Removal of cattle drinks and crossing points causing siltation and organic pollution, by the provision of alternative drinking strategies including novel pumping systems

- Monitoring Report

Action C3

LIFE09 NAT/IE/000220 BLACKWATER SAMOK

June 2015

The IRD Duhallow LIFE Project is supported through the LIFE financial instrument of the European Community.

I.R.D. Duhallow Ltd.

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Executive Summary

Livestock farm units split by rivers pose challenges from a nutrient management perspective as animals routinely need to cross the water course for pasture or milking. This is especially challenging for dairy farms where this journey could be made up to twice a day. Animals standing in water will frequently defecate or urinate in the watercourse they are standing in. The challenge is to prevent or reduce the amount of time animals spend in the water course without hindering the farming enterprise. The provision of bridge crossings, although the preferred option, may not be practical or are too costly. The DuhallowLIFE project developed an alternative strategy or "managed cattle crossing". A study by the LIFE project found that bovines if kept moving, rarely soiled the watercourse they passed through. Most soiling only occurred if animals were allowed to pause in their crossing and stand around within the water course. Therefore, a managed crossing system was developed, where cattle access to the river was restricted until it was time for them to cross from a farming perspective (i.e. milking or access to pasture). Only then were the animals driven across. This system was established at three farms and farmers signed up to a management agreement with the project.

A key action (Action C2) of the LIFE project was to fence off river banks to restrict livestock access and to improve the quality of the riparian zone in terms of bank erosion, biodiversity and water quality. This also entailed closing off of existing watering and access points for livestock.

Alternative drinking sources were provided for livestock where current practice was to allow animals direct access to water courses within the SAC. Alternative sources were only provided where existing cattle drinking points or open river bank access occurred. No new drinking points were established where none previously existed, to avoid any increase in water taken from the river. The majority of drinking points were replaced by pasture pumps for cattle. These were placed in 25 farms with up to five pasture pumps provided depending on the nature of farm and size of herd. These were popular with beef farmers only, as beef cattle have a lower demand for water compared to dairy cattle. Pasture pumps can service up to 15 cattle (O'Donovan Engineering, 2015).

Solar powered operated pumps were placed in 6 farms. These were more suitable for dairy herds as they can service up to 30 animals. The solar operated pumps are more complicated to

set up and operate and this is an issue which needs to be considered if promoting this technology on the ground.

One farm was fitted with the necessary infrastructure for rainwater harvesting. This was found to adequately service up to five 200 gallon troughs. However, during drier weather, it was necessary to supplement the water storage tanks with mains water used for the cooling plate in the milking parlour. This combination avoided the need to take water from the river.

Two beef farms were established on the River Allow as demonstration sites for the pasture pumps technology and one dairy farm was set up as a demonstration site for both solar powered pumps and rainwater harvesting. The sites now also serve as demonstration sites for the supplier of this technology in Ireland.

Background

Cattle Access

Cattle access to streams and rivers can have a negative effect on waterways and lead to habitat degradation (Sheffield, *et al.*, 1997). Unrestrained grazing along the riparian zone increases riverbank erosion and has the potential to cause changes in channel structure and flow patterns (Zeckoski, *et al.*, 2012). River bank erosion can be a source of silt in rivers (Scottish Environment Protection Agency, 2012). Soil erosion via livestock poaching at feeding points and bank edges not protected by a sufficient fencing regime may produce long-term degradation of the channels (Neill & Hey, 1992).

Allowing cattle and other livestock unchecked access to rivers and streams increases the risk of introducing pathogens (e.g. salmonella, leptospirosis and Johne's disease, source: Teagasc, 2015). This can also contaminate the water supply for wildlife and farms further downstream (Kay, *et al.*, 2012; Sheffield R., 1997). Cattle access points that were acceptable under the REPS schemes (Department of Agriculture and Food) do not stop contamination from these pathogens (Sustainable Water Network, 2013).

Supplying cattle and other livestock with alternative drinking strategies to direct access to the river or stream will reduced the risk of riverbank erosion and also prevent potential contamination of the water supply (Kilfeather & Feehan, 2009).

Action C3 of the Blackwater SAMOK LIFE Project (DuhallowLIFE) entailed providing alternative watering points and drinking strategies to replace direct access to the river by livestock.

