

# Removal of the Ver mill weir on the Sienne River

## The operation

Category	Restoration
Type of operation	Partial or total weir/dam removal
Type of environment	Intermediate river zone
Issues at stake (water, biodiversity, climate)	River continuity

Start of operation	October 2010
End of operation	October 2010
Length of river affected by the works	1 700 m

## River in the restored sector

Name	Sienne River
Distance to source	55 km
Mean width	18 m
Mean gradient	1.00‰
Mean discharge	8 cubic metres per second

## Aims of the project owner

- Compliance with regulations (Art. L. 432-6 Envir. code).
- Restore river continuity between the Airou tributary and the English Channel.

## Environment and pressures

The Sienne is a coastal river, 80 kilometres long, that flows into the English Channel in the harbour of the town of Regnéville. Its basin covers a surface area of 580 square kilometres. The area is essentially agricultural, dominated by grazing and fodder crops (maize) with some grain crops. The soil is fairly impermeable (orthogneiss and granite) with relatively steep slopes in a rather hilly area. Farm fields represent a sizeable percentage of the land cover, however the intensity of the pressures exerted on aquatic environments is limited. The chemical quality of water is rather high and the main disturbances are hydromorphological due to the presence of transversal structures. The Sienne is fragmented and fish have a difficult time accessing the upper reaches and the tributaries.

## The location

Country	France
River basin	Seine - Normandie
Region(s)	Normandie
Département(s)	Manche
Commune(s)	Ver



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The Sienne valley with the Ver mill weir in the foreground. April 2006.

Regulatory context Not applicable

## European directive references

Water-body ref.:	HR336B
Natura 2000 site ref.:	Not applicable
ROE (obstacle) code	4702



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Aerial view of the Ver mill site before the removal of the weir. April 2006



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Aerial view of the site after the removal of the weir. Automne 2011.

The Sienne is mentioned in Lists 1 and 2 of Article L. 214-17 of the Environmental code for migratory fish, including Atlantic salmon, sea lampreys, river lampreys, brown trout, sea trout and eels.

Approximately 40 transversal structures exist along the river, representing one structure every two kilometres on average. Most of these structures serve no economic purpose and half are in ruins.

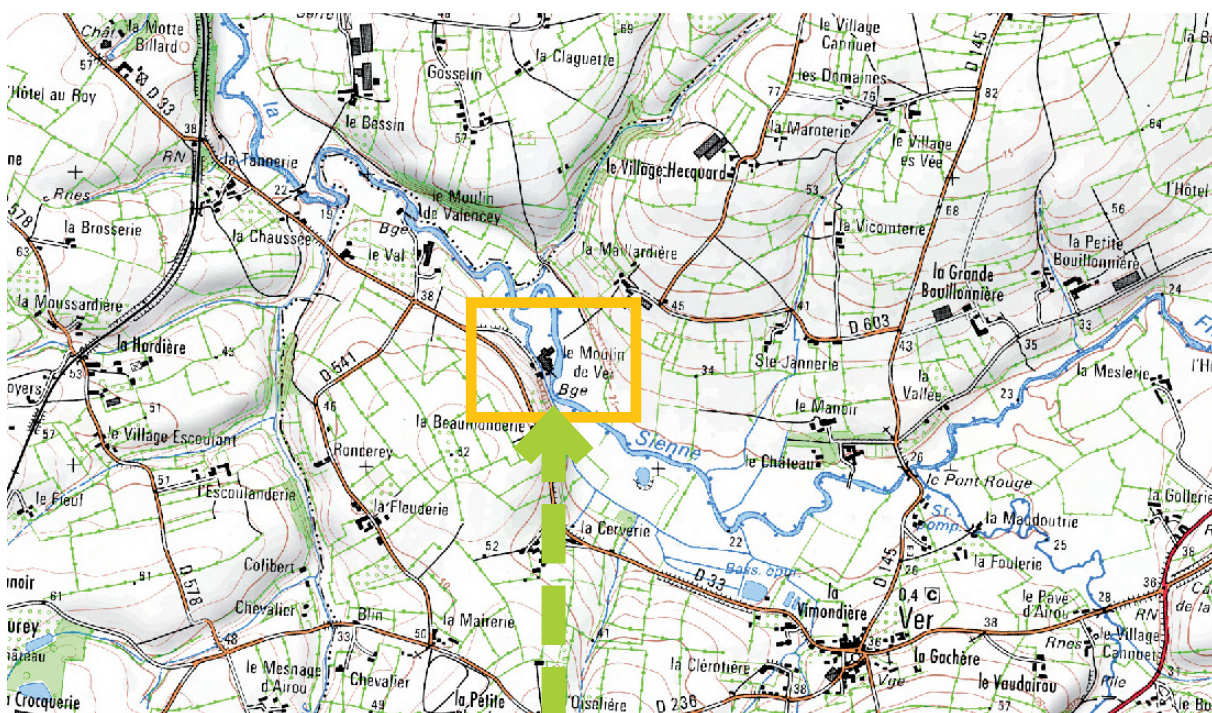
The Ver mill, built centuries ago, had not served an economic purpose for decades. The mill weir, 1.7 metres high, was in very poor condition. A night club exists on the left bank.

