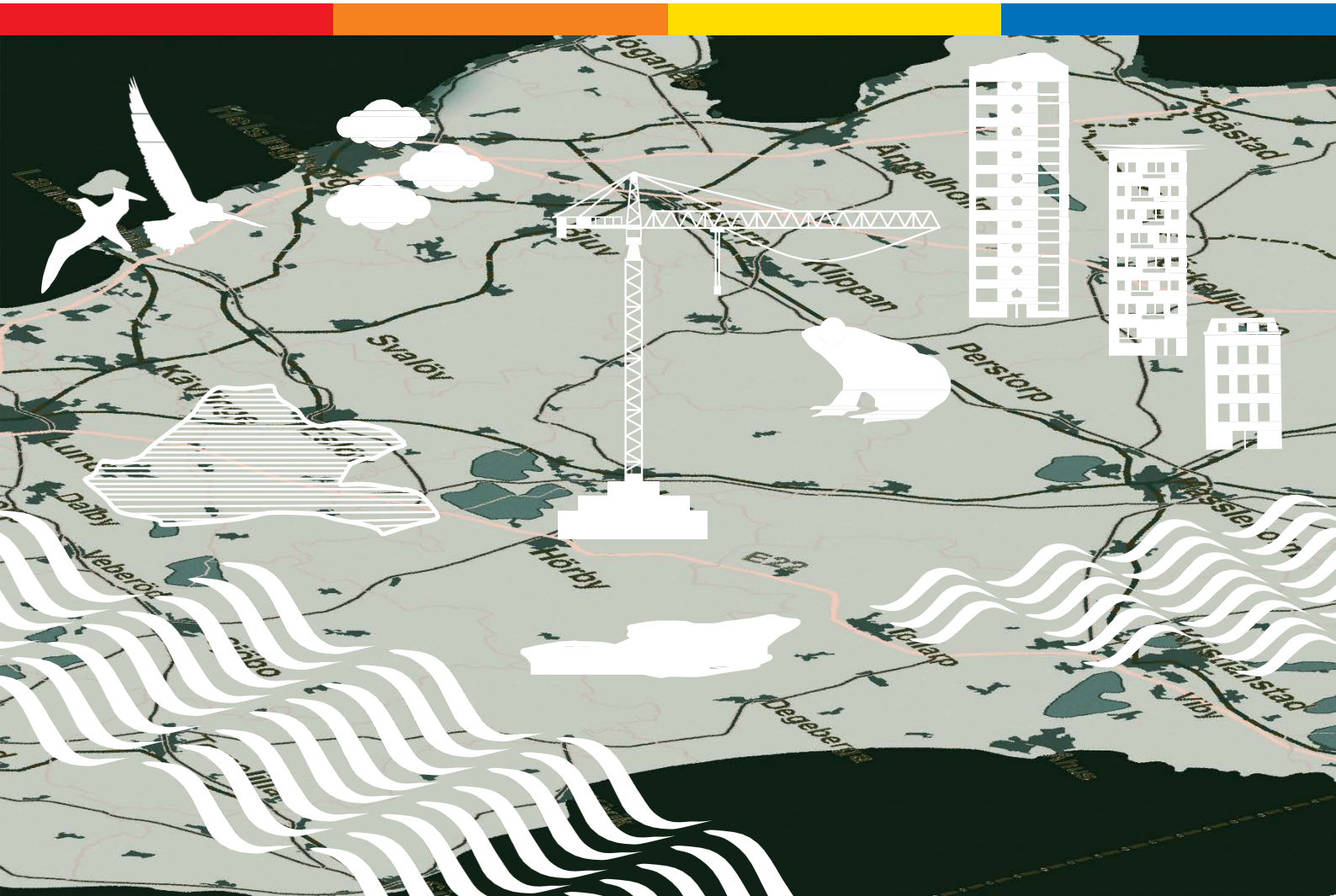
Länsstyrelsen Skåne

Interreg North Sea Region
Building with Nature
European Regional Development Fund

EUROPEAN UNION

# USER GUIDE – ENGLISH SUMMARY

Map service tool: Water and Climate
– Climate change, freshwater discharge and sea levels in relation to landscape topography and land use



## Introduction

The county administrative board of Skåne has compiled geographical information related to water and climate in a map service which aims to function as a regional planning tool predicting the effects of climate change (increasing sea levels and in-stream discharges) on multiple spatial levels.

