

CREATING THE NEW TIDAL AREA, KREETSAND

WORKING WITH NATURE IN HAMBURG

IAPH Sustainability Awards 2023

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26 May 2023

Agenda

01

Background: The Tidal Elbe Concept

02

Implementation: Creating tidal volume

03

Literally: Working with nature

04

Take a tour!

The Tidal Elbe Concept

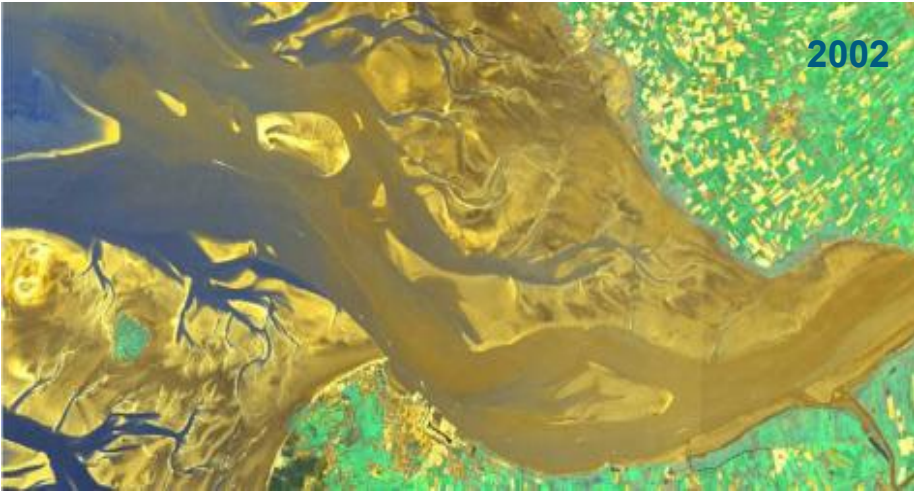
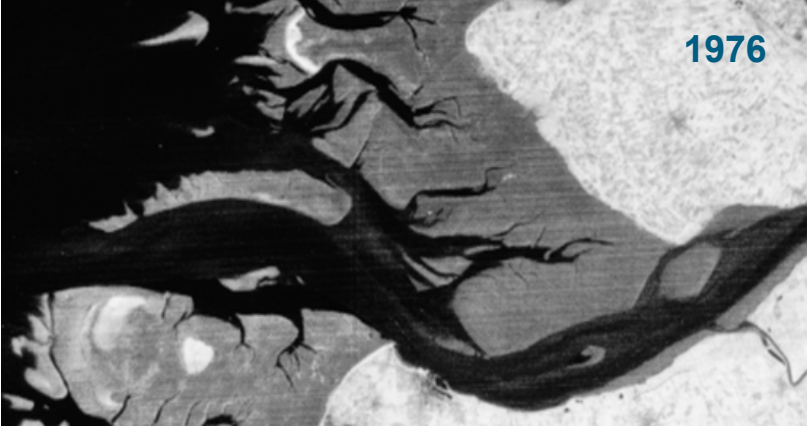
01

New tidal area Spadenlander Busch / Kreetzand



Estuaries

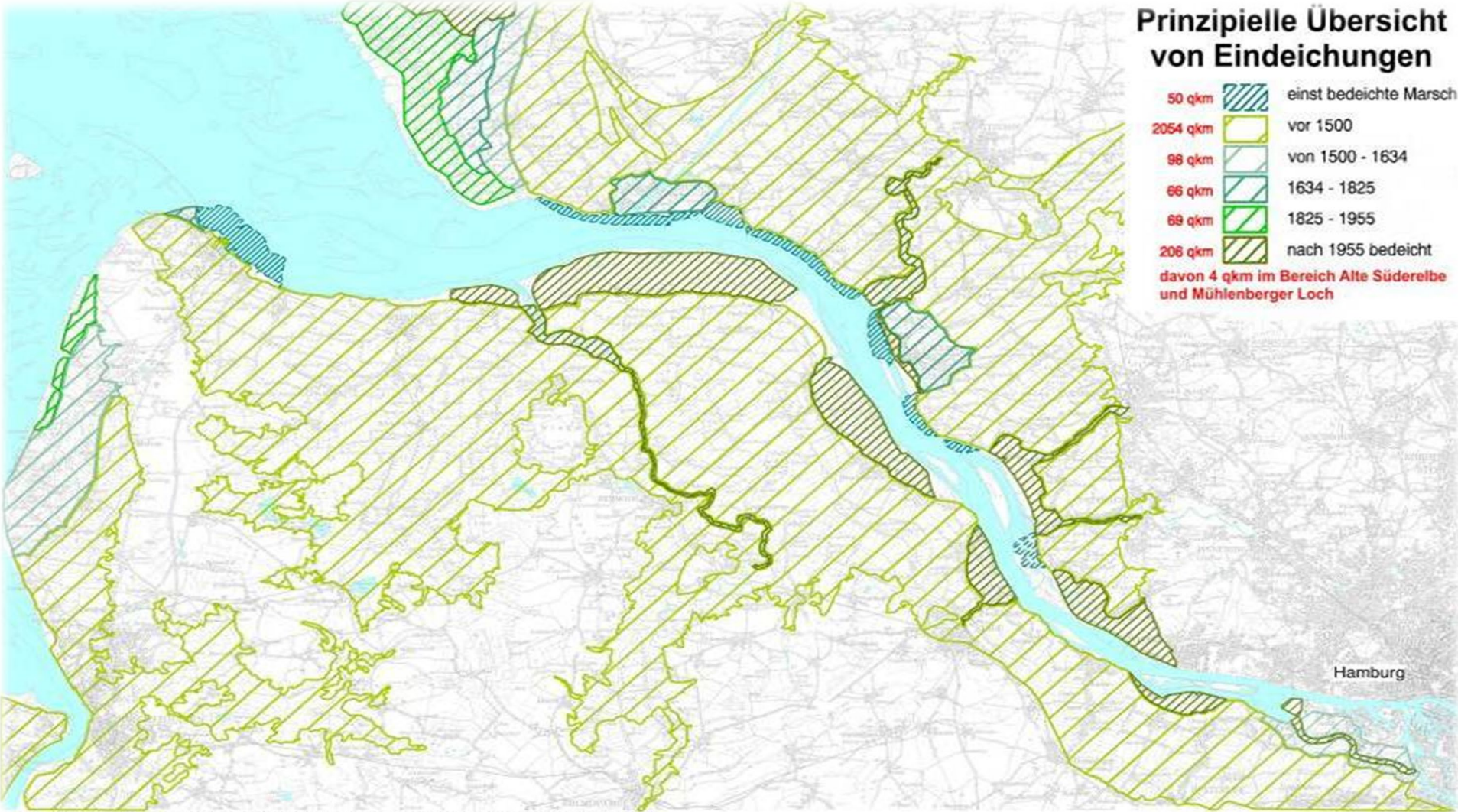
are changing...