Just upstream of the Ver mill is the confluence with the Airou Stream, the main tributary comprising spawning redds for salmon designated as a Natura 2000 site, primarily due to the presence of freshwater pearl mussels and Atlantic salmon.

### ■ Opportunities to act

The Sienne is a listed river and a number of projects were undertaken in the 1990s to ensure the passage of migratory fish over the transversal obstacles, notably fish passes. During the same period, in 1993, the gates of the Ver mill weir were opened, but even in the upper position, they continued to block the flow of water and the passage of migratory fish.

In 2005, following a change of owner, the Sienne AAPPMA (certified association for fishing and protection of aquatic environments) commissioned a study on the potential impact of removing the weir. The study in fact assessed two solutions, the installation of a fish pass and the removal of the weir. However, no progress was made in the negotiations with the owner, who did not wish to modify the structure. Consequently, no restoration work was undertaken.





In 2009, the mill was purchased by a new owner. The State services and the Water agency explained to the new owner the situation with the structure and the issues at hand in the sector. The owner accepted the removal of the structure given the safety issues (the dilapidated condition) as well as the regulatory and economic context (the publication of a new river classification in 2012, taking into account new species in the design of fish passes (Art. L. 214-17 of the Environmental code). The owner relinquished his water rights in November 2010.



An Atlantic salmon attempting to overcome the Ver mill weir. Autumn 2009.

Association Hydroscope

monitoring dealt with the spawning redds of sea lampreys and with the hydromorphological compartment (topography, flow patterns, substrate measurements, etc.).

The Departmental federation for fishing and the protection of aquatic environments for the Manche department monitors each year salmon populations, including an index on the abundance of juvenile salmon.

In 2012, the geomorphology (erosion dynamics, stream power, etc.) was monitored by an intern from the University of Caen. The Intermunicipal board for the development and maintenance of the Sienne (SIAES) undertook photographic monitoring of the changes in the riverbed and the banks for the first three years following the project\*.

### ■ Outcome of the project and outlook

The removal of the Ver mill weir made possible a return to a natural riverbed in the formerly impounded reach, over a distance of 1.7 kilometres.

The elimination of the reservoir resulted in an array of diverse flow patterns of running water. For example, seven riffles reappeared, alternating with rapids and more lentic flow patterns. The return of the riffles has made available a surface area of 2 400 square metres suitable as spawning habitats for fish species.

### ■ Works and developments

The Ver mill weir was completely removed. The rubble of the stone weir was used on the right bank to create groynes to centre flood waters. The project included maintenance of the riparian vegetation upstream. A nearby pond was restored to replace the mill pond that had been used by the local fire department. Finally, fences and watering points were set up on neighbouring lands.