Cattle Crossing

Allowing livestock direct access to surface waters can result in sediment loading and increased turbidity (Henning & Segars, 1997). This can have a damaging effect on salmon spawning grounds and freshwater pearl mussel habitat (Anon, 2004). Also, health problems can arise from this practice (Price & Lovett, 2002) with such issues as mastitis, cryptosporidium and other water borne diseases arising (Sheffield, 1997).

Action C3 of the Blackwater SAMOK LIFE Project (DuhallowLIFE) involved devising managed cattle crossing strategies at three crossing points in the Allow Catchment. The strategies require the farmers to drive their herd across the river in a timely fashion, thus

reducing the probability of the animals soiling the water. DuhallowLIFE worked with the relevant farmers to formulate these strategies, and agreements were signed to continue this regime even after the LIFE Project concluded.

Site Description

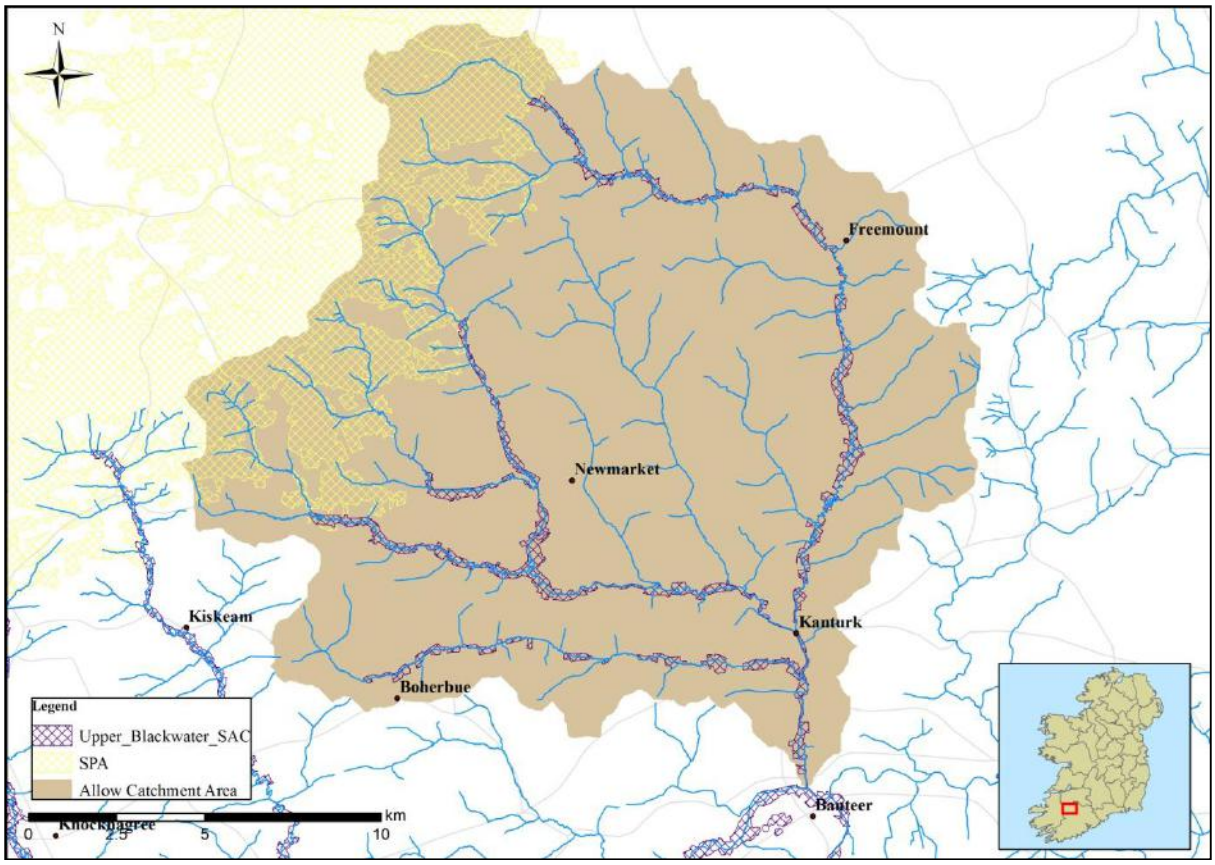

Figure 1 River Allow catchment area targeted by the DuhallowLIFE Project (LIFE09 NAT/IE/000220 Blackwater SAMOK)

The River Allow catchment is 310km^2 (*Figure 1*). The three major rivers that drain the catchment are the Allow, Dalua and Brogeen. The main agricultural land use in the catchment is pasture with dairying and sucklers forming the majority of farming practices.

