Alternative Water Supplies

What do we mean by 'alternative' water sources?

Traditionally, livestock have been allowed free access to natural watercourses in the form of rivers, streams/burns, hill sikes and ponds in order to access drinking water.

However, for a number of reasons (see below), this free access is becoming increasingly limited across the wider landscape and as a result livestock producers are having to find other sources and supplies of fresh drinking water for cattle and sheep on pasture.

This case study aims to draw together some of the approaches that we have considered and implemented as part of the Cheviot Futures project. It showcases a range of approaches that are available to supply water for livestock drinking requirements, including the considerations behind each one, the benefits and the drawbacks of various approaches. It is hoped that the information provided here will assist farmers elsewhere to determine the best option for their particular situation.

Reasons for requiring alternative sources

Livestock access to natural watercourses is being restricted for a variety of reasons, with total grazing exclusion of riverbanks becoming the preferred management option. It is often supported through capital grants as part of current grant schemes.

The main drivers towards removal of livestock access to watercourses and wetlands can be summarised as:

- **Riparian management for habitat creation or flood management**

  Removal of livestock grazing pressure increases the vegetative cover of the riparian (riverside) zone which in turn assists riverbank stabilisation and reduces the risk of bank erosion. In addition, rougher vegetation slows surface water flow ahead of reaching the main watercourse, further reducing erosion risk.

  In many cases, farmers are encouraged to fence off and plant up the riparian corridor on their land to increase the native woodland cover for habitat, biodiversity and flood risk reduction agendas.

- **Management of diffuse pollution risk**

  By removing livestock access to watercourses, the associated poaching risk to the riverbank can be removed. This reduces the sediment input to the river from the bankside trampling, as well as removing the input of faecal material to the water and the adjoining land. This has implications for improving the water quality within the watercourse, which may be driven by Water Framework Directive objectives, designated site objectives (Site of Special Scientific Interest, Special Area of Conservation, Special Protection Areas, Ramsar sites) and bathing water quality assessment – e.g. on the Eye catchment.

- **Livestock management**

  It may be desirable or beneficial to remove access to watercourses, wetland habitats in particular, from a livestock welfare perspective as well. Unfenced watercourses present a risk of livestock losses, and also offer opportunities for neighbouring livestock to come into contact with each other, which may present biosecurity risks or issues, particularly in an organic management scenario.

  Wetlands provide an ideal habitat for the mud snail, a key element in the liver fluke life cycle, as well as for blowflies and other insects known to be potential disease vectors, while rivers and streams may be a source of water borne issues such as leptospirosis or cryptosporosis. See Cheviot Futures Animal Health and Welfare case study for further information.

  By removing livestock access to these areas the impact of such diseases may be reduced, particularly when considering the widespread resistance to treatment methods such as Triclabendazole flukicide.

Climate change resilience link to sustainable water provision

The impact of predicted climate change effects adds an extra dimension to these key drivers with the likelihood of reduced rainfall during summer, combined with higher temperatures, and more incidences of drought conditions becoming the norm.

Watercourses and supplies that have previously been sufficient may not be sustainable under this scenario, leading to an added pressure to find an alternative means of providing clean fresh drinking water for livestock.

The issue of livestock water provision is anticipated to be of greater concern during the main summer grazing season due to the reduction in natural availability coupled with heat stress in livestock and peak demand for water from lactating animals and growing youngstock. However, the drivers noted above mean that alternative watering is a year-round consideration on many holdings, although the greatest pressure and requirement will still be during the summer.

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Alternative Watering Options
available for Livestock Farmers

There are a range of water supply infrastructure solutions available to livestock producers. Cheviot Futures has sought to trial a range of solutions on a number of farms across the project area.

Please Note – the costs provided here are intended to provide an indication only. Every site will be different and pricing will vary according to specific requirements. Project costs are given as net values – VAT may be applicable to similar works at the prevailing rate.

CASE STUDY

Mowhaugh Farm, Yetholm, Roxburghshire

Working with Cheviot Futures, this upland sheep farm identified issues relating to sustainability of water supplies in the face of a changing climate. During dry conditions water supply was insufficient to meet the demand from livestock, the farm steading and domestic use. It was determined that efforts needed to be made to improve the supply situation in order to maintain the viability of the farm in the medium to longer term.