The map service described in this summary has been developed by the Skåne County Administrative Board as part of the Interreg North Sea Region project "Building with Nature". Users of the map service are recommended to study this guide before entering the map service data base which is complex and sometimes hard to interpret.

The map service data base includes eleven geographical layers (GIS) in which information have been processed and stored. The layers cover spatial data related to catchment areas and tributaries characteristics such as discharge, landscape topography, land use, soil types, and hot spots in which wetlands could be hydrologically and ecologically restored. Additional layers include information about shore line characteristics (eg substrates) and dynamics (erosion vs sedimentation) along the sea, and the impact by increases (+1.0, +1.5, +2.0 and +3.0 meters) of the sea level.

## Objectives

The major objective of this summary is to illustrate and highlight the potential implications of the map service tool, especially the interactions between the GIS-layers and different climate scenarios. Moreover, the map service tool should be viewed as a dynamic "blueprint" of the landscape which enable the user to identify areas unsuitable for exploitations of different kind. For example, an area might be unsuitable for constructions due to some hydrological conditions however suitable for wetland restorations.

## Target groups and users

The map service tool is designated primary to users who work with comprehensive and strategical planning tasks at municipalities. However, the tool can also be useful for other actors such as consultants and NGO's working with, for example, landscape planning and ecological restoration.

The user guide linked to the map service tool, describes both possibilities and limitations related to each of the GIS-layers and how these layers interact with each other.

## Implementation of the map service tool

The Swedish municipalities are highly self-governed, the head authority responsible for the planning of land and water within their geographical boundaries.

Several different laws, such as the environmental code and the Planning and Building act, affect physical planning in Sweden. The major law which controls physical planning is the Planning and Building act, which regulates the zoning of the land, water and construction. In the second chapter in the Planning and building act different aspects and values are listed which should be taken into consideration while dealing with climate change aspects. Thus, planning of buildings and developments should be located on land that is suitable for its purpose.  In that context, there must be a consideration to aspects as human's health and safety, risk for accidents, flooding and erosion etc.

## Land use planning

The map service tool can be used to investigate an area´s probability to be flooded. By the additive information gained, by using multiple map layers, users of the map service tool may be able to make better decisions regarding appropriate land use.


*Figure 1. Cut-out from a comprehensive plan. The yellow marking is showing an adopted zoning plan with an area containing 65 planed apartments.*

By using the county administrative board´s “flood map”, which is based by a digital terrain model, depressions and hollows which constitute potential flooding areas, can be identified in the landscape. In figure 2 is the same area as in figure 1 but with the flood map switch on. The area of the adopted zoning plan has a large hollow, which contain almost the entire zoning plan.

