

## Flood protection combined with stream restoration in a complex context on the river Etsch (Italy)

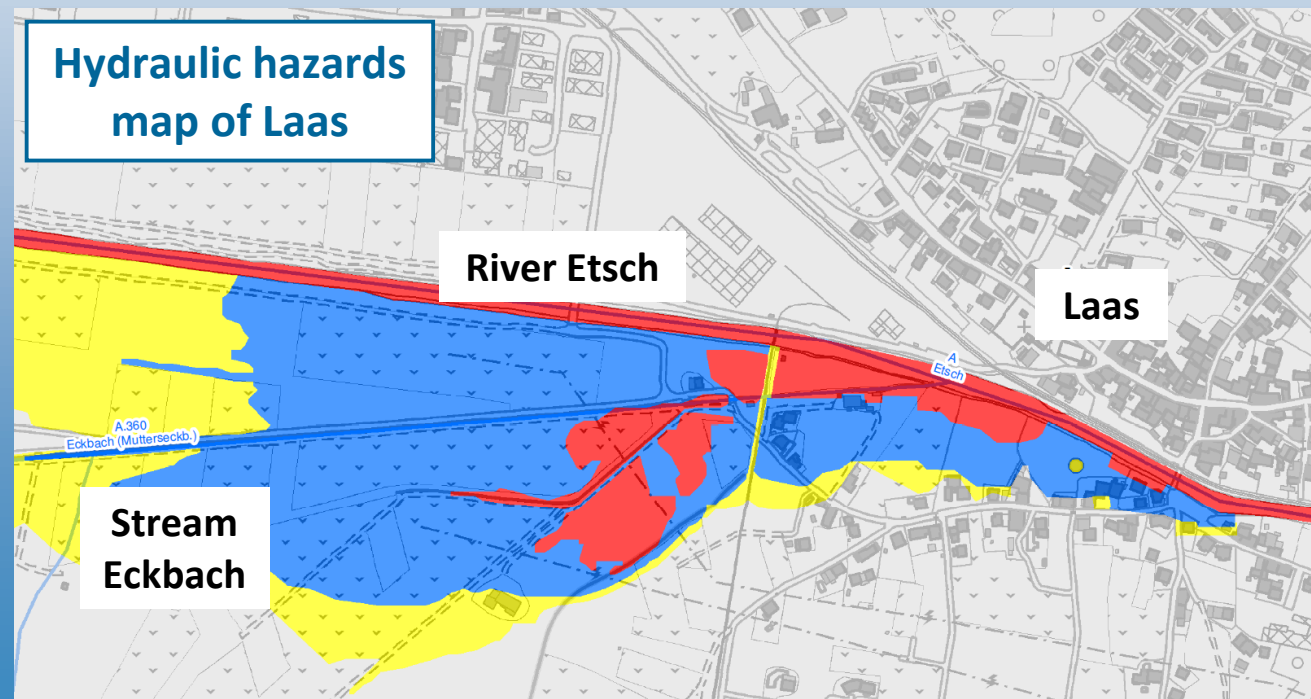


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# Introduction

- EU Water Framework Directive (2000)
- EU Floods Directive (2007)
- Project “Etschdialog” (2008-2010)
- Flood protection of Laas (2011-2013)





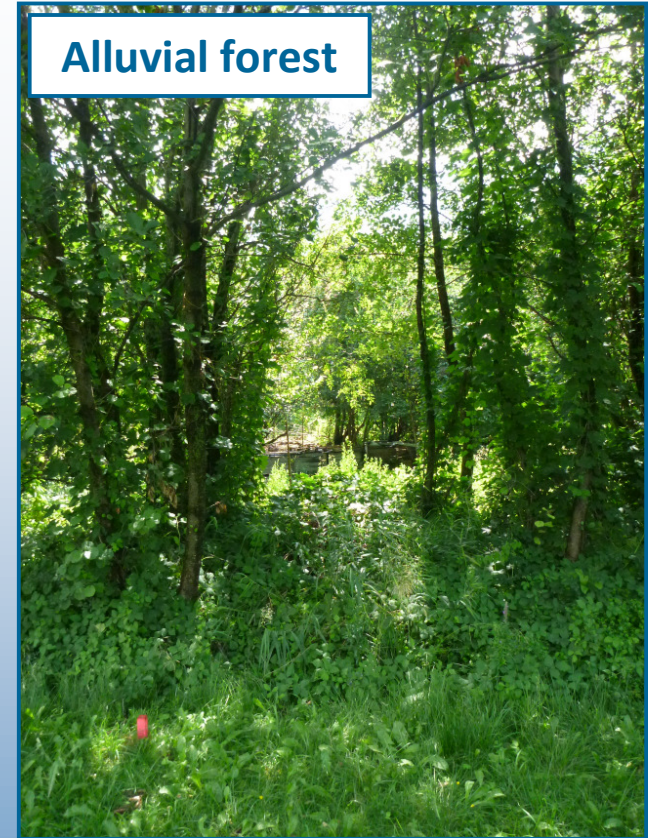
## River Etsch – Reference condition

- Meandering course
- Presence of many alluvial forests
- Large and active floodplain