The majority (70%) of the soils in the Allow catchment are deep, poorly drained mineral soils. Blanket peat covers approximately 5% of the catchment, mostly in upland reaches. Mineral alluvium is associated with the river channels, while shallow well drained mineral soils make up the remaining soil type in the catchment (EPA/Teagasc, 2006; Tedd, 2014).

The River Allow catchment rivers (Allow, Dalua, Brogeen, Glenlara and Owenkeale) form part of the Blackwater River (Cork/Waterford) Special Area of Conservation (Natura 2000 site code: 002170). These tributaries provide important habitat for Freshwater pearl mussel *Margaritifera margaritifera*, Atlantic salmon *Salmo salar* and European otter *Lutra lutra*, all of which are listed in the Annex II of EU Habitats Directive.

The upper reaches of the Allow catchment contain the Stack's to Mullaghareirk Mountains, West Limerick Hills and Mount Eagle Special Protection Area, which was designated as such for Hen Harrier *Circus cyaneus* (listed in Annex I of the EU Bird's Directive).

Methods

- All installed cattle drinkers (pasture nose pump, solar pump, mains and gravity feed from water harvesting tanks) were monitored to ensure that they were being used.
- Access points to the river were regularly checked to ensure they were closed off and out of use.
- Managed cattle crossing strategies were observed to ensure the agreed methodologies were adhered to.

Results & Conclusions

Nutrient and sediment concentrations can be greatly reduced by restricting cattle access to rivers and streams (Gaskin, et al., 2001). Establishing a fencing regime along riverbanks, especially where a buffer strip of vegetation is allowed to establish, ensures grazing animals are restricted from damaging these banks (Zeckoski, et al., 2012). The DuhallowLIFE project has fenced off 38.53km of riverbank in the Allow Catchment and has prevented livestock from overgrazing the tops of these banks and also from accessing the rivers. Measures to ensure that there were no negative implications for farmers or their stock (drinking troughs, cattle crossings, etc.) were successful. Alternative drinking strategies were provided to farms where the practice was to allow livestock direct access to water courses. These were provided where existing cattle drinking points or open river bank access occurred. The majority of drinking access points were replaced by pasture (nose) pumps for dry stock. Dry stock (e.g. beef cattle) require less water per day than dairying herds (Ward, 2015; Moran, 2014). These were placed in 25 farms with up to five pasture pumps placed depending on nature of farm and size of herd. Pasture pumps can service up to 15 cattle comfortably

All troughs that were installed in the catchment were fully utilised. The location of each trough was carefully considered so as to minimise any impact to the water source and riverbank. With regards to the pasture (nose) pumps, water was sourced where possible, from field drains. This ensured that any poaching to the ground surrounding the pumps was as far from the riverbank as possible (e.g. the pump in *Figure 4* is situated approximately 150m from the main Allow River channel). Due to the close proximity of a number of the pasture pumps to the road, many landowners took it upon themselves to remove the pumps from fields in which no cattle were grazing and re-install them as needed. This was as a precaution against theft.

Solar pumped drinking troughs were installed on six farms with dairying animals. These were more suitable for dairy herds as they can service up to 30 animals, each of which require between 60 to 155 litres of water per day (Moran, 2014). These require more technical ability for installation and the suppliers of the panels, O'Donovan Engineering Ltd., have committed to running maintenance workshops for all the farmers that have these solar powered pumps. The solar operated pumps are more complicated to set up and operate and this is an issue which needs to be considered if promoting this technology on the ground.

One farm on the Dalua had rainwater harvesting infrastructure installed. This was able to provide enough water for five 200 gallon troughs. During drier weather it was necessary to

supplement the water storage tanks with mains water used for the cooling plate in the milking parlour. This innovative combination, with full cooperation and input from the landowner, avoided the need to extract drinking water from the river.