...and are changed

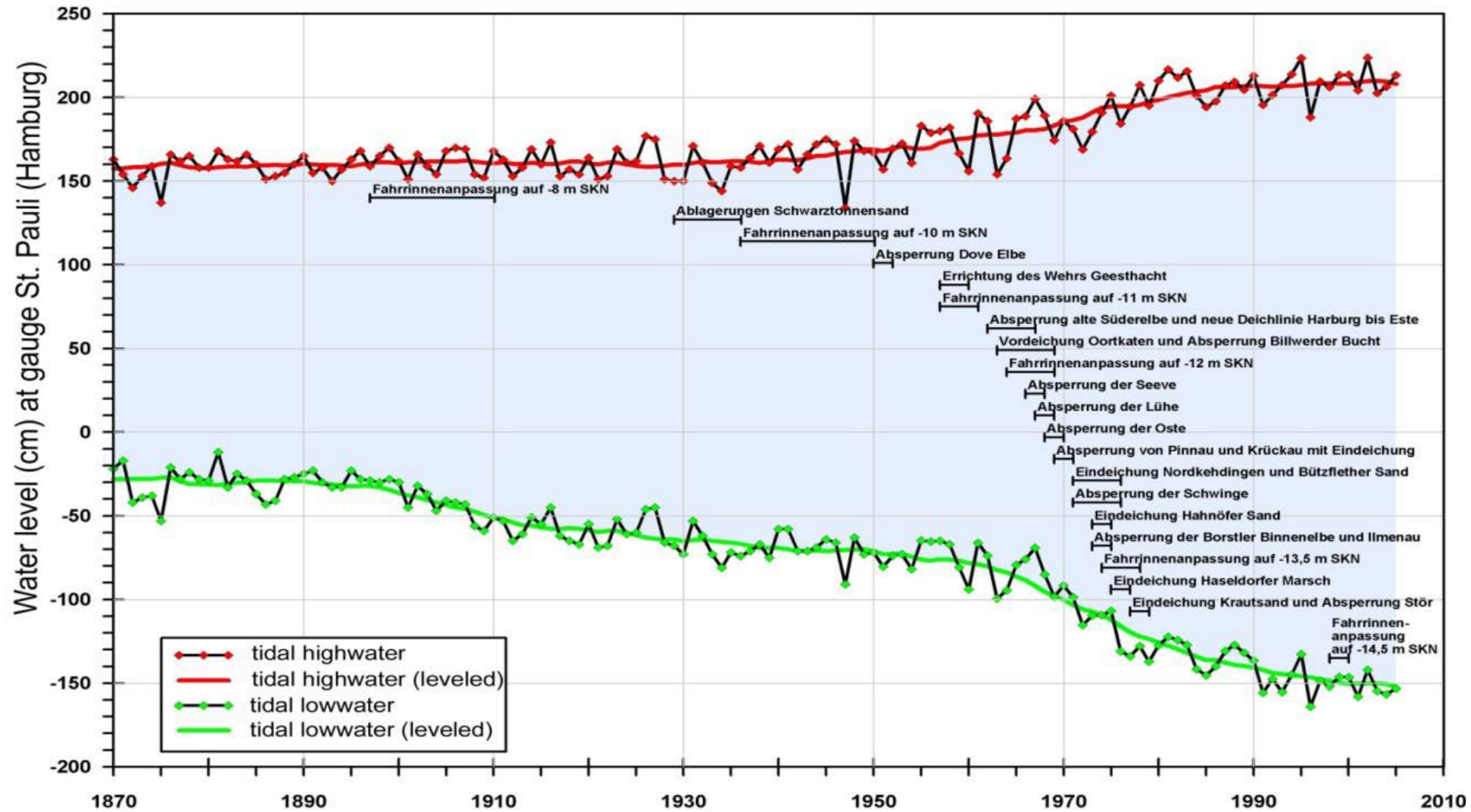


Land reclamation and dykes

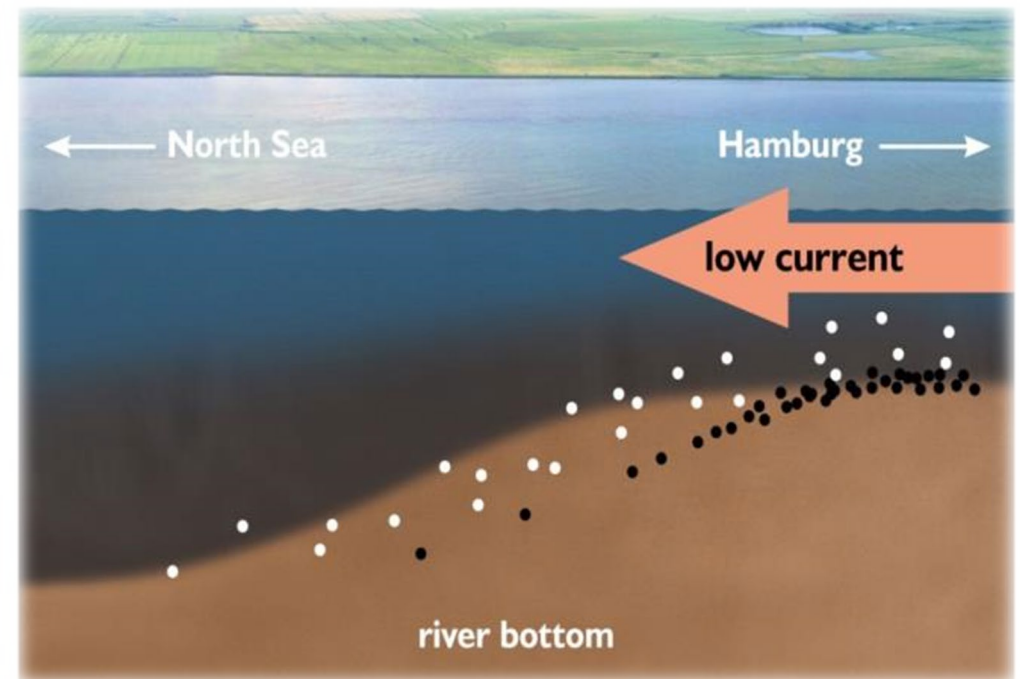
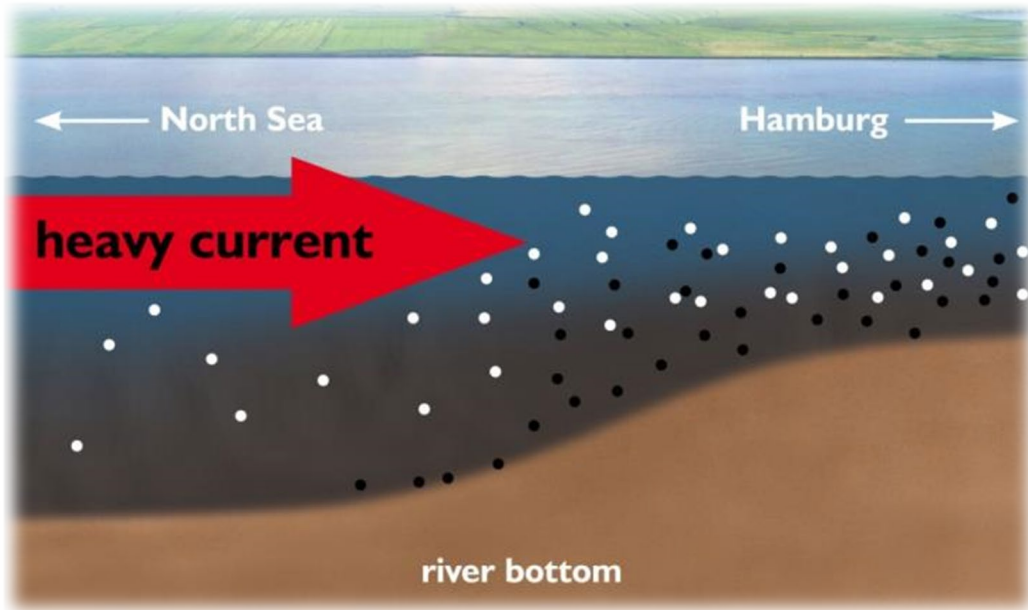


Herausgeber: Vermessungs- und Kartenstelle bei der Wasser- und Schifffahrtsdirektion Nord; Stand: 6/2006

