



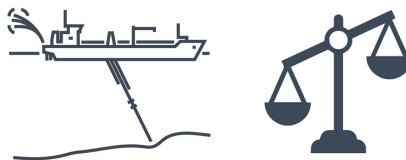
**Interreg**  
North Sea Region  
**IMMERSE**  
European Regional Development Fund



EUROPEAN UNION

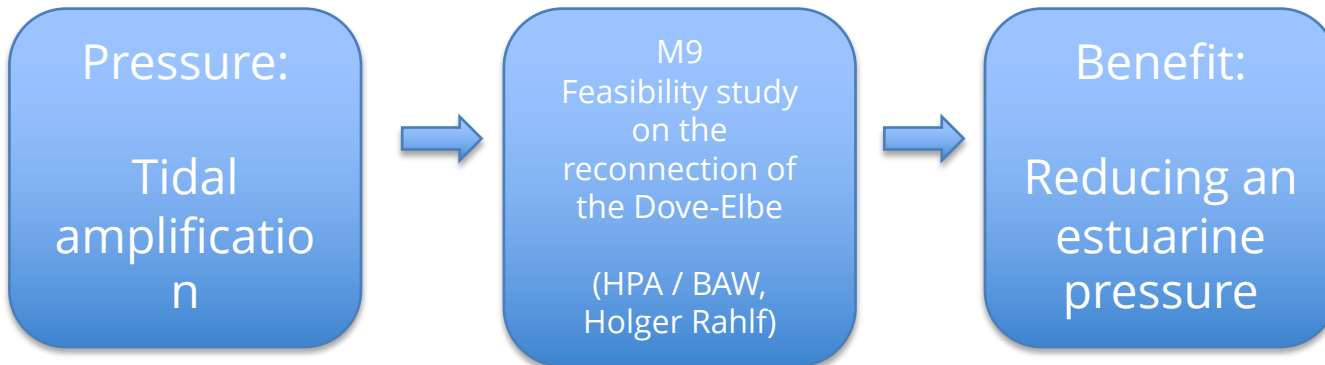
## Round 1: Session 2 - Sediments & Tides

- Feasibility study on the reconnection of the Dove-Elbe (Holger Rahlfs, BAW)



Estuary: Elbe

Topic: Sediments & Tides Partner: BAW / HPA



Assessment





# Feasibility Study

## on the Reconnection of the Dove Elbe

### **Content**

- Overview of the Elbe Estuary
- Background and Motivation of the Feasibility Study
- Measure Layout
- Results
- Recommendations

# Overview of the Elbe Estuary



## The Elbe Estuary

- Large Estuary
- Valuable Natural Area
- Important Seaports
- Important Waterway
- Long History of
  - Deepening
  - Coastal Protection
  - Land Reclamation
- Pressures
  - Tidal Amplification
  - Salt Intrusion
  - Sedimentation (e.g. tidal pumping)