## Historical map, 1820



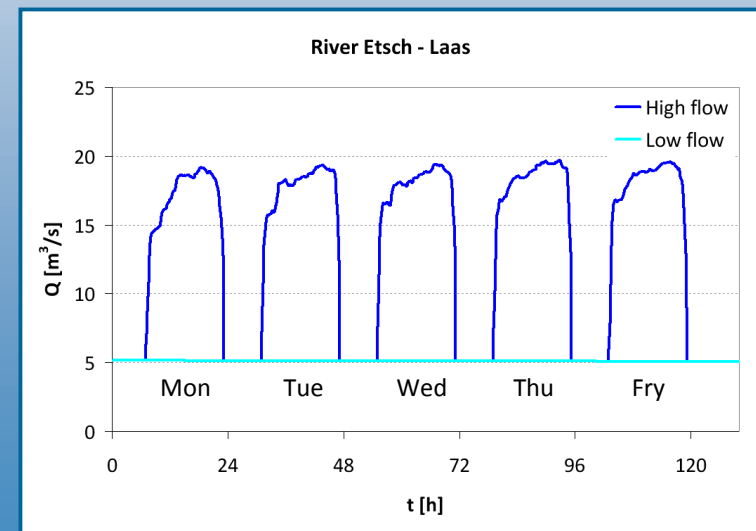
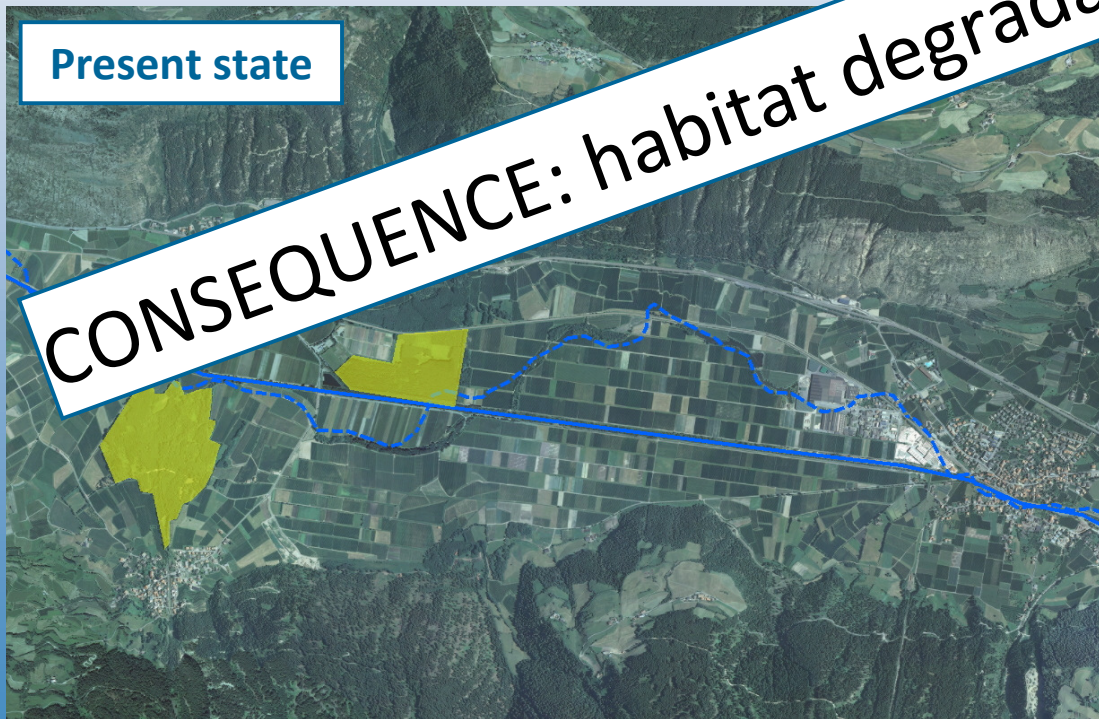
## Alluvial forest