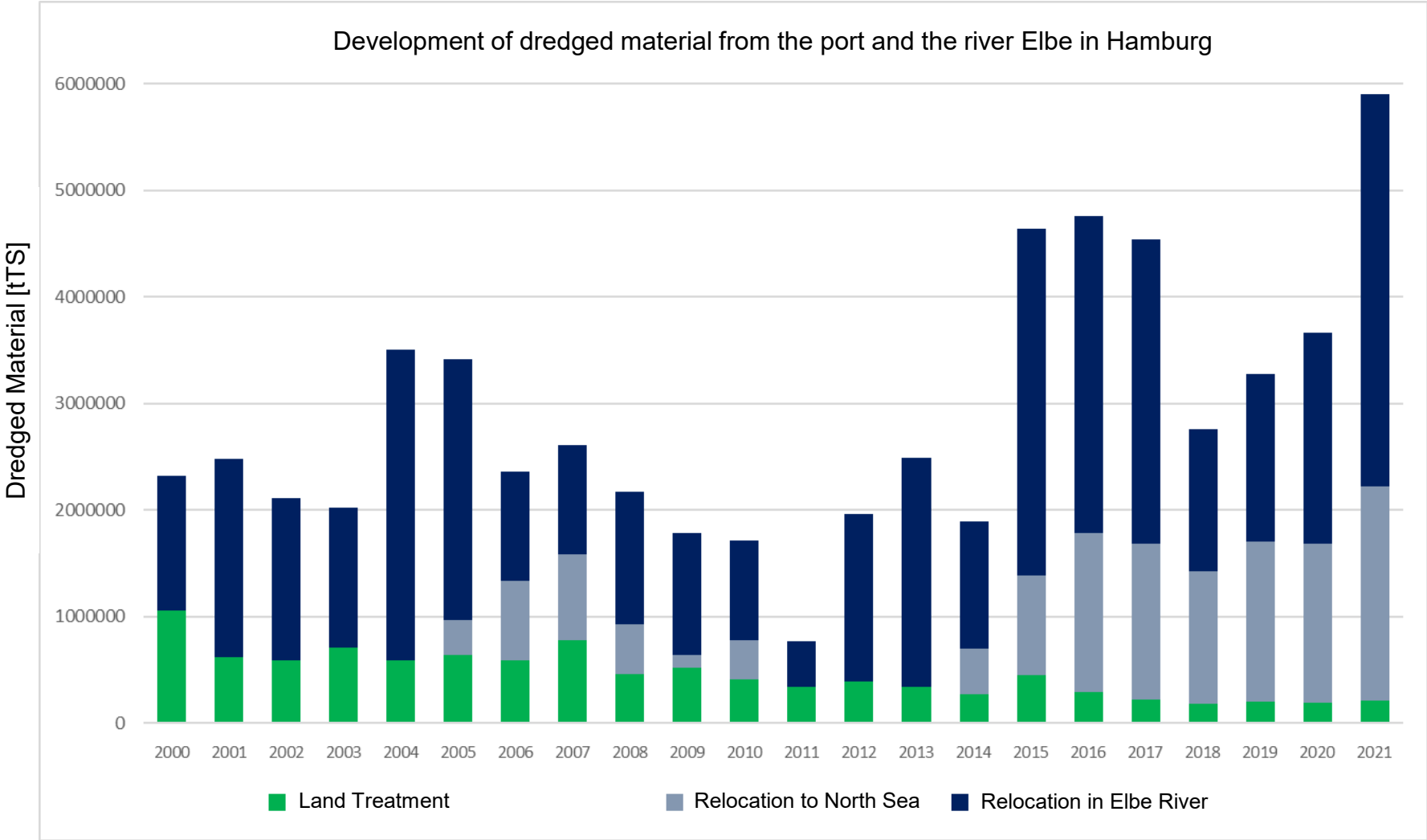
Tidal range and measures



Tidal pumping




Motivation: Increased need for dredging




Fixing the estuary: The Tidal Elbe Concept


Concept for a sustainable development
of the Tidal Elbe River as an artery
of the metropolitan region Hamburg and beyond

A contribution for discussion by Hamburg Port Authority and
the Federal Administration for Waterways and Navigation