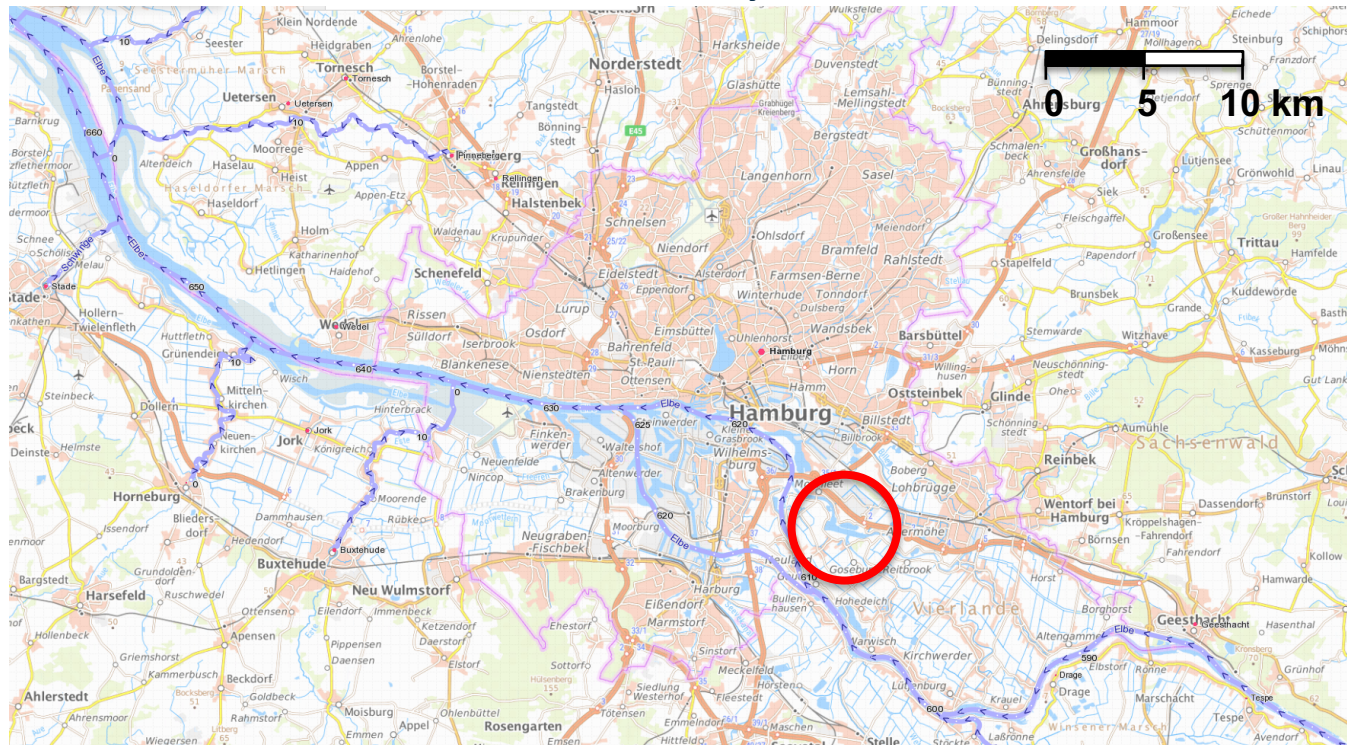


# Overview of the Elbe Estuary



## The Elbe Estuary

- Large Estuary
- Valuable Natural Area
- Important Seaports
- Important Waterway
- Long History of
  - Deepening
  - Coastal Protection
  - Land Reclamation
- Pressures
  - Tidal Amplification
  - Salt Intrusion
  - Sedimentation (e.g. tidal pumping)