Two beef farms were established on the River Allow as demonstration sites for the pasture pumps technology and one dairy farm was set up as a demonstration site for both solar powered pumps and rainwater harvesting. The sites now also serve as demonstration sites for the supplier of this technology in Ireland.

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Appendix 1: Example of Cattle Management Agreement signed by three landowners

Cattle Management Agreement between the IRD Duhallow EU LIFE+ Project and Mr Sean McLoughlin (Owner) of the selected farm at Curragh/Knocknacolan, Kanturk.

1. Background

This Cattle Management Agreement is to ensure that the IRD Duhallow EU LIFE+ Project and Mr Sean McLoughlin (Owner) have an understanding of their different roles and responsibilities.

The Agreement will serve the interests of the Project and the Owners by clearly stating what is expected in terms of working in partnership to deliver the work programme outlined in Cattle Management/Crossing method trialled and performed on the Owners land.

2. The Work of the IRD Duhallow EU LIFE+ Project

The Project seeks to improve water quality in the River Allow Catchment in areas affected by cattle disturbance due to trampling and faecal disturbance in order to conserve species and habitats designated under the Habitats Directive.

An integral part of this will be the selection of sites on which to implement and monitor this project action with local farmers/land owners.

3. Roles and Responsibilities of the IRD Duhallow EU LIFE+ Project

The Project is guided in all its work first and foremost by working in partnership with the selected land owners in an open and honest manner. This will respect the integrity and confidentiality of the Owner of the farm and his/ her family.

In this regard, the Project will:

- work in a spirit of partnership with the owner of the selected farm

- ensure the owner's name / farm name remain confidential on all Project documentation

- not disclose any information to any outside party without the consent of the Owner of selected farm

- Share all project information on the selected farm with the owner

4. Roles and Responsibilities of Owners of Selected Farm

The Project places great emphasis on shared responsibility and encourages the Owner of the selected farm to work in partnership with the Project Team in the delivery of this project action.

For this reason, the Project expects the Owner of the selected farm to:

- to be transparent in all matters impacting on this work of direct relevance to the Project

- to commit to make the work programme a success

- to actively participate in the activities and work programmes where possible

- agree to give permissive access to the Project Team to the lands bounding the river on which the work is to be undertaken

- to agree to practice the intended Cattle Management/Crossing method undertaken on the selected farm for their intended farm management / river conservation purpose for a period of five years after the end date of the project (01/01/2019).

5. Duration and Review of the Agreement

The Grant Agreement shall remain open for review for a period of One (1) Month from the date upon which the IRD Duhallow EU LIFE+ Project and the Owner of the selected farm sign this Agreement. This date will become the Effective Date and not beyond the 1st January 2014. After this one-month review period all provisions of the

Agreement will come into effect. The Grant Agreement shall be for a period not exceeding two Years (24 Months) from the Effective Date. Collectively, the Project and the Owner / Manager of the selected farm will review the implementation of the work programme if required. This will take place on an annual basis immediately prior to the anniversary of the Effective Date.

6. Termination of the Agreement

In the event of either party breaching any provision of the Agreement without mutual consent, the aggrieved party may seek clarification in writing from the other party. In the event where this is not forthcoming, either party, after consultation and a cooling off period of two months, may terminate without prejudice the provisions of the Agreement in part or in whole. As the entire Project is designed as a two way learning process between the Project and the Owner of the selected farm it is not anticipated that any condition of the Agreement

will be subject to termination without first dealing with the matter via an open process of consultation and discussion.

7. Signing Parties

I (We) have read this agreement and I am (we are) satisfied with its contents. The details given are correct to best of my (our) knowledge. I (We) agree to implement in full, to the best of my (our) ability, the agreed method and to work in co-operation with the project to implement this Agreement. I (We) consent to grant access to the project, its contractors and agents on my (our) land to implement and monitor work being undertaken. I (We) understand that no legal rights of way or wayleaves will be established or requested over my lands by the IRD Duhallow EU LIFE+ Project during or after completion of the project. As legal owner of land in question I am (We are) in a position to enter into this Agreement.

This Agreement is signed by Sean McLoughlin (Owner) as legal owners / managers of the selected farm located at Bawnmore South/Ballybahallagh, Kanturk and covered by this Agreement.