HPA
Hamburg Port Authority

 Wasser- und
Schiffahrtsverwaltung
des Bundes

 Wasser- und Schiffahrtsdirektion Nord

Dr.-Ing. Hans Peter Dücker
Dipl.-Ing. Heinz Glindemann

Dr.-Ing. Hans-Heinrich Witte
Dipl.-Ing. Karsten Thode

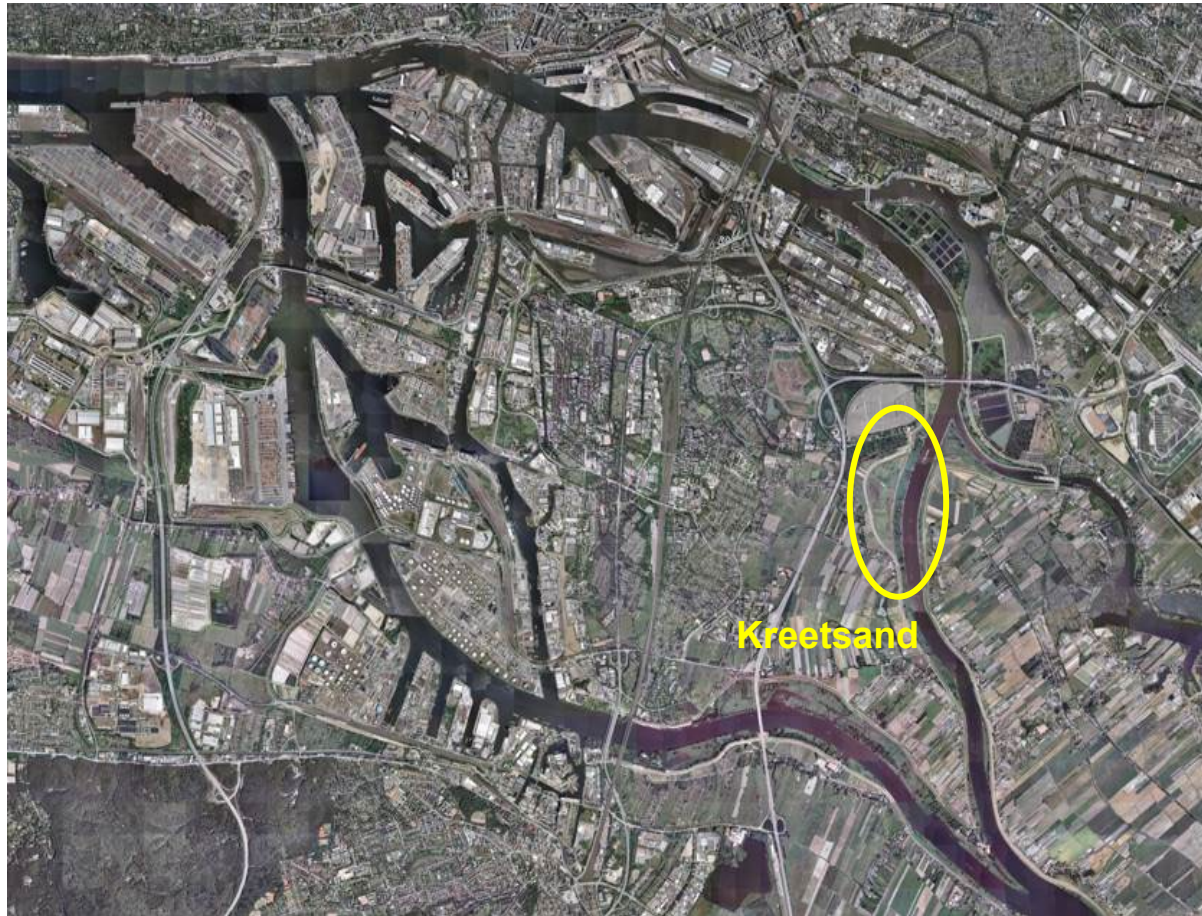
2006

Creating tidal volume

02

New tidal area Spadenlander Busch / Kreetzand