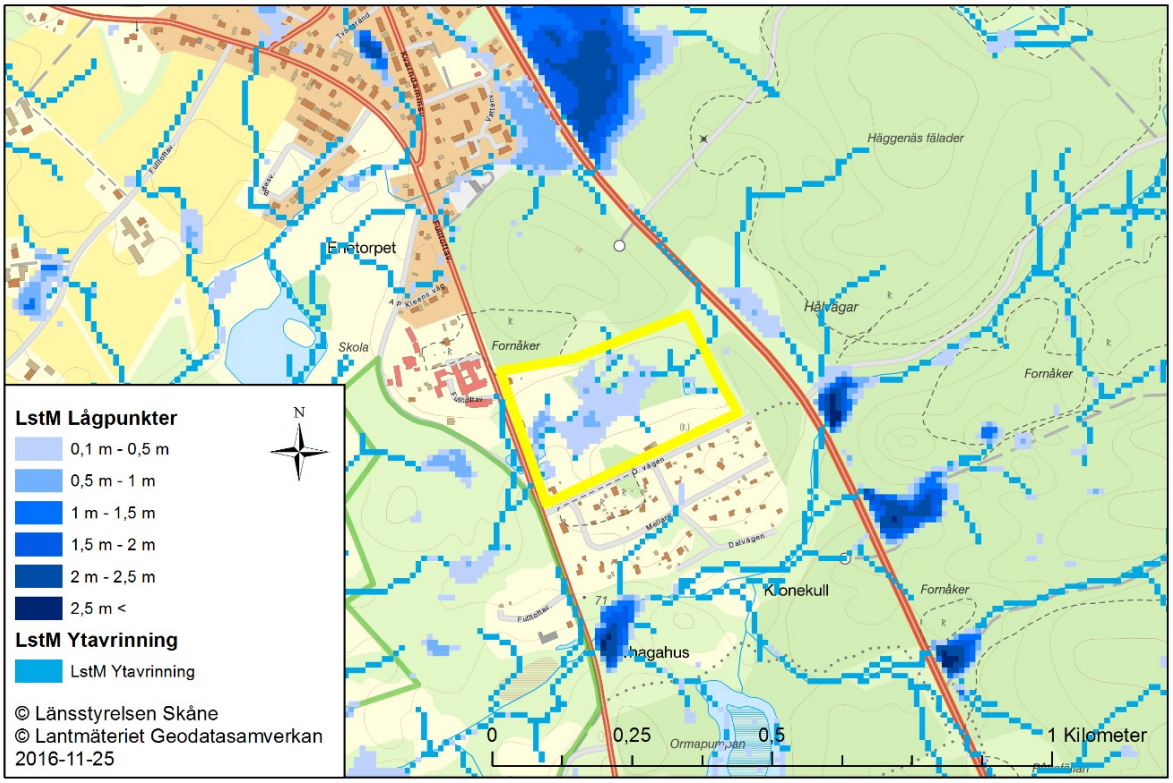



*Figure 2. The area in the comprehensive plan with an adopted zoning plan, when the flood map used.*

By using additional map layers describing the catchment area and hydrological flows in the same landscape enables the users of the map service tool to make better desicions about land use is suitable for specific areas.

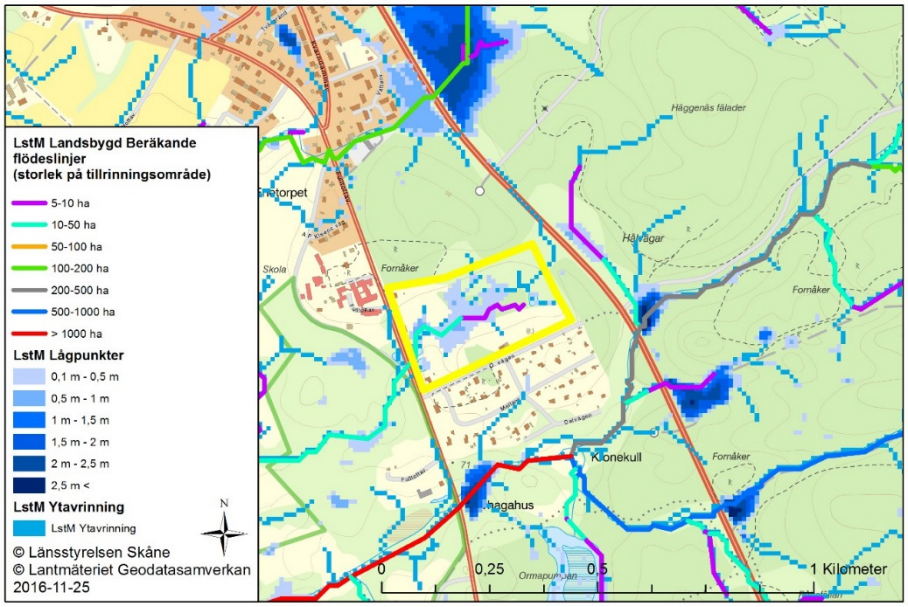



*Figure 3. The same area but with two layers from the map service which make it easier to choose an appropriate land use. The different line-colors indicates the size of the catchment. There are no "drainage enterprises" in this area to consider.*

The map service contains layers of the so called"drainage enterprises" (LstM Dikningsföretag Grupp). These are permits for drainage of the landscape. Although they are often old, they are still valid, and therefor important to consider in land use planning.

