Flon de Carrouge River restoration

Introduction

The Flon de Carrouge is a small river flowing into the Broye upstream from Moudon town. Totally natural in its upstream part, it presents a short but strongly canalized section into Servion village. Used in the past for hydraulic energy production, it was also more recently covered to optimized sawmill activities. Currently unused, the old concrete constructions are broken and present a potential risk against river inundation. Fig. 1 illustrates the situation.

Fig. 1: Flon de Carrouge in Servion village at the old sawmill section

Objectives

In order to restore this river section, a project including the land owner, the county and the local municipality is developed. The objectives are :

- Revitalisation of the artificial river section
- Reduction of inundation potential risk
- Restoration of the upstream longitudinal connectivity (natural gorges in molasse) with the downstream river (plain)
- Increase the landscape aspect into Servion village.

The environmental aspects are developed by Ecotec while Hydrique is in charge of the general project and the hydraulic aspects.

Hydrological analysis

In order to define the river and the required capacity, an hydrological study is developed. The flood capacity is then fixed to 9.2 m^3/s. This value is also corresponding to the capacity under the bridge. Fig. 2 illustrates the decreasing mean annual flows used to established the different embankment altitudes.

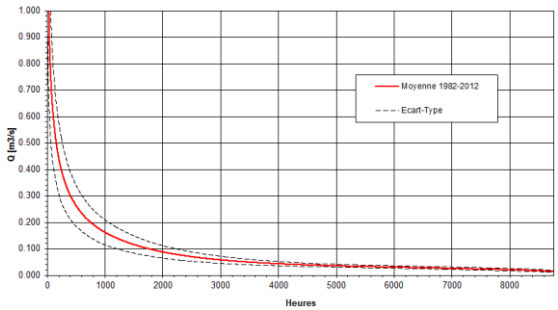

Fig. 2: Decreasing mean annual flows

Hydraulic model

Based on the hydrological flows and the river section defined by Ecotec after a long negotiation with land owner, a complete hydraulic model allowed to define the river capacity and the minimal water elevation during the low flow period.

Due to a break of slope, an important attention was paid to the sediment transport capacity, including the section and roughness modifications. It was shown that small deposition still remain possible. Nevertheless, the 10 years return period flood should offer a sufficient transport capacity in order to remobilized the deposited sediments.

Project

The new river flows into a total width of 16 m offering an important degree of liberty. Variable slopes of embankment are developed remaining a possible divagation to the river bed.

The proposed project, based on a diagnostic of the flora and fauna, aims to support the salmo truitta, the sculpin, the kingfisher and the dipper, as well as the ringed cordulette and the virgin calopteryx. The development of the watercourse is based on the creation of zones favorable to the development of a creek grove rich in helophyte species, the creation of sub-banks in rockfill, the creation of two thresholds to fix the bed as well as the seeding of a herbaceous stratum of blooming prairie type on the banks. Thus, only techniques derived from soft engineering are used and make it possible to eliminate all the existing concrete walls.

Fig. 3: Revitalization of Flon de Carrouge, project and realization

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