we are now using the solar-powered method for filling the pair of tanks.

As we have not yet had a winter, we have not yet

Tested the removal and reinstallation of the pump over winter and checked that the cables and hoses are OK over winter.

We intend to publish an updated project report once these final tasks are completed.

What we learned

- Electrical cabling – we bought weather resistant rubber electrical cable but found that resistance over the 30m run led to a drop in voltage, such that it was insufficient to power the pump. As we had already purchased the rubber cable, we used the remaining cable and all three cores, while not elegant, to reduce the voltage drop and deliver sufficient current to the pump. If we were doing it again, we would do more electrical calculations in advance, and purchase the appropriate cable.
- Solar panel specification - If we were doing it again, instead of purchasing one 160W solar panel, we would purchase 2x60W, connected in series to generate 24V. This would

allow for some voltage drop over the cable – however, an additional voltage regulator would probably also be needed to ensure that the pump received no more than its specified 12V.

- Solar Panel location – we initially thought we would install the panel on a neighbouring shed roof, but, mindful of recent thefts of solar panels on other sites, decided that a slightly more distant but much more discrete location would be better. The new site also benefits from being more south-facing. We discovered that there is enough sunlight for our purposes without having to be too fussy about the perfect alignment and angling of the panel. On a moderately sunny day, it only takes between 1-2 hours to fill the two 920L tanks.
- Float switch – we initially envisaged that the pump would be permanently enabled, and that a float switch inside the tank would automatically turn it on and off, depending on water level. However, the float switch added to circuit length, and therefore to the resistance/voltage drop problems. As the tanks filled more quickly than we envisaged, we decided that a simple on/off switch would be an acceptable solution: when the nearby allotment-holder is on their plot, they check the tank and, if needed, turn on the pump switch until the tanks are full.
- Hose – we initially imagined that we would surface lay the water hose over most of its course, and coil it up for storage during the winter. However, the 25mm/1” bore hose turned out to be far too stiff to make this feasible. Instead, we have permanently surface laid the hose and cable for most of their length, burying them only where they pass across a trafficed path and where they would be visible from a public footpath. It remains to be seen how it will fare in a really cold winter.
- Security, and safety notices – we budgeted for some safety notices to put up around the pump. In the event, the pump is very discreet inside its black plastic bin, and it is unlikely that someone would stumble upon it and hurt themselves or the pump. So, for security reasons, we decided not to draw attention to it with signage (especially as the signs would have been visible from the neighbouring public footpath).
- Complexities of siting – It took several goes to get the physical layout of all the components right, with some unnecessary holes drilled along the way!
- There were no major unforeseen health and safety problems, but stinging nettles were a problem and we did need to find some waders for working in the water.

Project spend

Spend to date has been largely in line with our original estimate.

Component	Original Estimate	Actual Spend	Notes
Bacoeng DC 12V submersible water pump	70.00	70.00	
50m 25mm hose	200.00	132.00	11m remaining
50m rubber cable	30.00	66.00	25m remaining
160watt solar panel	130.00	140.00	
Float switch	25.00	25.00	We purchased the float switch, but eventually used a simple on/off switch instead.
Timber for solar panel support	50.00	20.00	

Warning notices	50.00	0.00	Warning Notices were not required; we used a black plastic bin as a discreet housing instead.
Contingency 10%	55.00	69.00	We under-estimated the number and cost of connectors, junction boxes, jubilee clips etc.
Total	610.00	522.00	

We shall have final costs once we have been through a winter and the project is completely finished. There were no labour costs as all the work was carried out by volunteers.

Success? Roll out?

The project has been successful in establishing a working example that could be adapted for further use on Cripley Meadow Allotments or similar settings.

As described above, we could improve some technical elements of the design. However, the bespoke nature of each setting means that perfecting the technicalities is only half the battle. There is a lot more than meets the eye in to siting the panel, pump, routing cables and pipes, connecting the junction boxes and switches.

On Cripley, in parallel with this project, we have started another piece of work to train volunteer members on how to use the petrol pump to fill the tanks. Given that the petrol pump is a costly asset, we now think that, as long as we can make a success of volunteers using it, it would be sensible to continue to do so until the pump becomes uneconomical to maintain. When we can see that the petrol pump is ailing, we now know we have a workable, sustainable alternative.

Come, see it, talk to us

If you would like to come and see the installation, and talk to us about it, please get in touch – secretary@cripleymeadow.org.uk.

Authors: Manda Joyce & Rodney Smith, July 2019