## River Etsch – Present state

- Single-thread, trapezoidal channel (after 1825)
- Alluvial forests disconnected from the river
- Hydroelectric exploitation



## Objectives of the project

- Flood protection of Laas (HQ100)
- Ecological improvement
- Enhancement of social usability

1983



Alluvial forest



1987

## States of the river system

**Present condition**

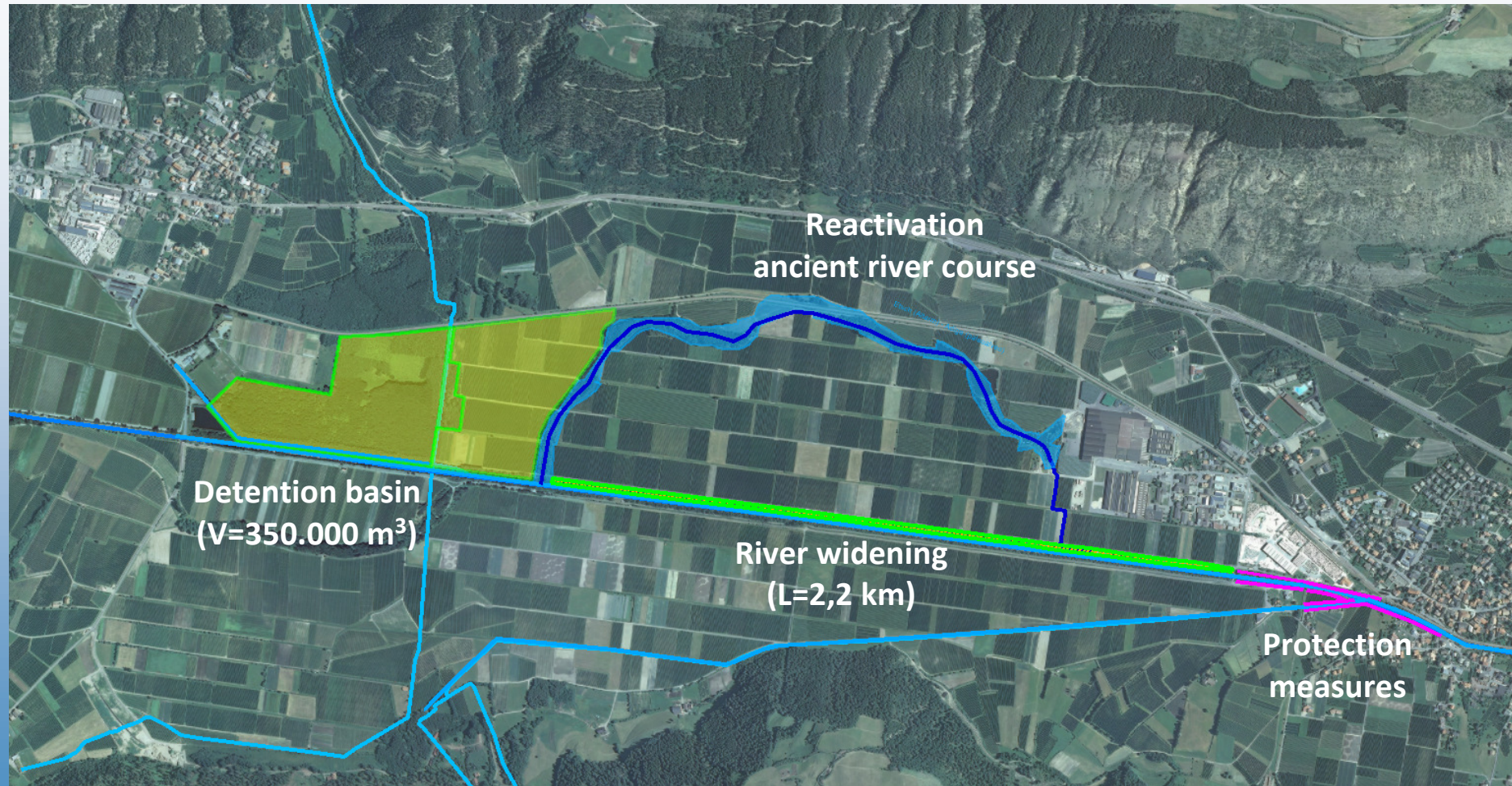


**Optimal condition**  
**(technically feasible)**

**Reference condition**



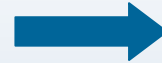
## Optimal condition – Measures planned



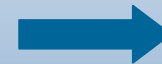


## Main issues: limitations

- High groundwater level in the alluvial forest
- Site Natura 2000
- Economical use of the forest
- Fishing lakes with private rights
- Discontinuity of the ancient river course