Creating tidal volume: pilot project Kreettsand

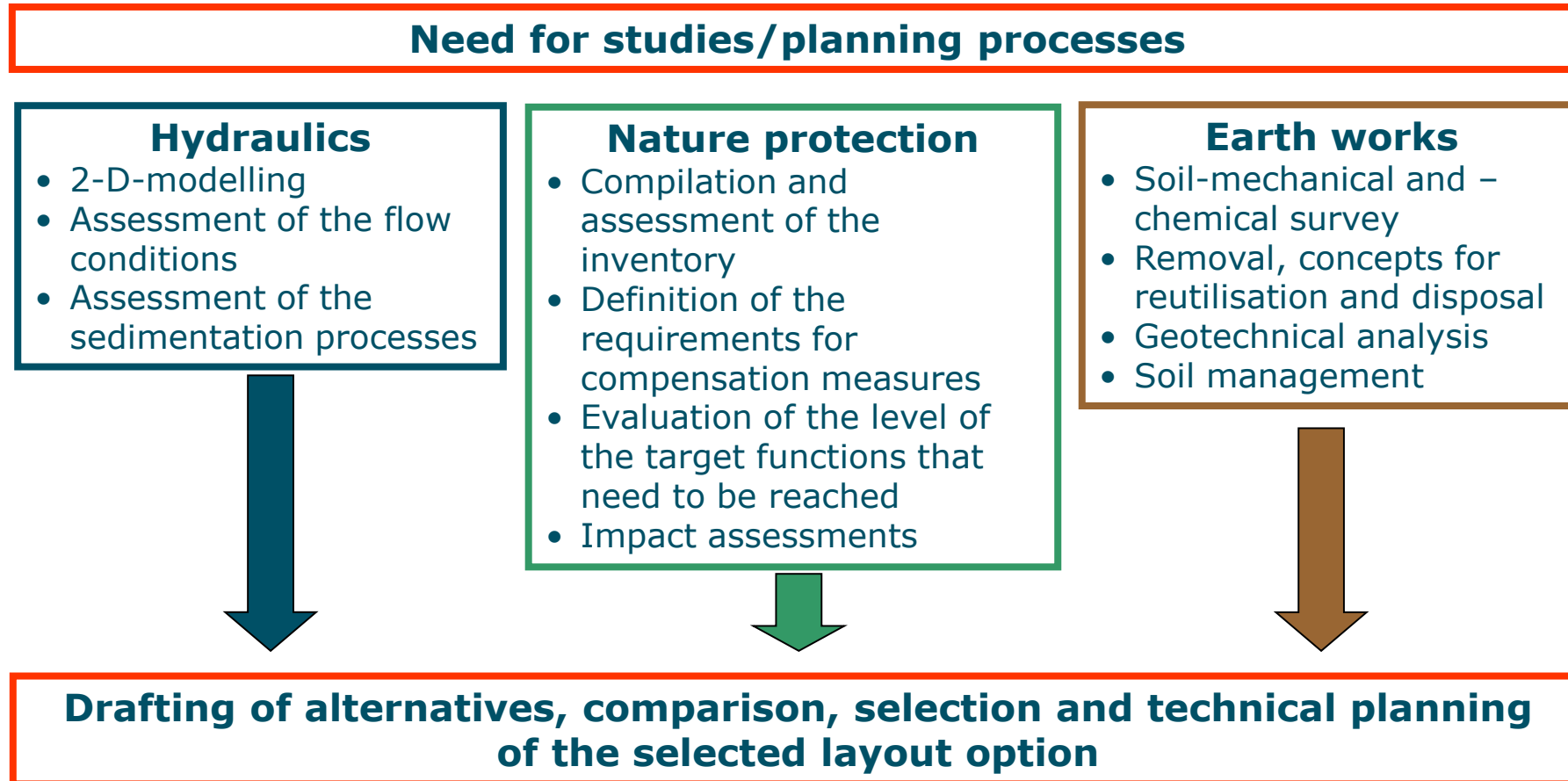


Pilot project Kreettsand



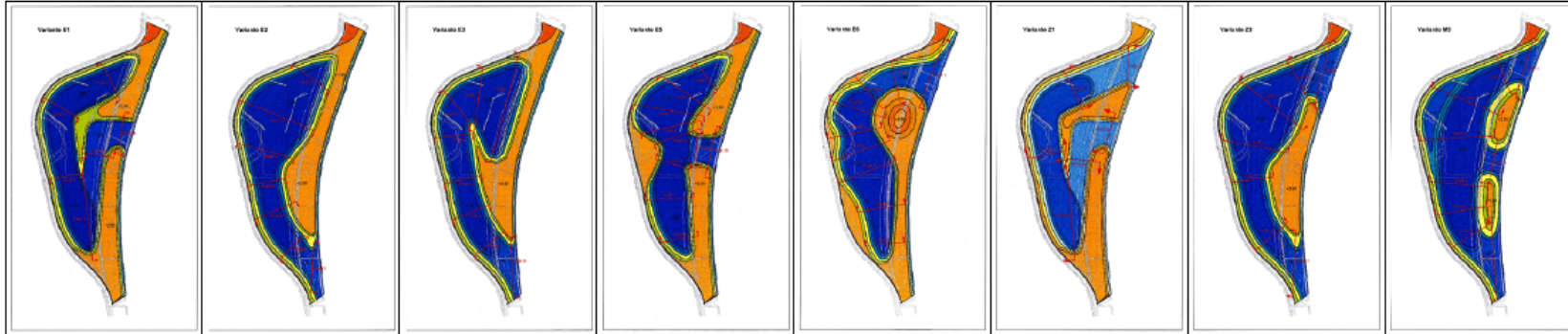
- former spoil area / dewatering field, dyke foreland (tidal meadow landscape)
- planning area ca. 47 hectares
- dyke realigned in 1999
- mean altitude approx. +5.50 m above sea level