## Measures to prevent flooding in urban areas

By creating more room for water in the catchment area, it is possible to decrease flow peaks downstream. By increasing the storage capacity of water in the landscape, the larger the possibility is to reduce flooding extremes in urban areas downstream. By using the map tool service, it is a possible to identify suitable locations where wetlands can be created. In figure 4, two possible locations are presented. The identified locations are characterized as having a large hollow and a large affluent in the landscape.

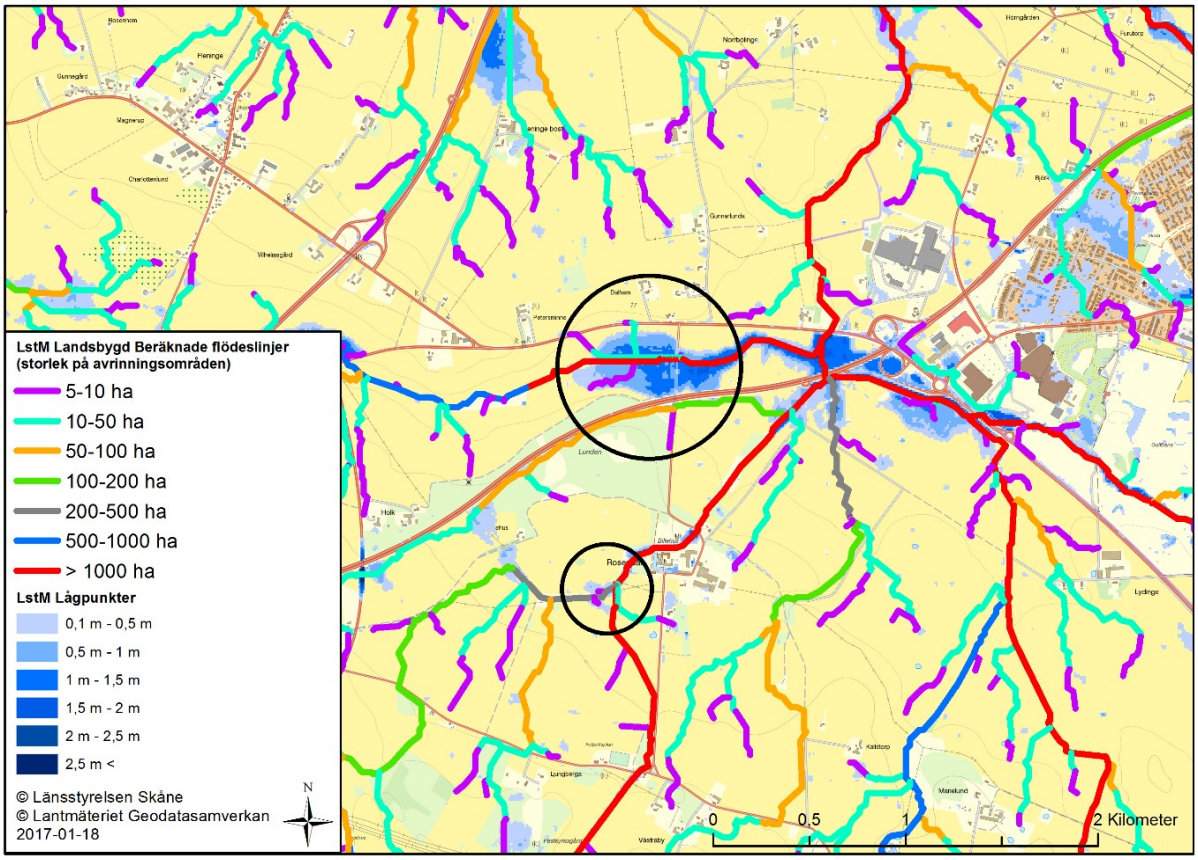



*Figure 4. By using two map layers (flood map and size of drainage basin) in the map service two possible locations for creating wetlands have identified (black circles).*

## Restore aquatic ecosystems

In addition to reduced discharge and flooding, this type of measures (creating wetlands for reducing discharge peaks) can also add other values to a landscape than to store water, such as improving the purification of the water, increasing biodiversity and recreational values.