Signature: _____ Signature: _____

Date: _____ Date: _____

We have read this agreement and are satisfied with its contents. The details given are correct to be best of our knowledge. The Project will implement in full, to the best of its ability, the areas of work it has agreed to. The Project will not carry out any work on the selected farm without first consulting the legal Owner / Manager of the selected farm. The Project Team will not discuss, disclose or exchange any information relating to the selected farm without the knowledge and consent of the legal owner or manager of the farm.

Project Coordinator - the IRD Duhallow EU LIFE+ Project

_____

Dr Fran Igoe

Date: _____

Appendix 2: Installation of alternative drinking sources

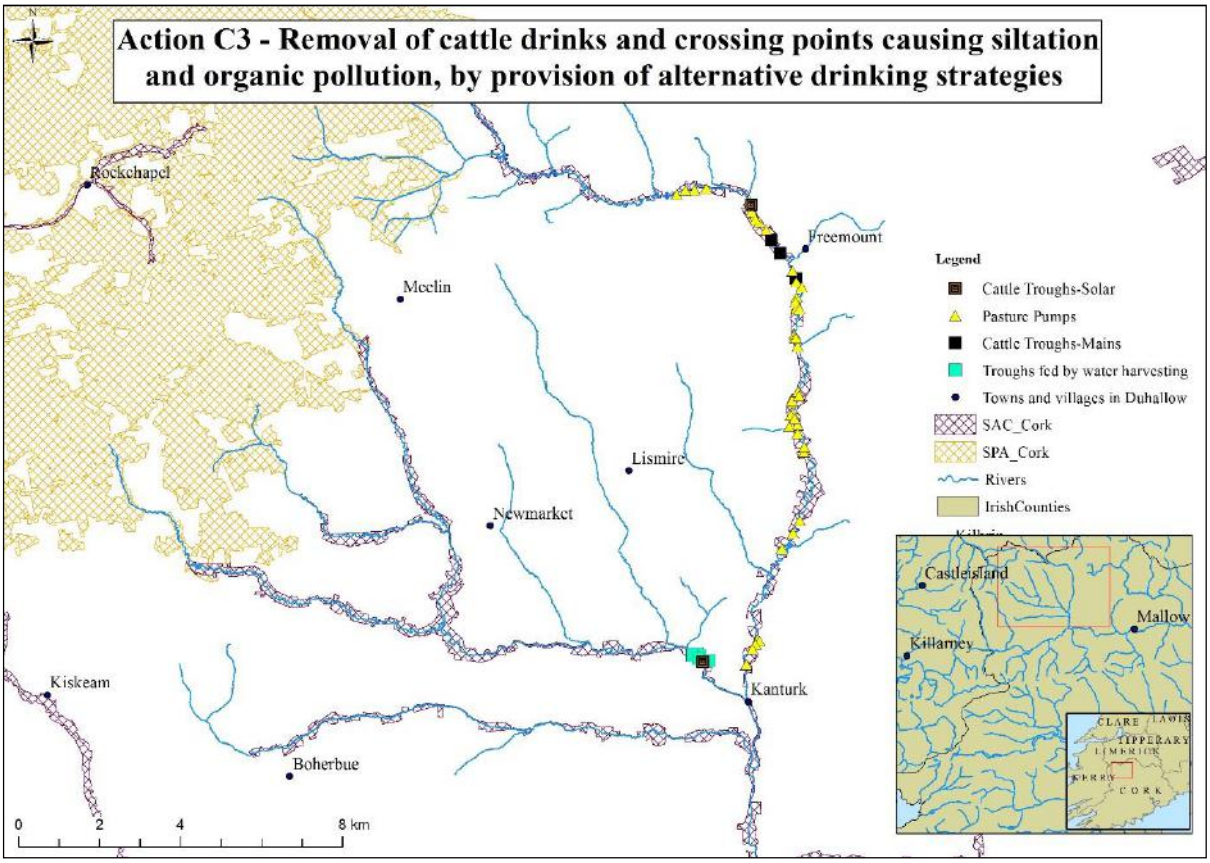

Figure 2 Extent of alternative drinking strategies provided to farmers throughout the Allow River Catchment