Planning process: relevant criteria



Range of layouts and modelling

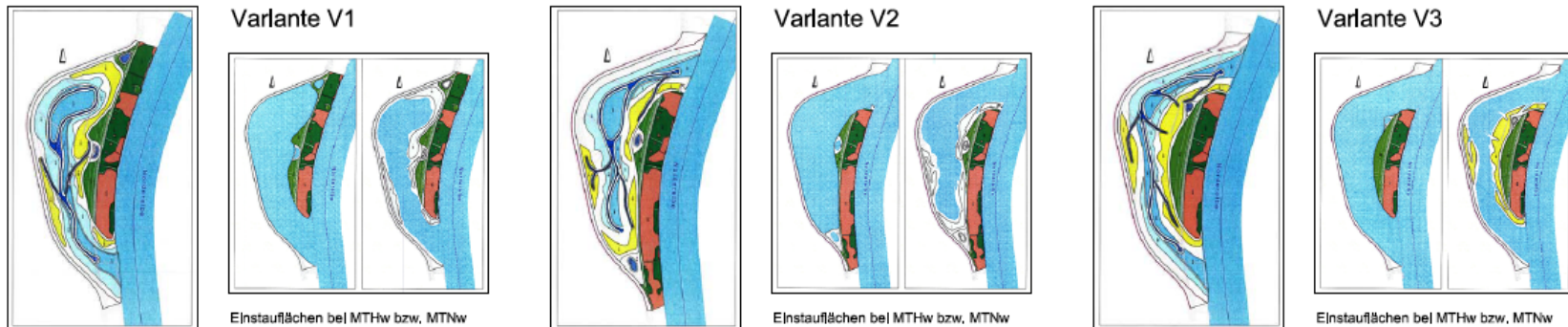
6. Vorauswahl von 8 Varianten im Hinblick auf die zu erwartenden Unterschiede bei der Strömungs- und Sedimentationsmodellierung
E1, E2, E3, E5, E6, Z1, Z3, M3



7. „Überschlägliche“ Modellierung der vorausgewählten Varianten, Ergebnisdiskussion