Wetlands have been a natural element in the Scanian landscape for many thousands of years, but during 19th century and 20th century, many wetlands were drained, streams were straightening and piped. But this changed in the 1990´s and more wetlands where restored. Today wetlands are once again more common in the Scanian landscape. Many of the original wetlands are today agricultural land, urban areas or include infrastructure, which means that there can be a lot of conflicts of interest working with restoration of aquatic ecosystem. These aspects are discussed further down in this section.

## Identifying potential areas suitable for restauration

The county administrative board´s flood map is useful for identifying natural hollows, i.e. areas suitable for wetland constructions in the landscape. In addition, there are other interesting areas for restauration which the flood map doesn't identify, for example long valleys. To find such areas, additional map layers should be added into the map service tool so that the potential riparian zones will be illustrated, with a +1,5 m and +2,5 m buffer zone from the stream section.

Figure 5 and 6 shows an example from the outlet of Klingavälsån Stream. In Figure 5, the flood map is used, and it doesn't look like a wet area according to the map layer. However, when the additional map layer have been added (potential riparian zones) a contrasting and much wetter area will be revealed, and hence a potential area for restoring wetlands

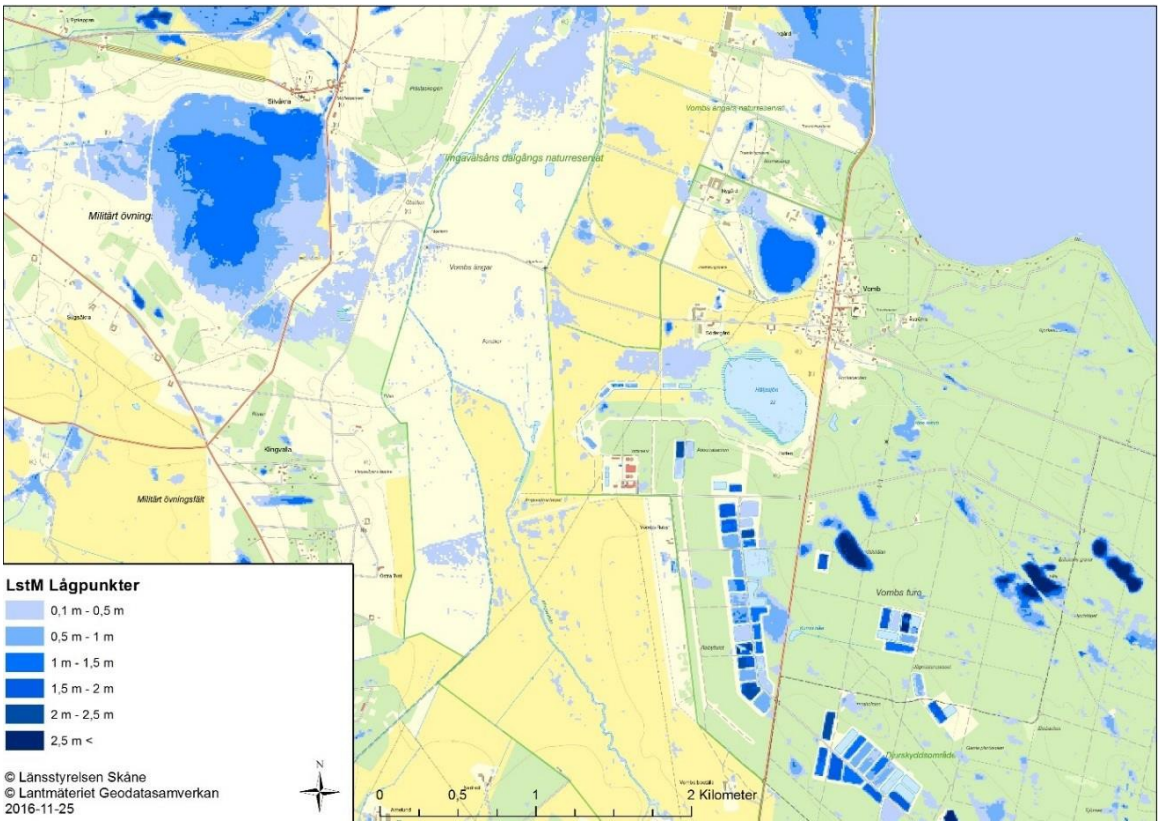



*Figure 5. Hallows in the landscape, near the outlet of Klingavälsån Stream.*

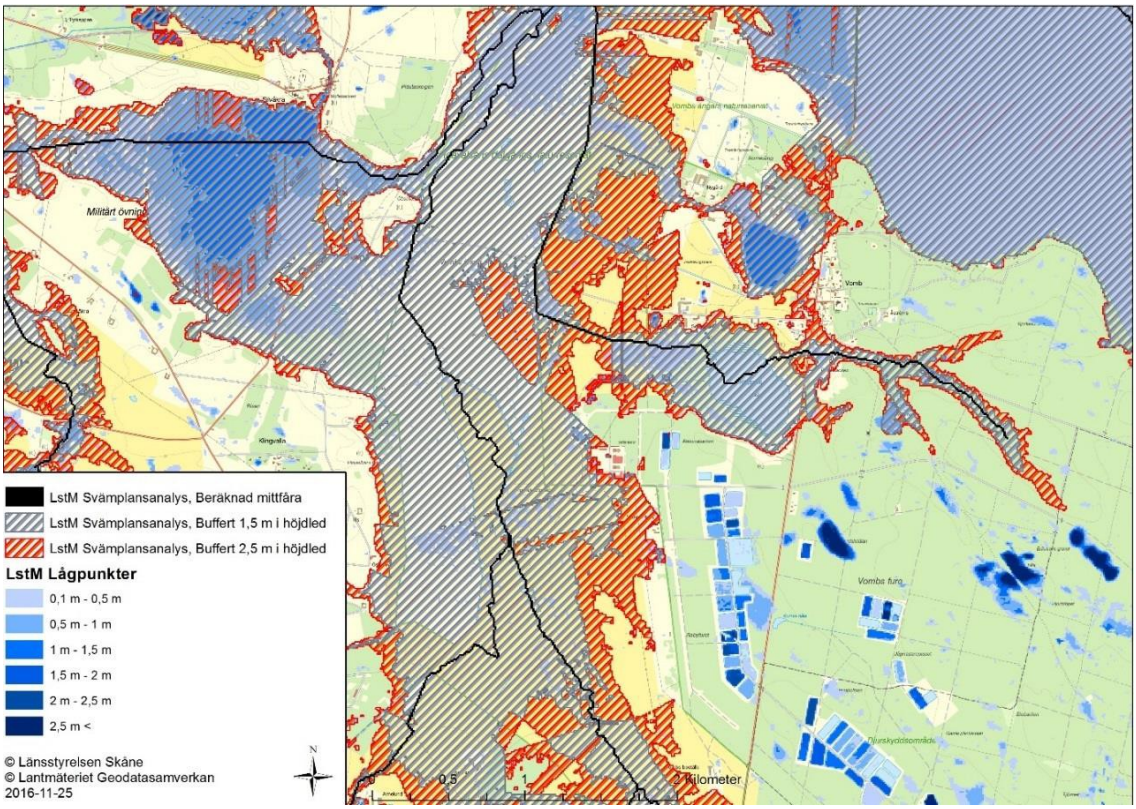



*Figure 6. Hallows and riparian zone near outflow of Klingsälvsån Stream.*

## Identifying aquatic ecosystems suitable for restoration

Restoring and rehabilitating aquatic ecosystems is a complex task as there are normally a lot of different interests at play which can affect the outcome of a specific measure, a wetland for example (location, size etc).