### ■ Regulatory approach

Not applicable.

### ■ Post-restoration management

No particular management measures were planned.

### ■ Monitoring

In 2010, before the demolition, the Seine-Normandie Water agency established a monitoring point (physical-chemical quality, macro-invertebrates, diatoms) 200 metres upstream of the weir. This monitoring point is checked every two months for the physical-chemical data and every two years on average for the hydrobiological data.

Post-works monitoring was carried out one month, six months and one year after the demolition, directly by Onema and the Water agency. This



Reactivation of sediment transport in the former impoundment following removal of the weir. May 2013.

\* For more information, see the "Monitoring" section in the fact sheet on the Wetlands portal.

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## Costs

In euros ex. VAT

Studies	21 423 €
Purchase of land	0 €
Works and developments	30 985 €
Promotion	0 €
<b>Total cost of project</b>	<b>52 408 €</b>

### Financial partners and funding:

*Seine-Normandie Water agency (90%), Basse-Normandie Regional council (5%), Sienne AAPPMA (certified association for fishing and protection of aquatic environments) (5%)*

### Technical partners:

*Sienne AAPPMA, National agency for water and aquatic environments (Onema), Intermunicipal board for the development and maintenance of the Sienne (SIAES), Seine-Normandie Water agency, Manche departmental territorial and maritime directorate, University of Caen*

The removal of the weir also significantly improved the upstream migration conditions (wounds, delays, etc.) for salmonids, eels and sea lampreys between the English Channel and the Airou tributary. In 2012, 13 spawning redds for sea lampreys were observed on the site of the former impoundment, thus confirming the suitability of the habitats made available following the elimination of the structure.

The discovery of riffles in the sector entailed the creation of a monitoring point for the abundance index of salmon juveniles (IAS index). In 2011, the index stood at 49 at the monitoring point (high status). That represents significant progress for the monitoring point because the index was zero (no riffles) prior to the removal of the weir. These results indicate effective restoration of continuity for fish. The areas upstream of the Ver mill are now available and the suitability of the reproduction habitats in the former impoundment is also manifest.

An increase in fishing activities has also been observed in the sector, due notably to the increase in the salmon population.

However, the improvement in the passage of migratory fish at the Ver mill is limited by the existence of other structures blocking movement in the river. There remain two or three structures that make passage difficult or impossible for fish and block their access to spawning redds upstream and in the tributaries.

The physical-chemical monitoring revealed an improvement in the oxygenation of the river waters and the river effectively achieved good physical-chemical status in 2011. Samples of benthic macro-invertebrates taken in the years following the removal of the weir indicate very high habitat quality.

Geomorphologically speaking, the Sienne would appear to have returned to a more natural hydraulic gradient. Post works, major quantities of coarse sediment reappeared on the site of the former impoundment. This sediment has been and continues to be transported by two-year winter floods. The river has

also recommenced natural adjustment via lateral erosion in the concavity sections of meanders.

In 2010, the Seine-Normandie Water agency launched a study to obtain a comprehensive and shared assessment of the hydraulic structures in the Sienne basin. The study contained proposals for work on structures to restore river continuity, taking into account local environmental, economic and social issues, while also assessing the value of maintaining the structures. The overall objective of the study was to look at a strategy to restore river continuity in the Sienne basin, taking into account the heritage value of the structures.

## Promotion of the project

The SIAES, in conjunction with Onema, prepared a technical fact sheet on the removal of the weir.



[http://sd-2.archive-host.com/membres/up/4517356054702344/Note\\_moulin\\_de\\_Ver\\_Complet.pdf](http://sd-2.archive-host.com/membres/up/4517356054702344/Note_moulin_de_Ver_Complet.pdf)

A number of visits to the project site were organised, notably for river technicians in nearby river basins as well as for elected officials and the local population.

The Normandie CATER (Water and river technical group) also produced a video during the project.

<https://www.youtube.com/watch?v=Uut23nc6q8g>

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