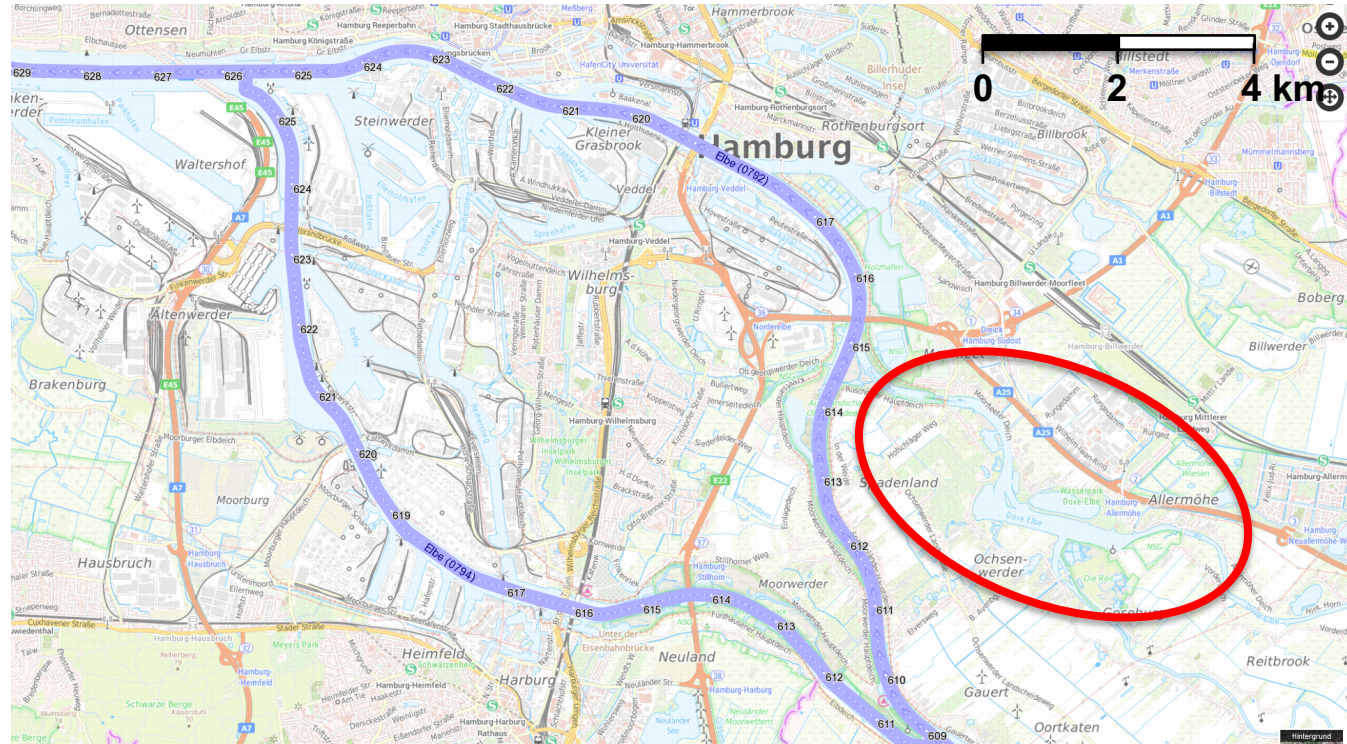


# Overview of the Elbe Estuary – Dove Elbe



## The Elbe Estuary

- Large Estuary
- Valuable Natural Area
- Important Seaports
- Important Waterway
- Long History of
  - Deepening
  - Coastal Protection
  - Land Reclamation
- Pressures
  - Tidal Amplification
  - Salt Intrusion
  - Sedimentation (e.g. tidal pumping)