Limited available volume  
for the detention basin



Unfeasible the reactivation  
of the ancient river course

Ancient river course



Discontinuity in the  
ancient river course



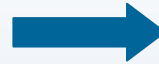
Fishing lake





## Main issues: limitations

- Intensive land use
- Presence of water intakes



Limited extension  
of possible river widening

- Urbanisation in Laas
- Industrial activity



Reduced space for  
river banks adjustment

Cycling path



Water intake



Urban area



## States of the river system

**Present condition**



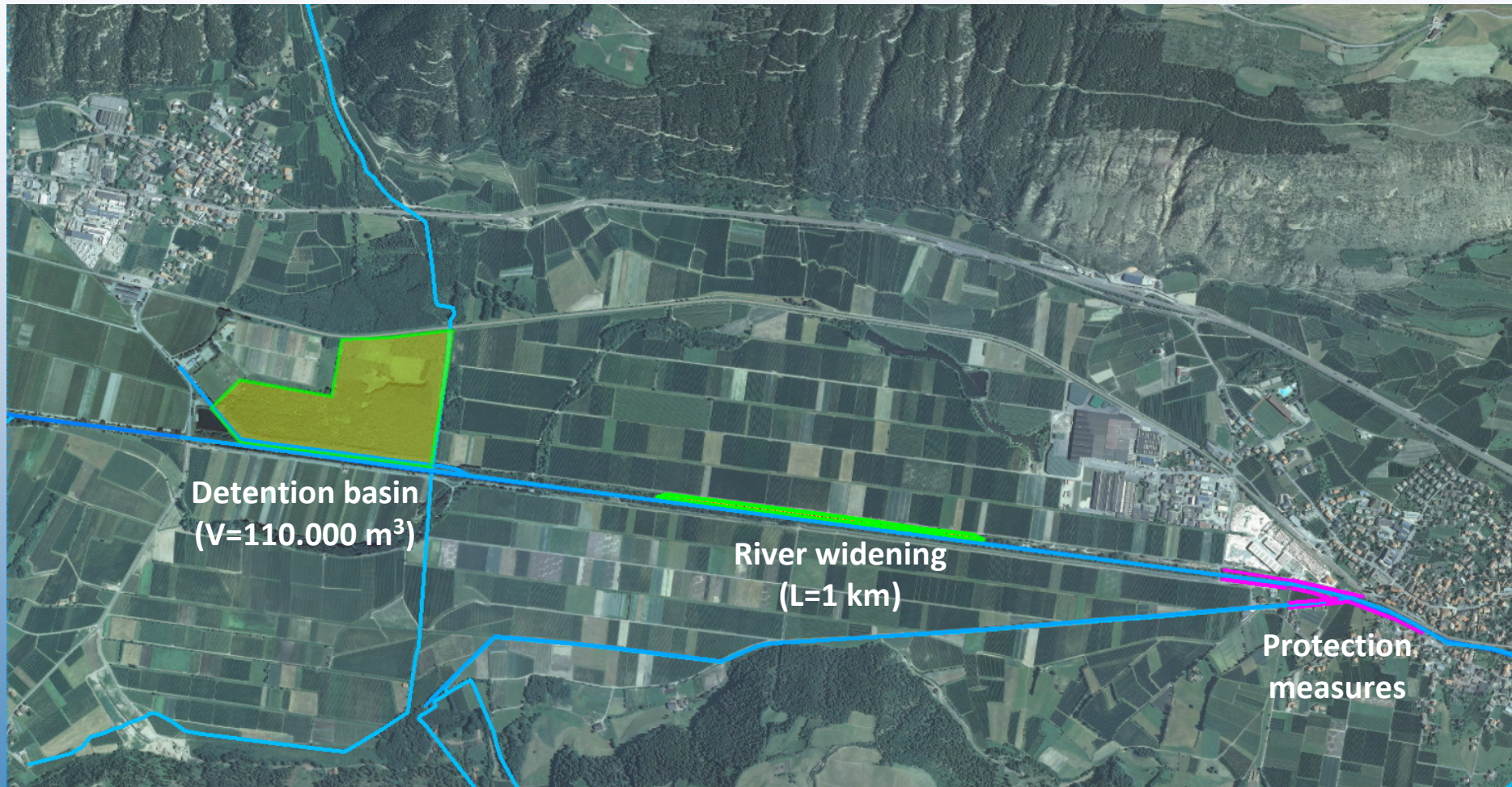
**Best achievable  
condition**

**Optimal condition  
(technically feasible)**

**Reference condition**

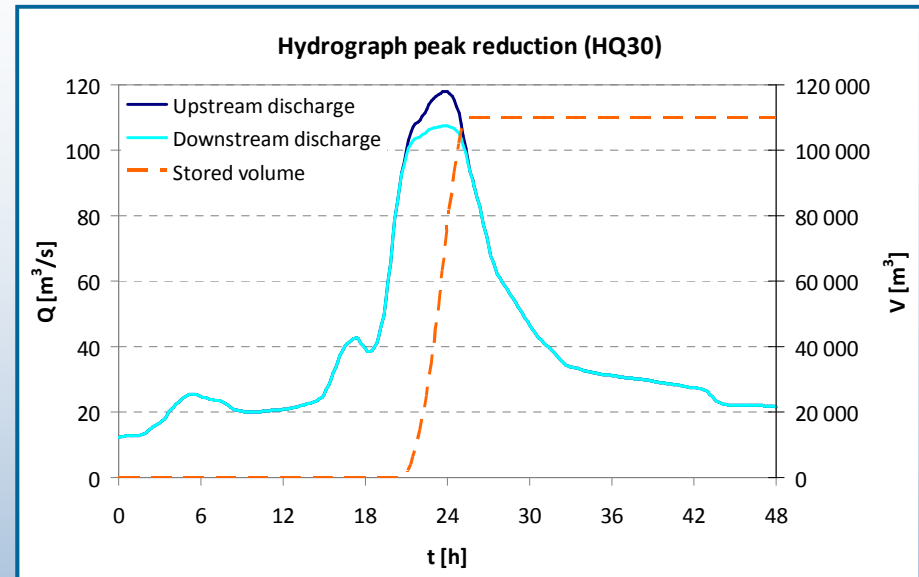


## Best achievable condition – Measures planned



## Compromises and technical solutions

- Detention basin ( $V = 110.000\text{m}^3$ )
  - adjustable weir to optimize the stored volume
