DESCRIPTION OF SITES

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Project name and acronym:		IMPROVE LIFE - Improving connectivity, hydrology, habitats and resilience in aquatic ecosystems
Name of the project area: *The name must be used consistently on all maps and Part B*		Fämtan
Surface area (ha): *Indicate the total surface of the project area in hectares, rounded to two decimals*		61,70 (288 km^2)
EU protection status (if applicable)	**SCI**	SE0610208
	SAC	
	SPA	
Other protection status according to national or regional legislation (if applicable):		Natura 2000 protection status (Ch 7, §27-29, SEC). National interest for nature conservation (Swedish Environmental Code, Ch 3, § 6, SEC). National legislation of the riparian zone (Swedish Environmental Code Ch 7, §13-18, SEC). Water Framework Directive (2000/60/EC). Habitats Directive (Council Directive 92/43/EEC on the Conservation of natural habitats and of wild fauna and flora). Additional applicable National legislation according to The Swedish Environmental Code Ch 3, 5-7, 11, 26. Regulation of fish stocking (HVMFS 2021:7). Regulation of fisheries (FIFS 2004:37).

Main land uses and ownership status of the project area

Indicate what are, at the project application date, the main uses made of the project site (e.g. farming, tourism, urban, nature conservation, etc.). Indicate the approximate percentages (in %) of the various uses, ensuring that the total reaches 100%. Indicate also the ownership status / types of the area at the project application date (e.g. private, state, etc.) and the approximate percentages (in %) of the different ownership status / types, ensuring that the total reaches 100%.

Land use status (%): Forest (xx), Water (xx) and Open land, i.e. meadows (xx).

Ownership status (%): Private (xx) and state (xx).

Importance of the project area for biodiversity and/or for the conservation of the species /habitat types targeted at regional, national and EU level (give quantitative information if possible)

Justify why you have selected this particular area for your project. Explain why your choice is the most appropriate to reach the project's objectives.

The River Fämtan project area is situated in the northern part of Värmland and includes the Natura 2000 watercourse Fämtan and its surrounding watershed. R. Fämtan is one of river Klarälvens largest tributaries comprising important habitat for the threatened endemic landlocked populations of Atlantic salmon (*Salmo salar*) and brown trout (*Salmo trutta*) who migrates from Lake Vänern each year. R. Fämtan holds the Natura 2000 status from entering the county of Värmland to its outlet in Klarälven, a distance of 25 km with a catchment area of 288 km^2.

Its main conservation purpose is to protect the habitat type “water course of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation” (Natura 2000 code 3260), and the unique Atlantic salmon who spends its entire life in freshwater (Natura 2000 code 1106). Except the project´s target species salmon and trout, also Eurasian minnow (*Phoxinus phoxinus*), alpine bullhead (*Cottus poecilopus*) and five other fish species

are known to inhabit the watercourse.

As R. Fämtan flows southwards through the landscape the stream exhibits a various of characteristics such as calm flows, streams, and rapids. The upper part is surrounded by meager pine forests, and for long distances Fämtan flows calm through wetlands. In the lower parts, the speed of the water increases, and the character of the stream is changing. Here, Fämtan flows through an impressive and beautiful canyon with many rapids and falls. Despite this, Fämtan may be one of the least affected tributaries to Klarälven in a hydropower perspective, however, the stream and its tributaries historically have been essential from other industrial points of view. Log-driving, different types of mills, iron industries and some small-scale hydroelectric powerplants have all used the watercourse as a resource. Due to the historical use of the water recourse, and other human activities in the area, the river constitutes national and regional interest cultural environment, such as a variety of ancient monuments. In turn, this has led to numerous alterations of R. Fämtan' s natural appearance and functions with major negative effects on the biota as a result.

Most of the soil type in R. Fämtan' s catchment area has a poor buffering capacity against acid substances, which makes the rivers susceptible to acid shock. The waters are thus failing to achieve good chemical status (classification according to the Water Framework Directive, WFD). To prevent acidification, the County Administrative Board of Värmland conducts extensive liming in the water system each year, through both wetlands, lime dispensers and lakes.