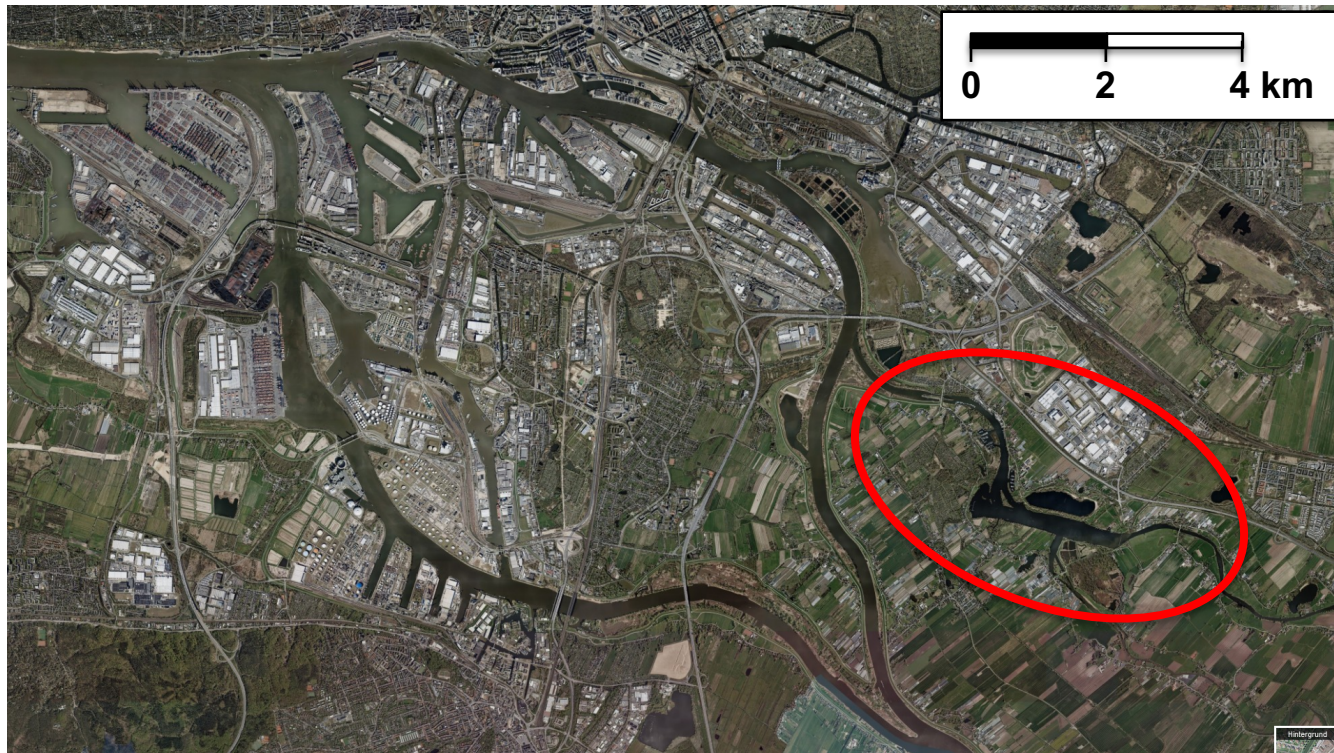




# Overview of the Elbe Estuary – Dove Elbe

## The Elbe Estuary

- Large Estuary
- Valuable Natural Area
- Important Seaports
- Important Waterway
- Long History of
  - Deepening
  - Coastal Protection
  - Land Reclamation
- Pressures
  - Tidal Amplification
  - Salt Intrusion
  - Sedimentation  
(e.g. tidal pumping)





# Overview of the Elbe Estuary

## The Elbe Estuary

- Large Estuary
- Valuable Natural Area
- Important Seaports
- Important Waterway
- Long History of
  - Deepening
  - Coastal Protection
  - Land Reclamation
- Pressures →
  - Tidal Amplification
  - Salt Intrusion
  - Sedimentation  
(e.g. tidal pumping)

### Negative Consequences for Economy

- Maintenance dredging of Fairway (> 150 Mio EUR/y)
- Maintenance of Structures

### Negative Consequences for Ecology

- Quality of waterbody, tidal flats and marshlands
  - Oxygene
  - Sediments
  - Turbidity
  - Pollution
  - Habitat and Biodiversity
  - ...

### Negative Consequences for the Administration

- Less Acceptance for the current Estuary Management

# Background and Motivation for the Feasibility Study



- + In 2013 a stakeholder dialog was started to find acceptable solutions for a better sediment management and river engineering concept.

After 3 years of discussion 23 suitable locations at the estuary were detected to achieve the common goals.



- + In 2016 the Forum Tideelbe started as a follow-up dialog process as an estuarine partnership to select the 5 most promising measures.

Main goals: Increase of tidal volume and estuarine habitat creation



↓  
Impact in general:

- Decrease of tidal amplitude
- Sediment transport (tidal pumping) is affected
- Increase of salt intrusion

Impact intensity depends on location and amount of additional tidal volume



# Background and Motivation for the Feasibility Study

- + Since 2018 the IMMERSE-project supported the estuary partnership at the feasibility phase for the reconnection of the Dove Elbe by
  - developing a measure layout with the participation of stakeholders
  - assessing the hydromorphological effects and measure effectiveness
  - tendering a feasibility study that should investigate the ecological effects





European Regional Development Fund EUROPEAN UNION

**Auswirkungen der Anbindung  
der Dove Elbe an die Tideelbe und  
Auswirkungen für die Stakeholder**

**Machbarkeitsstudie**





**BBS Büro  
Greuner-Pönicke**

Russeer Weg 54  
24111 Kiel  
Tel.: 0431/698845  
Fax: 0431/698533  
[www.bbs-umwelt.de](http://www.bbs-umwelt.de)



**Planung  
& Moderation**

Hohe Weide 7a  
20259 Hamburg  
Tel.: 040/41303866  
Fax: 040/41303867  
[www.planung-moderation.eu](http://www.planung-moderation.eu)



**Ingenieurbüro  
Dr. Lehnert + Wittorf**

An der Dänischburg 10  
23569 Lübeck  
Tel.: 0451/5929800  
Fax: 0451/5929829  
[www.geo-technik.com](http://www.geo-technik.com)