  - pumps for periodical inundation



- Distributed widening of the river Etsch
  - 15m widening,  $L = 1\text{km}$
  - placement of groynes and boulder clusters
  - restoration of hydromorphological units
  - reduction of hydropeaking consequences (stranding)



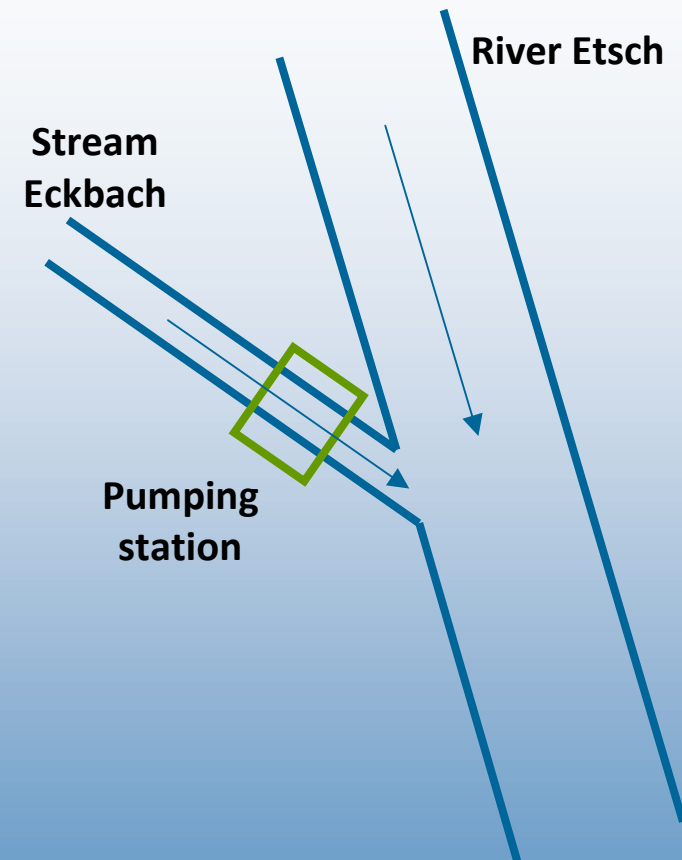


## Compromises and technical solutions

- Protection measures in Laas
  - new walls and banks adjustment
  - water pumping installation on Eckbach
  - conservation of ecological hotspot



- Local measures
  - enlargement of existing pond



## Conclusions

- Restoration projects conditioned by the complexity of the context
- Compromises necessary to reach concrete results
- Continuous cooperation of professionals – interdisciplinary team
- Fundamental communication to stakeholders (forums)





## Prader Sand, 2012

Thanks for your attention!

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26/01/2012