8. Verbal-argumentative bzw. rechnerische Bewertung der Varianten anhand der Kriterien gemäß Punkt 5

9. Auswahl von 3 Vorzugsvarianten

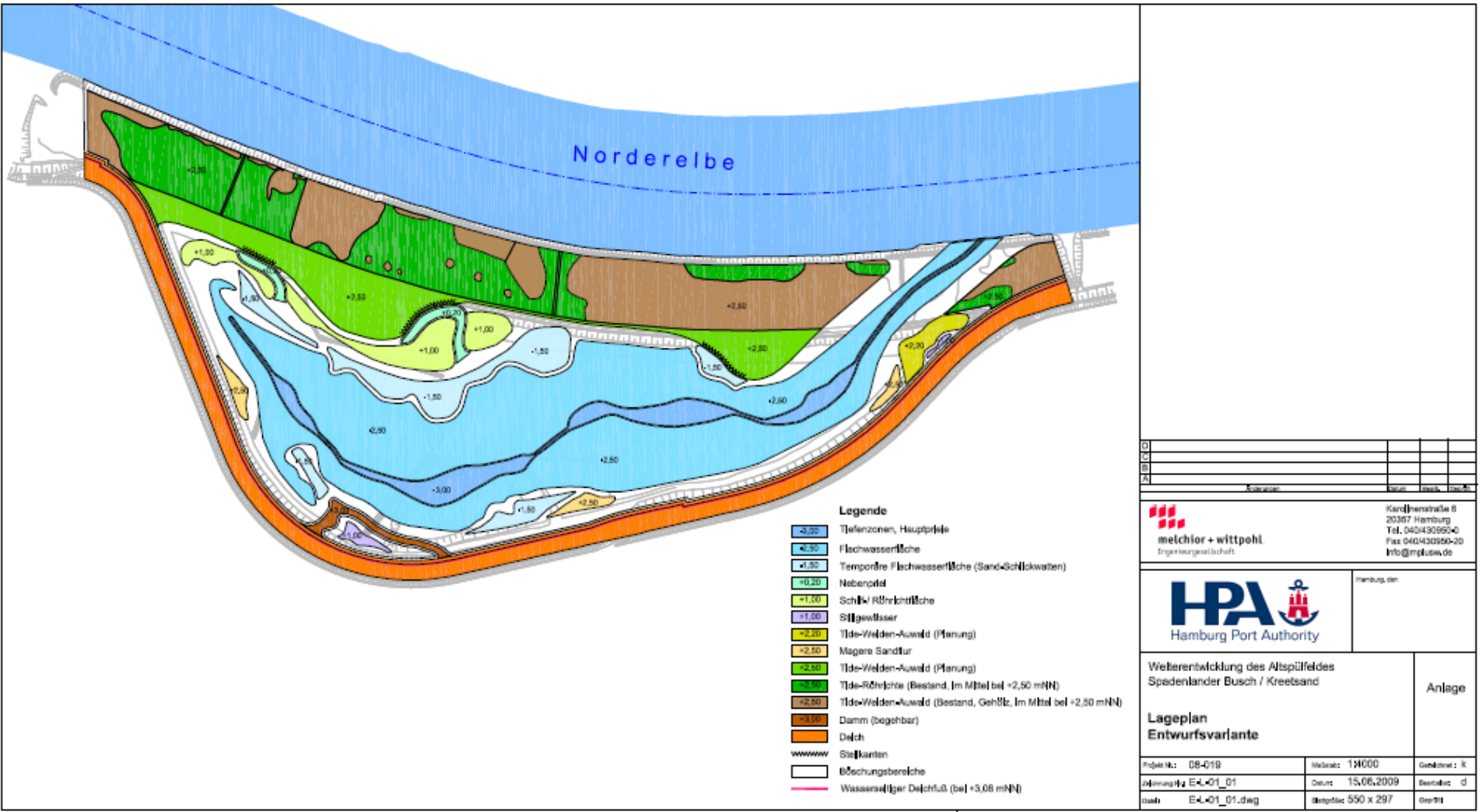


Planning process: criteria rating matrix

- Rating of the options using different criteria
- Creation of valuation units
 - target achievement
 - impact on subjects of protection
 - time line
 - costs
- To prioritize key criteria, the scoring assigns additional weight to:
 - Tidal hub attenuation
 - Sustainability of tidal low water
 - Restriction of sedimentation impacts
 - Preservation of alluvial forests and biotopes
- Sensitivity analysis to verify the results

Bewertung der Planungsvarianten V1 bis V3					hier Wichtigkeiten Ändern		
				Tendenz	100		
Zielerreichung: Tidepotenzial Verringerung von Tideenergie Nachhaltigkeit		P1	Tidepotenzial / Flutraum positiv: Maximierung des Tidepotentials	auf	10		
		P2	Lokale Energiedissipation positiv: möglichst starke Zerstreung der Tideenergie	auf	5		
		P3	Nachhaltigkeit: Beschränkung Sedimentationsprozess positiv: Minimierung von Sedimentation / Unterhaltung	ab	12		
		P4	Dämpfung positiv: Hoher Dämpfungseffekt bezogen auf die Tide im Elbstrom	auf	17		
					44		
Auswirkungen: Natur und Umwelt	Schutzgut Natur	N1	Schutzgut Mensch positiv: Erlebbarkeit durch visuelle Wahrnehmbarkeit Erlebbarkeit durch Erreichbarkeit	auf	8		
		N2a	Schutzgut Boden (Aushub unnatürlich) positiv: Rockbau belasteter Böden Rockbau standortuntypischer Böden	auf	3		
		N2b	Schutzgut Boden (Aushub gewachsen) positiv: Verbleib gewachsener Böden	ab	2		
		N3	Schutzgut Wasser positiv: Gute Wasserqualität Großes Wasservolumen Tide-Vielfalt	auf	5		
		N4a	Schutzgut Pflanzen positiv: Vegetationsflächen insgesamt	auf	2		
		N4b	Schutzgut Pflanzen positiv: Schaffung zusätzlicher Auwald	auf	1		
		N4c	Schutzgut Pflanzen positiv: Minimierung entfernter Auwald	ab	2		
		N5a	Schutzgut Tiere, Bedeutsame aquatische Lebensräume positiv: Große Flachwasserflächen	auf	5		
		N5b	Schutzgut Tiere, Bedeutsame terrestrische Lebensräume positiv: Schaffung zusätzlicher Auwald	auf	1		
		N5c	Schutzgut Tiere, Bedeutsame terrestrische Lebensräume positiv: Minimierung entfernter Auwald	ab	2		
		N6	Schutzgut Klima positiv: Ausgleichsfunktion Kaltluftentstehung Maximierung Dauereinstauflächen	auf	0		
		N7a	Schutzgut Luft positiv: Minimierung Ausbau- und Transportvolumina	ab	2		
		N7b	Schutzgut Luft positiv: Gehölzerhalt, -schaffung	auf	3		
		N8	Schutzgut Kultur und Sachgüter positiv: Erhaltung	auf	0		
							36
		Termine		T1	Dauer bauliche Umsetzung positiv: Minimierung der Bauzeit	ab	5
							5
		Kosten		K1	Investkosten positiv: Minimierung Investkosten	ab	10
				K2	Betriebskosten positiv: Minimierung Betriebskosten	ab	5
							15