# Measure Layout after stakeholder involvement



## Technical aspects

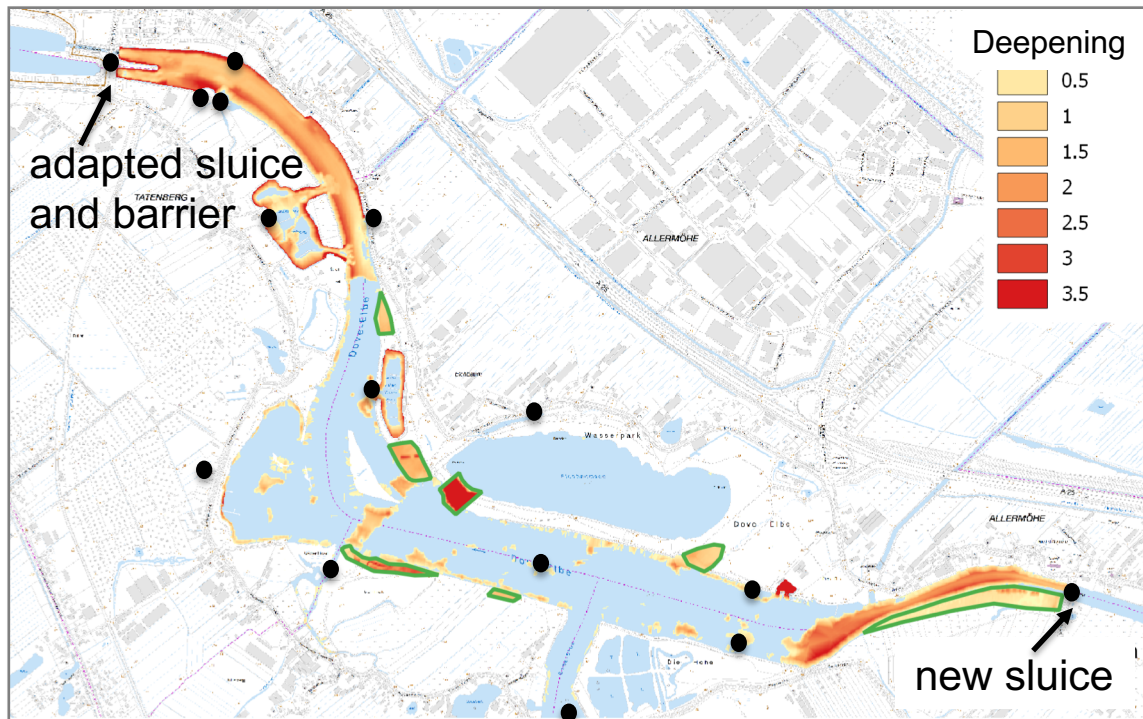
- + Tidal inlet through adapted sluice
- + Adaption of other structures (●)
- + New sluice
- + Dredging volume 650.000 m<sup>3</sup>
- + Tidal volume appr. + 2,5 Mio m<sup>3</sup>

## Ecological aspects

- + FFH habitat types + 134 ha
- + §30 habitat + 8 ha

## Economical aspects

- + Costs 500 Mio EUR

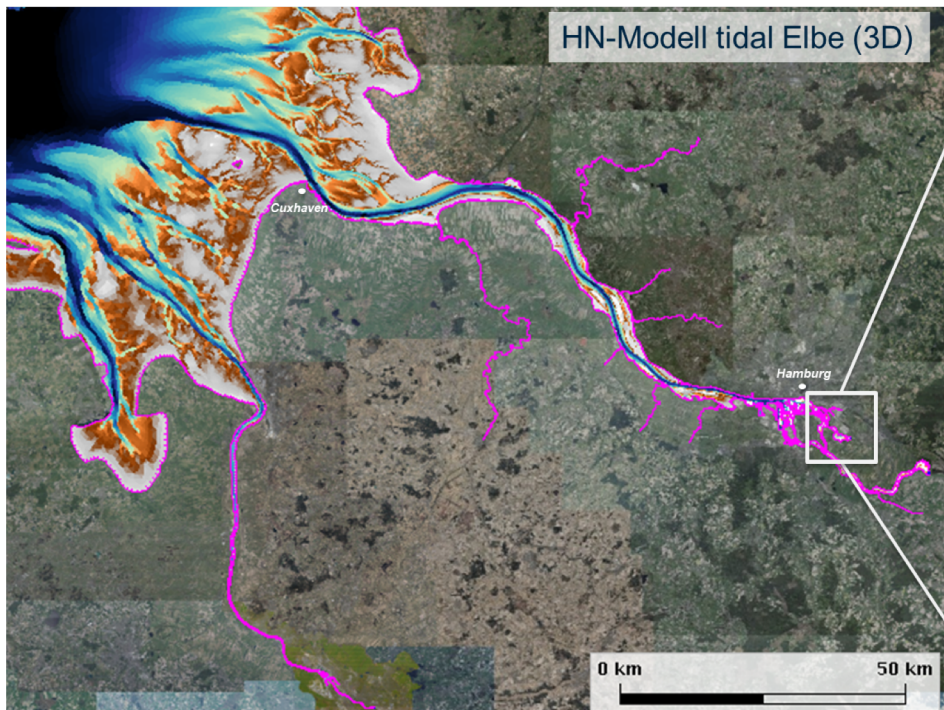




# Results of Feasibility Study

Use of numerical model to determine the hydromorphologic effects of the measure

(= measure induced impact to the abiotic parameters of the estuary)