A large proportion of the catchment area consists of wetlands of which many are heavily affected by ditches. The widespread drainage of wetlands and the straightening of watercourses through these types of biotopes has resulted in disconnected links between water and land, which in turn has affected the wetlands' retention of water, filtering sediments, nutrients, and other substances. This in turn leads to for example high color of incoming water and increased risk for low flows during dry periods and on the contrary high flows during wet periods. Hence, besides to decrease C02-emissions, measures to increase the wetlands' retention of water and to recover previous water regimes are important for improving both the hydrological and indirectly also the ecological status of R. Fämtan. The rewetting of wetlands will also be directly beneficial for the biodiversity in target areas. Today, around 600 species (plants, fungi, insects, amphibians, and birds) that depend on wetlands are red listed in Sweden and another nearly 300 species that use the wetlands are on the list. Among birds that breed in the R. Fämtan catchment are the fish-eating species Red-throated Diver (A001), Black-throated Diver (A002) and ospreys (A094). The restoration measures in watercourses and adjacent wetlands also benefit otters (1355) through expected increased prey base of fish, crustaceans, amphibians, and larger aquatic insects. The rewetting measures will create more suitable habitat for the Hazel Grouse (A104), Black Grouse (A409) and Western Capercaillie (A108). Humid environments with a rich field layer, where there is an adequate abundancy of insects, are of great importance for their hens and chickens. Wood Sandpiper (A166), European Golden Plover (A140) and Crane (A127) nest in wetlands in forest and marsh mosaics next to R. Fämtan. Rewetting of damaged marshland increases the area of suitable habitat for the species by 100 hectares. At the same time, overgrowth is slowed down. The habitat of the Three-toed Woodpecker (A241) in the R. Fämtan area includes natural coniferous forest and various types of swamp forests. Rewetting of damaged bog and forest land creates more dead wood in the area in the short term, while the proportion of deciduous trees increases. The positive effects on both hydrology and ecosystems will be achieved by an extensive plugging of excavated trenches (so-called trench plugging) in strategical wetland-areas, together with mud-traps in the riparian zone to prevent episodical disposal of fine particulate matter into the R. Fämtan.

Additionally, more than 35 ha of stream area within R. Fämtan main stem is significantly affected by the clearing of larger structures such as stones, blocks and dead wood that preceded the extensive log driving – era during the mid-2000th century. This has resulted in both a lack of heterogeneity, reduced habitat-area, and quality for especially the Atlantic salmon population and trout, reduced connectivity both longitudinally and with floodplains, as well as reduced water retention. During the logging-period, several smaller dams with associated water reservoirs were also constructed to facilitate effective log-driving downstream. These dams are now obsolete but still and severely affect the longitudinal connectivity. Comprehensive habitat restoration by returning substrate like stones and boulders back to the water and the removal of obsolete dams are therefore important tasks for the project.

As forestry is a widespread trade within the project area several roads for log-trucks have been constructed during the past 100 years. As these roads often passes over larger and smaller streams road-culverts are very common. Unfortunately, many of the culverts are not designed properly to achieve longitudinal connectivity for the stream inhabitants. A major commission for the project is therefore to adjust or replace these culverts to facilitate free migration, mainly for fish.

Overall, R. Fämtan' s ecological status (according to the Water Framework Directive, WFD) is classified as moderate and unsatisfactory due to deficient hydrology, inadequate connectivity, morphological condition, hydrological regime, and acidification. The reason why there are several classifications is that R. Fämtan is divided into three sections within the conservational management plan.

Altogether, the impact of numerous anthropological activities has had a severe and negative effect on the Fämtan Natura 2000-site and its designated species. Therefore, in this project there must be a combined approached of habitat restoration in streams and rivers by returning boulders and stones to the stream, hydrological restoration of wetlands by plugging ditches, and improvement of longitudinal connectivity (dam removal, replace faulty road culverts and construction of fish passage). These mitigations will substantially augment the hydrological regime, habitat quality, migration, and biodiversity in the project area. Hence, this will enhance habitat conditions and production of fish and thereby improve the conservation status of the Natura 2000-site and its main target species, such as Atlantic salmon and secondary target species, such as Trout and Grayling. In addition, freshwater pearl mussel (*Margaritifera margaritifera),* which is prioritized in the HD, has not been inventoried in the area before, and will therefore be conducted within the project. If freshwater pearl mussels are found, morphological rehabilitation needs to be designed in accordance with this fact. Finally, liming activities in the catchment area will be adapted so that no biota is negatively affected by acidification.

An action plan for morphological river restoration together with measures for improved connectivity by removing migration barriers has recently been developed for R. Likan by the Klarälven Water Council (Klarälvens vattenråd). This plan will serve as an important basis for upcoming and more detailed descriptions of needed measures, and for application of necessary licenses and permits.

The conservation status of the site will be improved by the following actions:
Work package 2 Preparing concrete restoration and conservation actions
Task 2.2 Permit and licences
Task 2.3 Pree studies and designs

Work package 3 Connectivity
Task 3.1 Dismantling or bypasses at obsolete dams
Task 3.2 Removing migration barriers at road culverts

Work package 4 Habitat restoration
Task 4.1 Habitat restoration in rivers

Work package 5 Restore hydlological regime
Task 5.2 Restoration of mires by plugging or filling ditches