Planning process: detailed planning of the selected option





Working with nature

03

New tidal area Spadenlander Busch / Kreetzand

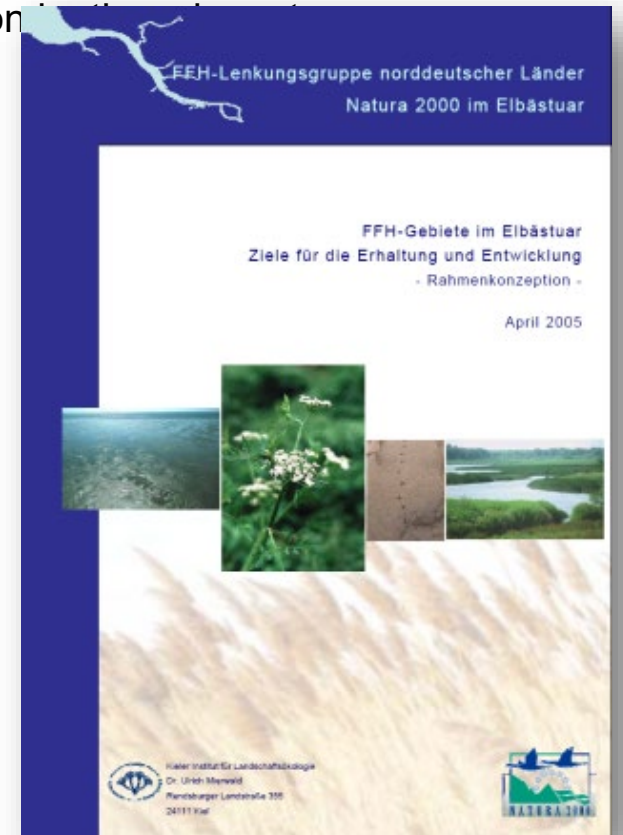
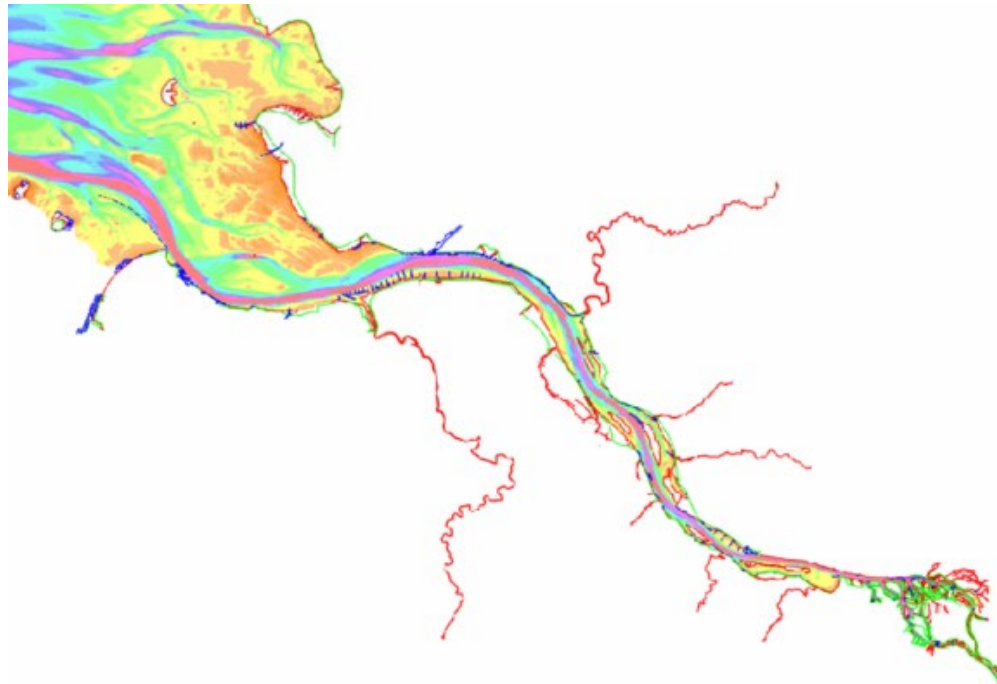
Winner of the PIANC Working with nature award (2014)



Did we understand the environment?

- A 3D hydro-numeric model has been developed, tested, and can be utilized to closely examine the system.
- An ecological framework concept for the Elbe estuary has been established and agreed upon by authorities, stakeholders, and the EU.

→ YES!



Did we involve stakeholders and partners?

- Involvement of stakeholders from the early stages has been the cornerstone of the communication strategy.
- Local citizens, NGO's, relevant authorities were periodically and personally addressed to contribute to the development of the project.
- Engaging the wider public has been a pivotal aspect, both historically and in the future trajectory of the project. Notably, the project has been integrated into the International Building Exhibition (IBA 2013), fostering numerous excursions tailored towards students and schools. Furthermore, an innovative permanent information booth has been established to deliver valuable insights.

→ YES!



Did we identify “win-win” solutions?

- The project goes beyond legal requirements, creating valuable estuarine habitat. It aligns with the Natura 2000 management plan for the Elbe estuary and will contribute to a larger nature protection site. The new tidal area will particularly benefit fish species and the endemic *Oenanthe coniooides*.
- The project increases knowledge (it is the first of its kind!) and awareness on tidal systems, sediment management and estuarine habitats.
- The site will be an attractive location for nature observation and recreation.

→ YES!



Did we enable nature to play a significant role in the design process?

- The project aims to establish an initial state and subsequently allows natural processes to shape the site.
- The project is strategically designed to leverage the assistance of nature in sediment management.
- However, periodic maintenance work, such as water injection, will be essential to remove excessive sediments from the site.

→ YES!



Did we adhere to the planning principles of Working with Nature, and was it effective in achieving our goals?

- The project was carefully planned from the beginning, involving an integrated process:
 - The project's objectives were established through extensive discussions with authorities, stakeholders, and the public.
 - A comprehensive understanding of the environment and its functioning was gained well before the project commenced, considering the estuary as a unified system.
 - The site selection process involved evaluating various options, considering multiple factors in a balanced manner.
 - The initial project design was chosen from a diverse range of possibilities.
 - Importantly, the project obtained legal approval without significant objections or delays

→ YES!



Dike Shed: An Information and Viewing Point



- Information about the construction phase Kreetsand
- Information-center for the tidal Elbe concept
- Point of reference for IBA 2013
- Project within the EU-Project „TIDE“
- Costs: about 100.000 EUR; EU-funding rate: 15 %

Take a tour

04

New tidal area Spadenlander Busch / Kreetzand

Change the landscape

- **Create 30 hectares of shallow water**
 - Remove deposited soils: ~ 1.2 million m³
 - Remove natural ground: ~ 0.8 million m³
- **Sum of excavation material:**
~ 2,0 million m³
 - Soil for utilization: ~ 0.8 million m³
 - Soil for disposal: ~ 1.2 million m³



Interventions in tidal floodplain forest



Compensation for tidal floodplain forest



Soil excavation



Soil management



How it happened – Nov. 2013



How it happened – Aug. 2014



How it happened – Aug. 2015



How it happened – June 2016



How it happened – July 2017



How it happened – April 2018



How it happened – May 2020



How it happened – May 2021



How it happened – Feb. 2022



How it happened – May 2022



HAMBURG PORT AUTHORITY

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Wiethoff

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