For instance, a lot of potential areas for restoring a stream, intersect with infrastructure such as roads and buildings. This means that it is important to investigate how a measure can affect the long-term development in the area. Interestingly, the map service tool can be useful to find areas that need protective measure to secure infrastructure for possible flooding. Figure 7 is an example illustrating the stream´s potential riparian zone is between two roads.

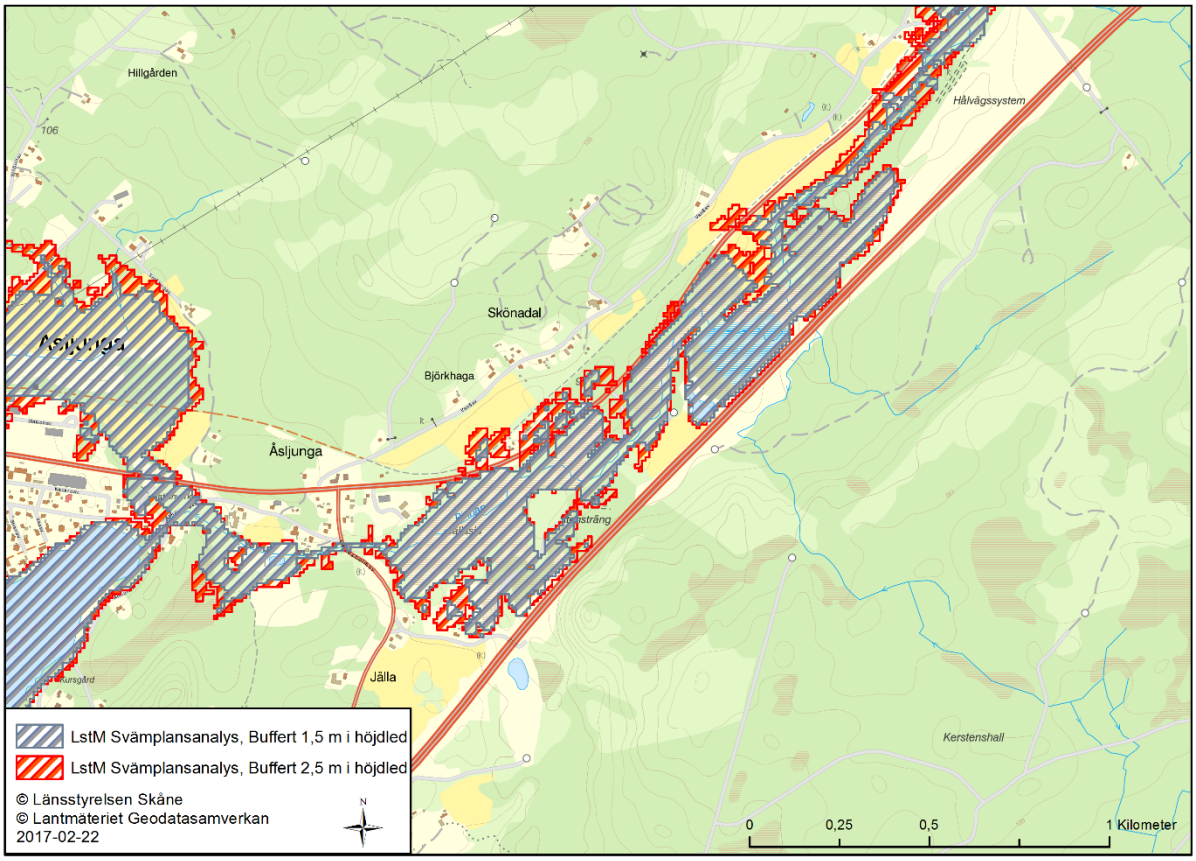



*Figure 7. A riparian zone at +1,5 m and +2,5 m, between two roads, which higher flooding may damage the road.*

When to restore a water way it is crucial to first consider the already existing nature values in the area. Even though an area has been effected of human activities, it can still contain a large biodiversity which should be taken into consideration. An area of interest may also contain Natura 2000-areas, or nature reserve where special permits and licenses needs to be administrated before any measures can be taken. Likewise, measures in any aquatic environments are regulated by the environmental code.