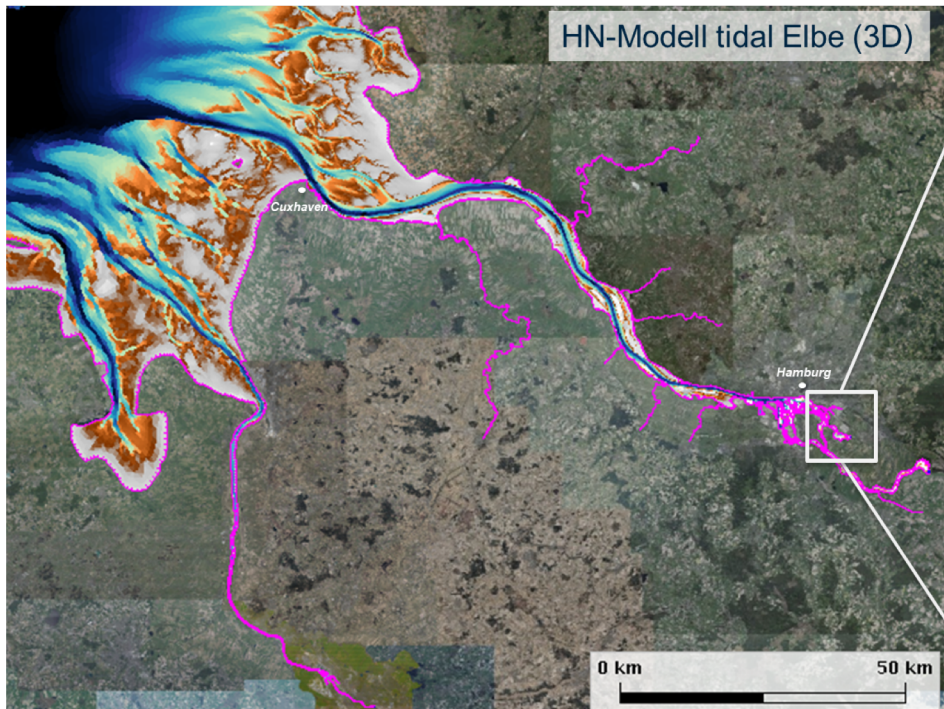




# Results of Feasibility Study

Use of numerical  
modell to  
determine the  
hydromorphologic  
effects of the  
measure

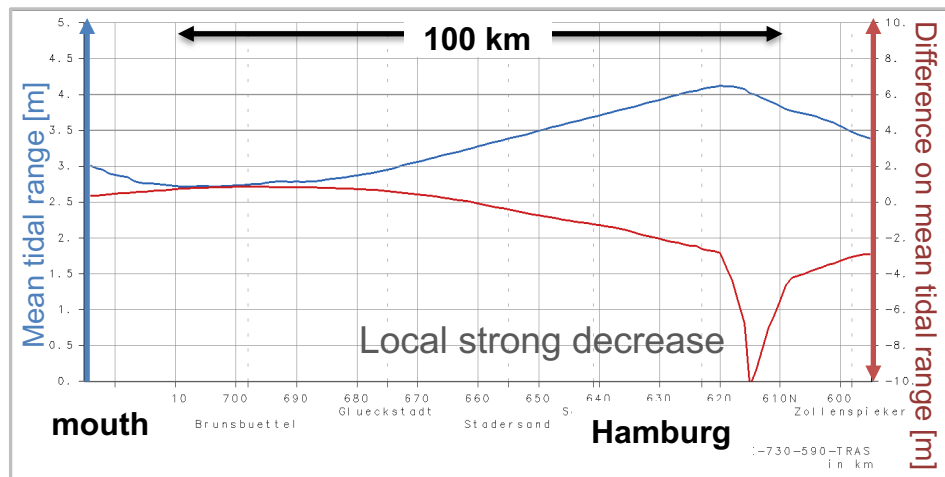
(= measure induced impact  
to the abiotic parameters of  
the estuary)