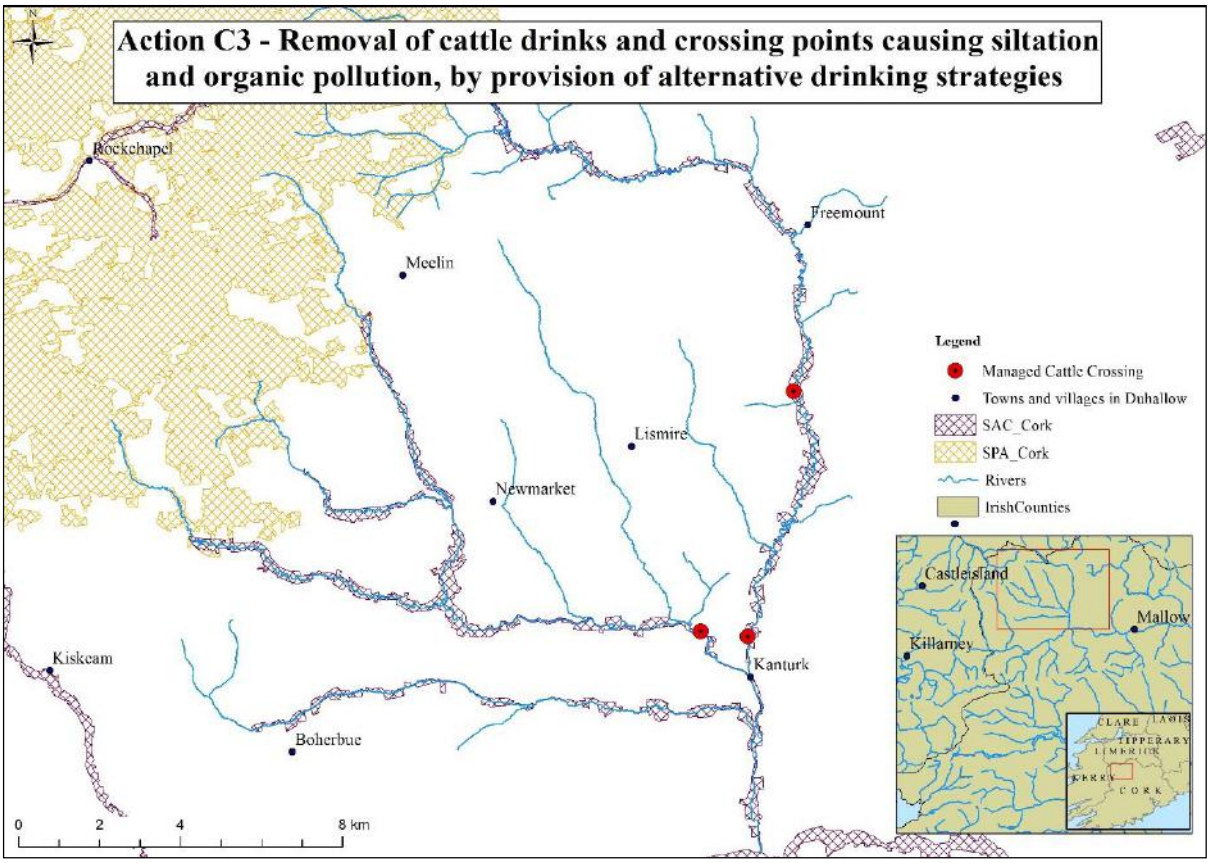

Figure 3 Locations of the three managed cattle crossing points that were agreed by the respective landowners

Figure 4 Cattle drinking from one of the pasture pumps installed along the Allow River at one of the demonstration farms (beef)

Figure 5 Solar panel in the middle-ground powers the machine that pumps water from the river to either of the two drinking troughs (foreground and background) – demonstration farm (dairy)

Table 1 Examples of cattle access points blocked off by the LIFE project. Pasture (nose) pumps, solar pumps, gravity and mains feed drinking troughs were supplied by the project as alternative drinking strategies.