OPTIONS CONSIDERED

- Solar powered system drawing from the main Bowmont Water
- Papa pump system
- Papa Siphon Pump
- Pasture pump

SOLUTION 1

Dual Papa Pump System

The water supply alteration solution came in the form of the PAPA pump, with existing hill watercourses being utilised as the water source. It works by providing flowing water to the catchment chamber, which is then piped down to the pump chamber and in turn back to the farm, supplying livestock water troughs along the way. The system was designed, configured and installed by Connicks Ltd, specialists in water solutions for farms.

Two pumps have been installed to provide a zero-energy pumping system to move water in excess of 1km (A-B below) at a 15 metre head height from the pump chamber to the 5,000L supply tank at the farm steading.

The system was installed in September 2012 and, following initial priming, filled the supply tank within 24hours, running off one pump.

Completed works at Mowhaugh, September 2012. Looking up the line from the pump chamber onto the hill supplying the water resources. © Connicks

Project schematic taken from Connicks Case Study – Alternate Watering – Papa Pump Installation; Connicks 2013

The dual Papa pumps in situ within the pump chamber at Mowhaugh, August 2013.

Initial priming of first Papa pump at Mowhaugh, September 2012. © Connicks

PROJECT COSTS

Site layout, system design, supply and installation of equipment and materials - £8,500 (not including plant and machinery costs or water troughs).

ADVANTAGES

- Low maintenance and cost effective – virtually no running costs and can be maintained by the farmer
- Simple and reliable – only two moving parts; high strength construction; causes very little disturbance to the watercourse
- No energy costs to operate - uses the natural energy of flowing water to operate
- Capable of pumping up to 20,000L per day and can transport water over considerable distances
- Fully adjustable flow
- Can handle small sandy sediments within the water body and also fluctuations in water levels

DISADVANTAGES

- Mowhaugh installation has experienced issues with frogs entering the pump equipment – can be solved with the addition of extra filters and screens
- System requires start up priming
- Site specific configuration and system design may require specialist input

PERMISSIONS AND CONSENTS REQUIRED

The system at Mowhaugh is covered by a registration level authorisation from SEPA (Scottish Environment Protection Agency) under the Controlled Activities Regulations (CAR), allowing for up to 50 cubic metres to be drawn by the pumps in any one day. This is more than sufficient to cover the water being utilised at the site. The SEPA advice for this installation was to cover the amounts of water being abstracted from the watercourse, irrespective of the volumes directly used with the remainder being returned to the natural system just below the pump chamber.

Foot Valve to supply water to the Pasture Pump.

SOLUTION 2

Pasture Pump

Following works to improve the riparian habitat on the farm through native woodland planting, requiring removal of livestock from the area, an alternative source of drinking water was required. This site required the supply of water sufficient for use by small numbers of ponies and occasionally cattle. It is unlikely that the field will be used for sheep on a regular basis.

The intention originally was to supply this site using the Papa Siphon Pump, offering the first UK trial site for the new product, but the site characteristics were unsuitable, therefore the pasture pump option was selected.

The pasture pump is a nose pump – as the animals drink from the pump bowl, they push against a lever which in turn operates a piston and the diaphragm pumps more water. The pump unit is positioned within the field, raised on a platform to allow easy access for stock. At Mowhaugh the water is drawn from a borehole accessing the water table, but the pump can equally be used to draw water direct from a watercourse.