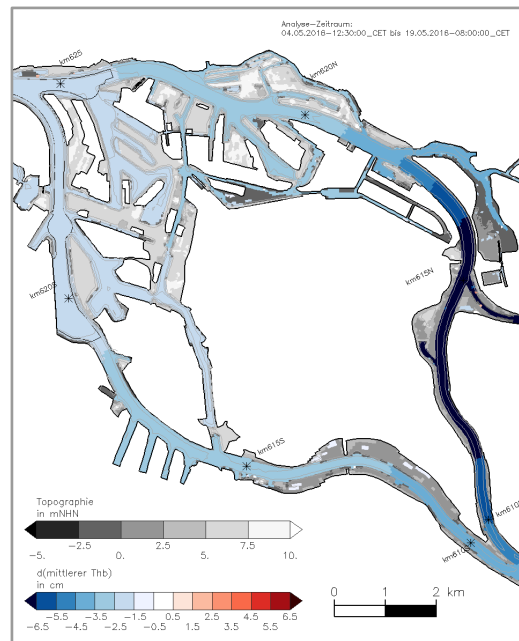
# Results of Feasibility Study



+ Tidal range lowers 2 to 3 cm in Hamburg port area



Results of the tidal range along the tidal Elbe

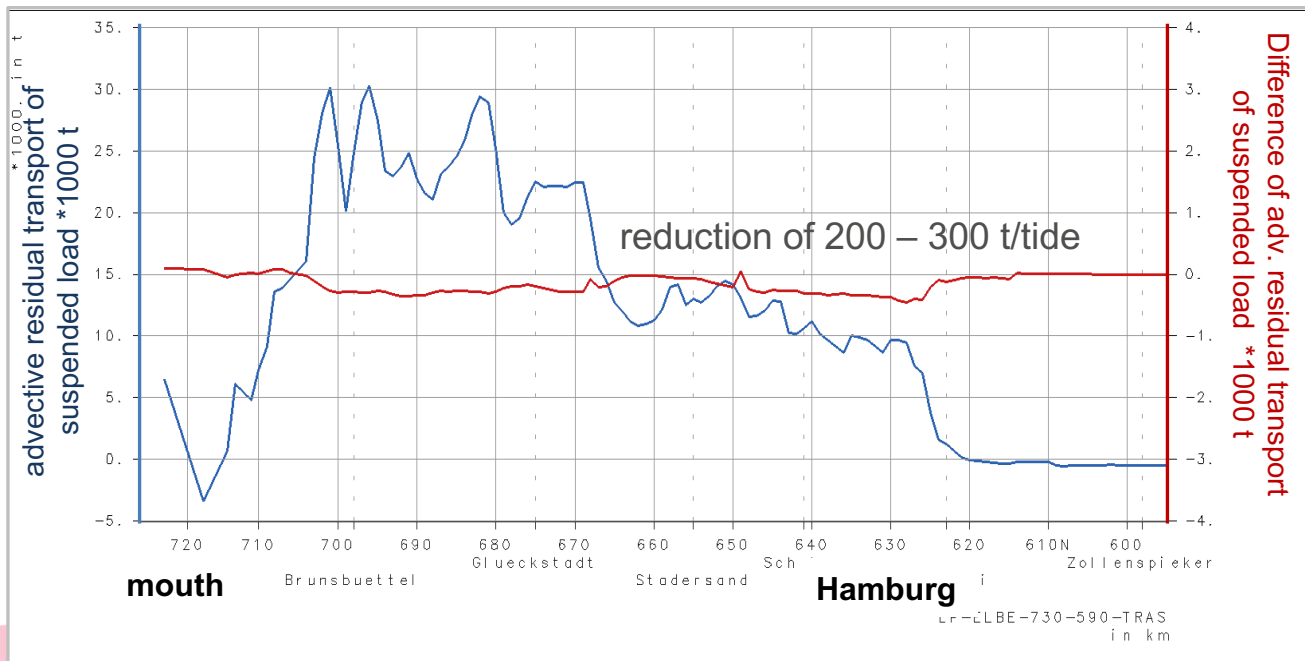


Difference on tidal range in Hamburg



# Results of Feasibility Study

- + 1-2% less advective residual upstream transport of suspended load (towards Hamburg)