Before	**After**
Downstream of Allow Bridge (ITM: 539382,613703)	
 April 2011	 April 2015
Downstream of Allow Bridge (ITM: 539424, 613469)	
 March 2013	 August 2015 (Willow was also planted along the riverbank)
Upstream of Kanturk Town (Dalua River) (ITM: 537253, 604118)	
 September 2012	 February 2013
Downstream of Johnsbridge (ITM: 539435, 609757)	

October 2012

August 2015

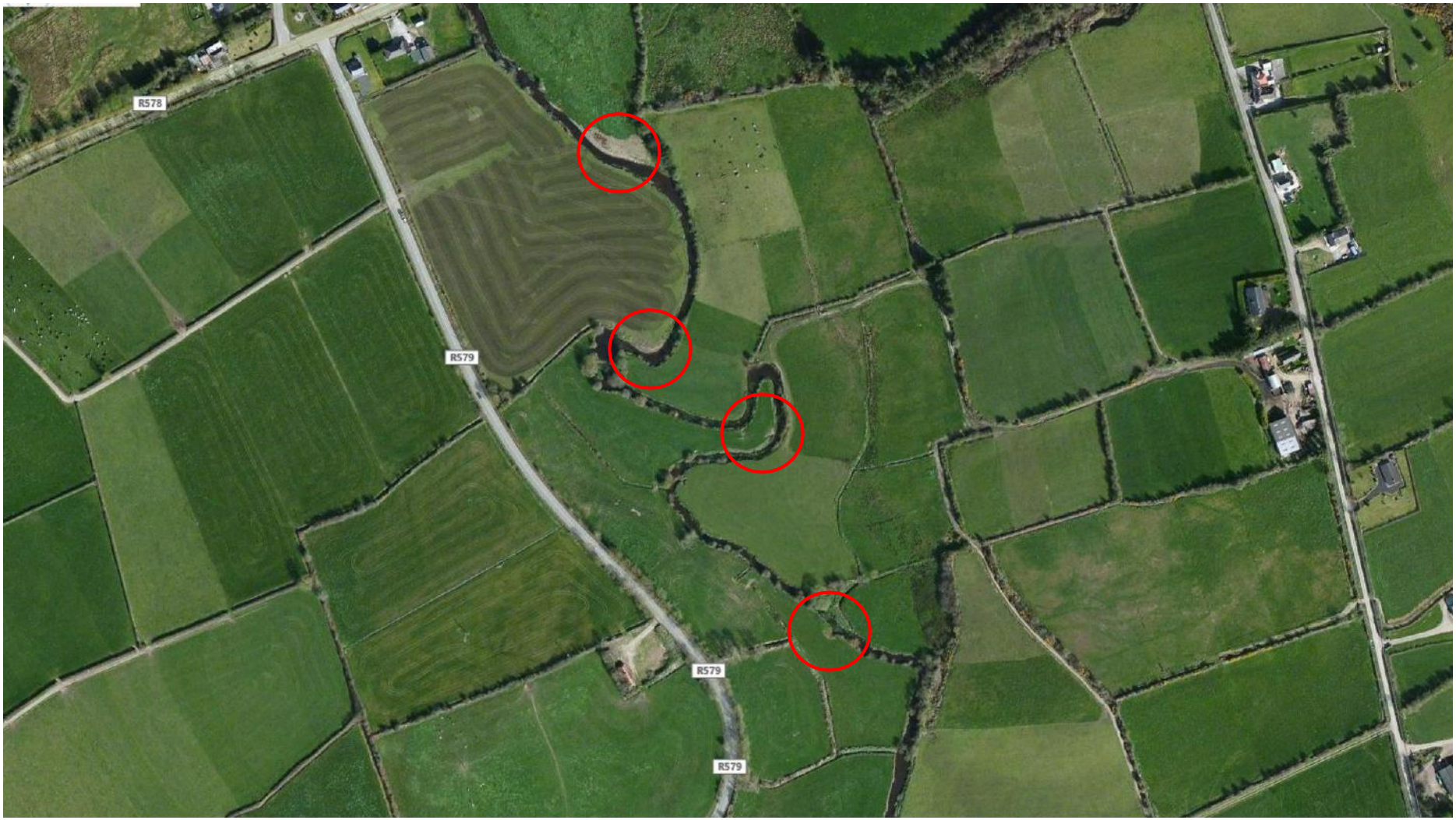

Figure 6 Aerial photograph of section of Allow River, near Freemount, prior to works. Circled are three cattle access/drinking points.