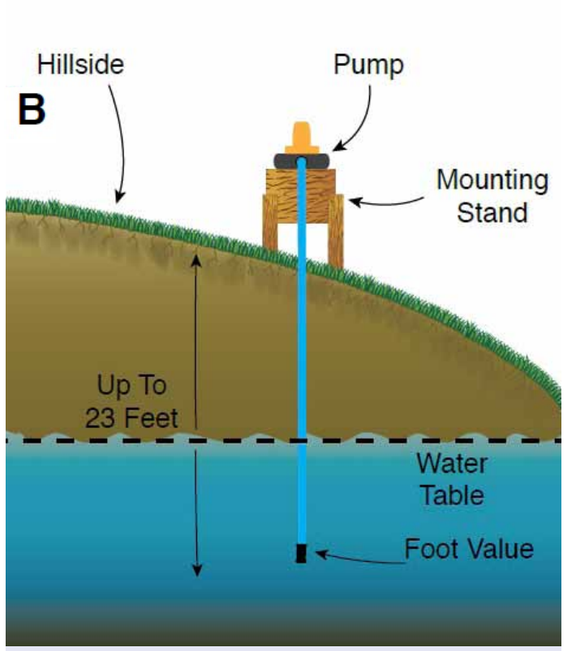
PROJECT COSTS

Pasture pump purchase and delivery - £300

Site preparation and Installation - £450

ADVANTAGES

- No power requirement
- Protects river banks and watercourses
- Suitable for cattle and horses
- The diaphragm pump supplies constant fresh clean water on demand from its natural source
- Capable of providing up to 7m vertical and 70m horizontal lift
- Dispenses 0.5L with each pump lever action; trough capacity 1L



Schematic showing the principal of the layout used at Mowhaugh; image taken from the McVeigh Parker Aquamat II Pasture Pump brochure

CASE STUDY

West Fenton Farm, Wooler, Northumberland

The project developed at West Fenton was intended to trial a system suitable for summer grazing systems where livestock (in this case sheep) are rotated around available pasture throughout the season, requiring a solution capable of supplying a number of fields across the farm unit.

OPTIONS CONSIDERED

- **Development of a fully portable alternative watering system, powered by solar PV technology**

SOLUTION

Trailer Mounted Solar PV System

The solution developed in partnership between Cheviot Futures, Inherent Energy and the farm business represents the first fully integrated portable system to be developed in the UK.

The system is designed to draw energy from sunlight to maintain the charge in the battery bank, supplying power to the pump when it is required to draw water to refill the holding tank and/or trough.

The pump does not need to run permanently, only when the levels in the holding tank/trough drop below the critical level determined by the float switches.

The system specification includes:

- 24V DC Self Priming (to 2.5m max.) Diaphragm Pump 16 litres per minute maximum flow with maximum total head to be <4m with 19mm flex hose fittings
- In-Line Strainer & In-Line Flap Valve
- Solar PV panel – 250Wp – and fittings
- Charge/Load controller, with ball TypeFloat switch and relay
- 24VDC Deep Cycle Battery Bank
- Storage tank and water trough, plus fittings
- Supply and fit-out of suitable trailer (towed by Quad Bike or Pick-Up – not "road legal")

PROJECT COSTS

Development of prototype design, supply and delivery of fully functioning system - £4,200

Please Note – this unit is a prototype model and subsequent development as a commercial product may attract more competitive pricing depending on demand and alterations to specification.

ADVANTAGES

- Offers a fully portable system suitable for any pasture site with an adjacent water resource

The portable solar powered water system developed by Cheviot Futures and Inherent Energy in partnership with the farm business at West Fenton, July 2013. Rear view showing the holding tank and inclusive trough arrangement.

- Power supplied by the solar PV arrangement could be sufficient to run electric fencing infrastructure in addition to the pump (would require a DC-DC adaptor)
- No requirement for energy input
- Low maintenance
- Easy to transport and store due to compact size and universal ball coupling drawbar

DISADVANTAGES

- Unlikely to be suitable for use during the winter months due to risk of damage from freezing conditions
- Prototype still needs further development so timescale for wider availability currently unknown
- Requirement for sufficient sunlight – careful siting and a flexible approach to stocking levels will be required to maximise system capabilities

PERMISSIONS AND CONSENTS REQUIRED

This solution is unlikely to require any form of permission for water abstraction as it will only draw water when levels in the trough and holding tank dictate a requirement, rather than there being a permanent through flow of water.

See below for an explanation of the abstraction allowances in both England and Scotland.

The portable solar powered water system developed by Cheviot Futures and Inherent Energy in partnership with the farm business, July 2013, shown in location at Mowhaugh as part of the alternative watering workshop held in August 2013.