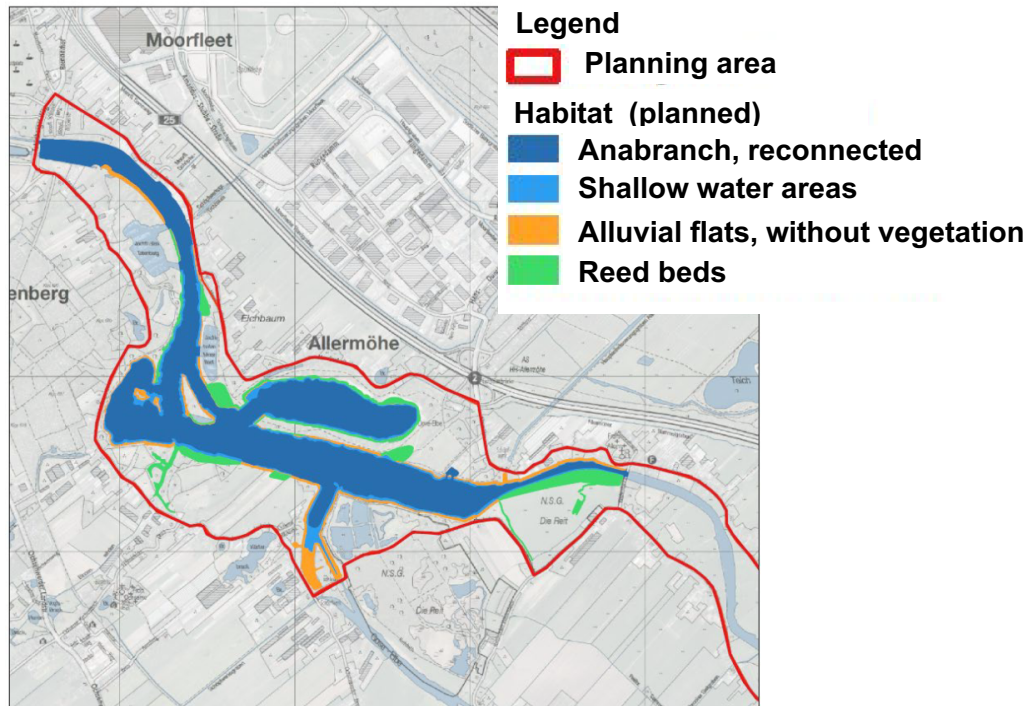


Advective residual transport of suspended load along the tidal Elbe



# Results of Feasibility Study

- + Creation of additional estuarine habitat for the Elbe estuary
- but
- + Not all stakeholders agree with the improvement of the existing habitat, they want no change in a today high quality recreational area which has developed nicely over the last 70 years.
- + ...it is good as it is today!







# Results of Feasibility Study - Summary

## Present Situation

- + Planning area is affected by anthropogenic activities over hundred of years
- + Still water body of former anabranch and the landscape is accepted as water affin recreational area with high quality for residents and tourism

## The Plan

- + Additional 134 ha of tidal habitat and 2,5 Mio m<sup>3</sup> additional tidal volume is planned
- + The measure effectiveness on tidal conditions and sediment transport at large-scale is constrained (due to adaptations according to stakeholder acceptance)

## The People

- + 90% of the local residents do not like the proposed changes in habitat





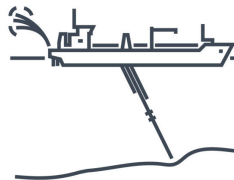
# Recommendations

Study can be of interest for other estuaries.

1. Process should start by early communicating estuarine pressures & functions and raising awareness.
2. Engage local residents, general public, stakeholder organizations and estuary managers in developing alternatives, identify solutions and take responsibilities.
3. Emotions and mentalities have to be considered.
4. External factors beyond the scope of action of estuary managers can affect measure acceptance.
5. Consider specific characteristics of every estuary:
  - measure being successful at one estuary cannot directly be transferred to other estuaries.
  - less effective/ not feasible measure at one estuary might have high potential at another place.
6. Long-lasting process, that at the Elbe estuary just started and must be further developed.
7. One single measure cannot reverse the impacts of longtime anthropogenic changes -> Combination of measures and a flexible sediment management is recommended







Does your estuary face similar pressures?

Could the presented solution(s) be applied in  
other estuaries?