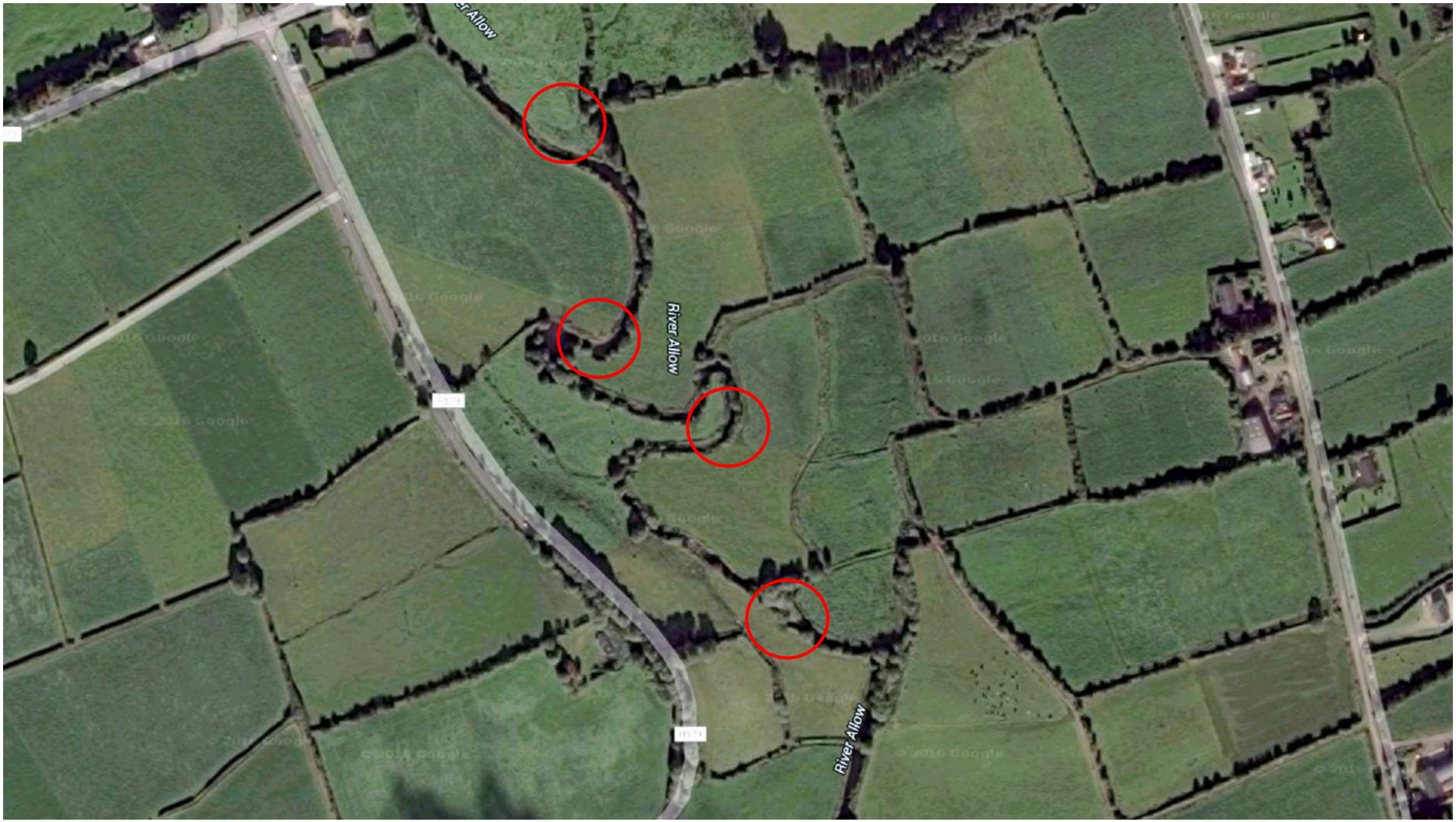

Figure 7 Section of Allow River (Google Maps, 2015). Cattle access to the river was restricted and the access points are no longer visible, when compared to Figure 6.

Figure 8 Example of managed cattle crossing (Dalua River). The landowners involved in the scheme agreed to drive their herds across the river in a timely manner so as to ensure there was as little soiling of the river as possible.

Figure 9 Example of managed cattle crossing (Allow River). The crossing was timed from when the first animal entered the river to when the last cow exited. It took a total of 60 seconds for the entire herd of 40 cattle to cross the river.