CASE STUDY

Venchen Farm, Yetholm, Roxburghshire

This site has been developed as a Cheviot Futures demonstration site in relation to sustainable management of riparian land, with development of floodplain specification fencing and riparian native planting. As a result the livestock access to the main Bowmont Water through the site was removed by permanent fencing.

OPTIONS CONSIDERED

- **Mains water connection**
- **Pump powered by renewable sources – wind or solar**

SOLUTION

Mains Connection

The selected approach for this site was a connection to the mains water network and the installation of a high capacity concrete trough with associated hardstanding to minimise poaching damage.

This solution was the preferable one due to there being an existing pipe connected to the mains on the site and concerns over vulnerability of high-value pumping equipment by renewable means in such a public location to theft or damage.

Completed replacement water supply works at Venchen, February 2012

PROJECT COSTS

Concrete trough – supply and installation including pipework and fittings - £900

Hardstanding – materials supply and installation - £480

ADVANTAGES

- Security of supply, irrespective of local weather conditions and climatic influences
- Familiar territory for contractors and farm business alike
- Inexpensive to install

DISADVANTAGES

- Farm businesses are likely to be liable for payment of water rates using this approach
- Charges and potentially lengthy consultation to secure permission for connection from the relevant water company

PERMISSIONS AND CONSENTS REQUIRED

- Connection to the mains network is at the discretion of the water company - complete a Pre Development Enquiry initially, available online:

  Northumberland - www.nwl.co.uk

  Borders - www.scottishwater.co.uk

Cheviot Futures Practical Demonstration Event

Cheviot Futures held a practical demonstration event focused on alternative watering options on 21st August 2013.

The event was held at Mowhaugh Farm, Yetholm, by kind permission of Chris and Louise Dixon and offered the 22 participants a valuable opportunity to view, compare and contrast the benefits of the pasture pump, solar PV powered systems, PAPA pump system and the new PAPA Siphon pump on one site.

Specialist information was provided by key partners Inherent Energy, McVeigh Parker, PAPA and Connicks, supported by the real life experiences of the farm business and local contractor involved with installation and maintenance of the systems in place at Mowhaugh.

Ian McHale explains the Aquamat pasture pump

Chris Dixon talking to the group about the Dual Papa Pump System.

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Abstracting Water from Surface Waterbodies – What are the Rules?

Generally speaking, abstracting water to supply livestock drinking troughs is unlikely to require formal authorisation. However, the detail of all proposals should be checked against the requirements ahead of implementation to be sure. If in doubt – ask!

In England, abstraction licences from the Environment Agency may be applicable if water is to be impounded, or volumes in excess of 20 cubic metres per day are to be abstracted (4,000 gallons). It is advised that farmers considering abstracting water for agricultural uses check the local Catchment Abstraction Management Strategy (CAMS) for their area.

In Scotland, abstraction of up to 10 cubic metres per day is allowed under General Binding Rule (GBR) 2 and does not require formal authorisation under the Controlled Activities Regulations (CAR) as long as the GBR requirements are adhered to. Abstraction in excess of 10 cubic metres but less than 50 cubic metres per day is likely to require a registration level of authorisation, whilst volumes in excess of 50 cubic metres per day are likely to require a licence (simple or complex) level of authorisation. Registrations and Licences are approved by SEPA.

Watercourses bearing a statutory designation – SSSI, SAC etc. – may have additional restrictions. Provision of alternative water is likely to be linked to riparian improvement efforts to the benefit of the interest features, but allowance should not be assumed. Check the activities requiring the consent of Natural England (England) or Scottish Natural Heritage (SNH) if your watercourse is within a designated site. The majority of tributary watercourses of the Tweed catchment are within the SSSI but abstraction for livestock drinking provision is not listed as an operation requiring consent.

Environment Agency

Environment Agency
Yorkshire and North East Region

North East Area Office:
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Skinnerburn Road,
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0370 850 6506

SEPA
Scottish Environment Protection Agency

Scottish Environment Protection Agency (SEPA)

South East Region Office:
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01896 754 797

Photo: Bowmont Water

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The Scottish Government

LEADER